Components of Quality of Delivery in Task-Shared, Psychosocial Interventions: Fidelity and Competence of Nonspecialist Providers in Rwanda

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Spring 2024

Abstract

Families in low- and middle-income countries (LMICs) face significant mental health and psychosocial care gaps. In recent years, researchers and practitioners have addressed these gaps by task-sharing evidence-based mental health and psychosocial support (MHPSS) interventions to nonspecialist community providers. Task-shared interventions have demonstrated effectiveness (improvements in MHPSS outcomes of intervention participants); however, quality of delivery (fidelity and competence) has rarely been examined as a factor associated with effectiveness despite implementation science models suggesting a causal link between quality of delivery and effectiveness.

In this study, I apply a mixed methods approach to examine the quality of delivery by nonspecialists who are facilitating an evidence-based, early childhood development and family violence prevention program, known as Sugira Muryango, in Rwanda. Currently, Sugira Muryango is being expanded and implemented through the Promoting Lasting Anthropometric Change and Young Children's Development (PLAY) Collaborative, which scales up Sugira Muryango to 10,000 households living in extreme poverty in Ngoma, Nyanza, and Rubavu districts. The program has strong ties to the Rwanda National Government and their social protection and policy goals.

I find that nonspecialist age is significantly associated with higher initial fidelity and competence scores and smaller improvements in fidelity and competence over time. In addition, nonspecialists in Nyanza district were more likely to have higher initial fidelity and competence scores but also see smaller changes over time. Fidelity and competence were found to significantly co-vary. Multi-level growth models revealed that fidelity was not a significant predictor of changes in any child discipline outcomes or of any responsive caregiving outcomes. However, competence significantly predicted changes in some responsive caregiving practices, specifically acceptance and learning materials, and it predicted decreases in physical punishment. In semi-structured interviews, the nonspecialists provided examples of using skills such as rapport-building, empathy, and active listening to deliver Sugira Muryango effectively. Nonspecialists also provided examples of barriers to quality of delivery, including compensation and technology issues. Overall, this dissertation contributes empirical evidence to what we understand theoretically and moves towards development of best practices for monitoring and supervising nonspecialists in task-shared MHPSS interventions.

Dedication

This dissertation is dedicated to J.C. Hodges, whose wit, wisdom, friendship, baked goods, and cat are all significantly associated with a more positive doctoral experience for me ($p < 0.000$).

Acknowledgements

This dissertation would not have been possible without the support of so many of you along the way. Most importantly, I would like to thank my dissertation committee (Theresa, Eve, and William) for providing feedback and guidance for the last several years. Your expertise and focus on applied research and implementation science has helped me understand the scope of the literature, frame my research questions, and develop my methodology. I am incredibly thankful that each of you stand in the gap between research and practice and use your own research to inform practical solutions for communities. Theresa, I am so lucky to have worked under your mentorship and at the RPCA throughout my time at Boston College. I have learned a lot from you, and I am impressed with all you balance on a daily basis and the connections you maintain with colleagues all around the world. My favorite memories are being at the Rwandan Research Symposium with you and sitting around at dinner with you, Rachel, Libby, and Gabi and talking about all the travel stories and also traveling to New York for our Sesame Workshop presentation.

Matias and Melissa – thank you for using your unbelievable statistical knowledge to help me refine my models. You are both the most brilliant statisticians that I know and, fortunately for me, amazing at teaching as well. Matias, I would be in the doctoral program for an entire extra year without your data management support. This multi-level, longitudinal data set was quite a merging challenge, and I appreciate all your support as a colleague and, more importantly, a very good friend. Zonggui, I cannot thank you enough for your help with my R code. You are so patient and so knowledgeable – I had a lot to learn when pivoting to a new software with a complex model I had not used before, and I truly could not have finished in time without your support.

To my colleagues at the RPCA, FXB Rwanda, the Centre for Mental Health, and Caritas – you have taught me so much throughout my time in the doctoral program. I love working on teams, and doctoral programs can feel very isolating for many people. I am incredibly thankful to have had the opportunity to be team-based and to learn from your experience with research and intervention delivery. RPCA colleagues, I have had so much fun with you over the last few years, and you are all so great at what you do. FXB Rwanda and Centre for Mental Health colleagues, I would have gotten nowhere without your help contextualizing my dissertation findings and helping me understand the nuance of what was happening on the ground in Rwanda. Faith – you deserve a special shout-out for being the absolute best qualitative coding partner I could have imagined. You are brilliant and so helpful! And Caritas colleagues, it was a joy to get to know you and spend the summer of 2022 with you. It was a rough one (I still refuse to eat fish with bones in it), but you were so supportive and kind, and I hope we meet in person again one day. In particular, I want to thank Emmanuel for being such a delight to work with over the years. You made my job easy!

To my CRS colleagues – I do not know where I would be without you and the experiences I had with you at the beginning of my career that were so formative. They frame my research interests and everything I hope to do from this day forward. It is humbling to put research impact, and sometimes lack thereof, into perspective when I think about what is actually relevant in the communities that we worked in. I am blown away by the quality of your work and your character, and I have learned things from you that I will remember for the rest of my life. I made many mistakes when learning how to manage teams and how to make things work in very challenging contexts. Being able to learn from each one of you was such a privilege, and it has made me a better leader and a better researcher. It weighs very heavily on me all that was lost in Afghanistan and continues to be taken away, and I think very often about you and what we had hoped to do in Afghanistan. I feel like I was forced to be part of a great betrayal, and you deserve so, so much

better than what was handed to you. One of you said something like “sometimes I have no hope for the situation to change, but it doesn’t mean I don’t have hope – my hope is in who I can choose to be in these situations.” In this line of work, there are many opportunities to give in to fear or hopelessness and turn inward, but you serve as an example of encountering great difficulty with honor, dignity, and selflessness.

Of course, I have to thank everyone who made my experience over the last few years in Boston infinitely more enjoyable. Doctoral programs can feel consuming, and I consider myself lucky to have made such amazing friends in Boston outside of the doctoral program and to be able to regularly disconnect. In the 11 years between graduating from high school and entering the doctoral program, I lived in seven countries and four states. I never had a place that felt like home, and every meaningful adult relationship ended in a goodbye. It is very special for me to have deep friendships with people I admire who I do not have to say goodbye to anytime soon. I never imagined I would want to stay in Boston long-term, but you have made this place a home for me, and I’m excited to continue being a part of each other’s lives. Rohan, you have been such a solid source of support and encouragement for me, and my life is so much better because of you. I also want to thank Dr. Quinn and Dr. Dinh at Boston Children’s for giving me the ability to walk and run again. I entered the doctoral program without being able to walk more than a quarter mile, and I acquired a closet full of mobility aids over the first two and a half years of the program. I can now walk across the graduation stage in heels because you took a chance on me and invested in me. I am forever grateful for how you have helped me heal and get my life back. I would not have been able to accept my post-doctoral position, which entails a significant amount of travel, without being able to walk again!

Finally, I want to thank my family and my lifelong, long-distance friends who have been consistent sources of support during the doctoral program and everything else. We all have such different careers and lives, but you have made it a priority to care about the issues and people that I care about as if it were your own life. It means a lot to me that even though you were not part of this doctoral experience on a daily basis, you know everything about it because you cared to ask. You have been cheering me on and setting me up for success from day one. You have always been a grounding force, and I love how we live life together even though we have been so far apart geographically.

Overall, it has been a wonderful and challenging journey to get to this point of finishing my PhD. Sometimes I think about how lucky I have been throughout the first decade of my career – living and traveling all over the world, learning hard lessons you cannot learn from a book or a statistical model, and doing it with such funny and smart people – and I wonder how the next 30-40 years could possibly be better. I suppose I’ll find out.

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Chapter 1. Introduction

Background

Globally, a high burden exists of mental health and psychosocial well-being needs. Nearly 10% of the global population faces a mental health disorder at any point in time (Keynejad et al., 2018); one-third of women have been exposed to intimate partner violence (World Health Organization, 2021); and one in two children are exposed to any form of violence (Pearson et al., 2023). Violence in the home and community is associated with long-term developmental problems in children and increases in externalizing and internalizing behaviors for both children and their caregivers (Jensen et al., 2023; Cano-Lozano et al., 2023).

There is a dearth of mental health professionals equipped to respond to the plethora of mental health and psychosocial needs of families and communities (Keynejad et al., 2018; Patel et al., 2018; Lange, 2021). The most significant mental health care gaps are in low- and middle-income countries (LMICs), which have a limited number of clinically trained psychiatrists, psychologists, nurses, and social workers as well as increased environmental risk factors and greater barriers to receiving care (Rathod et al., 2017; Ribeiro et al., 2023). For example, one out of five persons with depression receives minimally adequate care in high-income countries, while only one out of 27 receives minimally adequate care in LMICs (Thornicroft et al., 2017).

In recent years, researchers and practitioners have prioritized addressing the mental health and psychosocial support (MHPSS) care gap in LMICs. In 2015, the World Health Organization (WHO) launched the Mental Health Gap Action Programme (mhGAP), which provides evidence-based guidance for delivering and scaling up MHPSS interventions. This effort acknowledges a growing body of evidence that MHPSS interventions can be delivered by trained and supervised nonspecialists, a process known as task-sharing (World Health Organization & UN High

Commissioner for Refugees, 2015). Task-sharing refers to specialists collaborating with nonspecialist providers to deliver health-related services that have traditionally been assigned to experts with professional training and certification (WHO, 2007). In the field of global mental health, task-sharing has been an increasingly prevalent strategy that addresses the shortage of mental health specialists in LMICs (Patel et al., 2018; Lange, 2021), particularly as multi-sectoral approaches have demanded more comprehensive health systems that involve nonspecialists (Kakuma et al., 2014; Leocata et al., 2021). In addition, projects such as Ensuring Quality in Psychological Support (EQUIP) and digital platforms such as EMPOWER have been designed by lead researchers and stakeholders in the field of global health to consider ways to scale out tools and training resources for evidence-based, MHPSS interventions that are delivered by nonspecialists (The President and Fellows of Harvard College, 2022; World Health Organization, 2022).

Given the dearth of specialized providers in many settings, nonspecialists are critical for delivering evidence-based interventions (EBIs). In the past two decades, nonspecialized and informally trained individuals (sometimes referred to also as lay workers or community health workers) have successfully delivered a range of MHPSS interventions, including early childhood development and family violence reduction home-visiting programs (Ahun et al., 2023; Sengupta et al., 2023; Barnhart et al., 2020; Desrosiers et al., 2021), interpersonal psychotherapy for depression and anxiety disorders (Singla et al., 2021; Verhey et al., 2020; Bolton et al., 2003; Patel et al., 2011; Patel et al., 2010; Patel et. al; 2017; Newnham et al., 2015; Betancourt et al., 2021), and interventions for children affected by armed conflict (Jordans et al., 2016; Arega, 2023). For example, between 2009-2015, a majority (65%) of interventions for children affected by armed conflict were delivered by a nonspecialist. Nonspecialist-delivered interventions have

demonstrated improvements in MHPSS outcomes with moderate to large effect sizes (Singla et al., 2017; Singla et al., 2021).

Quality of Delivery of Nonspecialists

Although task-shared interventions are widely acknowledged as common strategies that effectively bridge the care gap and reduce health disparities in LMICs, historically, less attention has been paid to the quality of delivery of such interventions (Kanzler et al., 2021; Shahmalak et al., 2019; Singla et al., 2017; Kohrt et al., 2018). Quality of delivery is defined as both fidelity, "the degree to which an intervention was implemented as it was prescribed in the original protocol or as it was intended by the program developers" (Proctor et al., 2011, p. 69), and competence, the general soft skills such as empathy and active listening that equip facilitators to manage problems and tailor intervention strategies to the specific context (Kohrt et al., 2015; Barber et al., 2007; Ottman et al., 2020). Often, studies that described the process of training and supervising nonspecialists have not discussed if, or how, these efforts resulted in quality of delivery to the evidence-based intervention. This is in part due to the lack of standardized tools or measures for these constructs that can be shared across interventions (O'Shea et al., 2016; Kechter et al., 2019) in addition to the small sample sizes of quality of delivery data in studies. Both issues inhibit more complex analyses and generalizable findings (Bond et al., 2022).

In recent years, as the field of Implementation Science has grown, a shift has occurred toward identifying factors that contribute to quality of delivery in task-shared MHPSS interventions. In general, implementation fidelity of nonspecialists tends to be high across MHPSS interventions (Ceccarelli et al., 2024; Ryan et al., 2021); yet issues with fidelity measurement may skew these results (Lewis et al., 2015a; Lewis et al., 2015b). As the field of Implementation Science shifts to scaling and sustaining evidence-based interventions rather than determining

effectiveness, it is critical to identify factors that promote quality of delivery and can be harnessed in the long-term to ensure that tested MHPSS interventions maintain their quality of delivery and their evidence-based components (Lewis et al., 2018; Singla et al., 2018). This is particularly salient as delivery models shift to communities themselves and potentially have less oversight by trained professionals (Troup et al., 2021).

Training, supervision, technology, and intrinsic and extrinsic motivation have been identified as factors promoting quality of delivery in task-shared MHPSS interventions. Technology, such as training videos or quality monitoring via video or telephone, can be utilized to support the training and supervision of nonspecialist providers (Naslund et al., 2019; Turan et al., 2021; Hoeft et al., 2018). However, the technology can also inhibit quality of delivery due to connection issues, technical difficulties, and challenges deciding which activities can be adequately monitored via telephone or video (Triplett et al., 2023). Digital technologies have been used as platforms for expanding the reach of mental health care in LMICs, and, while this is a promising delivery platform, the same issues of connectivity and equal access to smartphones remain. The Lancet Commission recommends that digital interventions be adopted in task-shared interventions, as nonspecialist providers can fill the remaining care gap with community presence (Kola, 2020). Some studies have noted that provider characteristics, such as membership of the same community as intervention participants, increase quality of delivery and intervention effectiveness due to pre-existing trust and partnership (Kohrt et al., 2018; Hoeft et al., 2018).

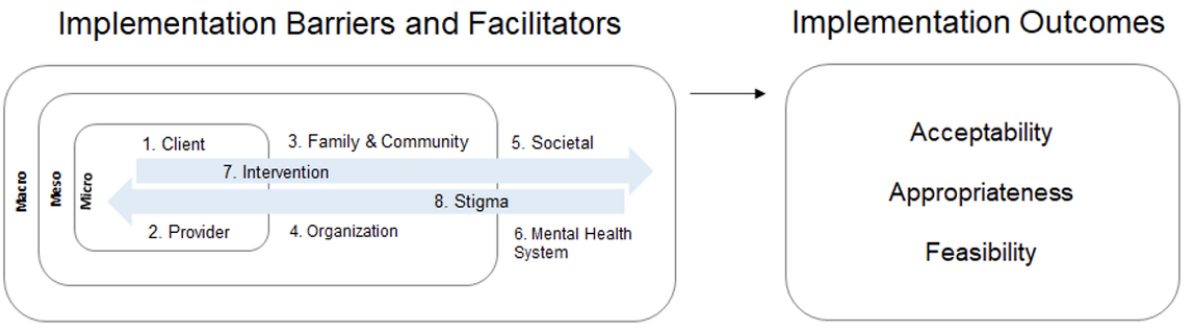
Training and supervision are critical for promoting quality of delivery (Seegan et al., 2023). There is no “one size fits all” for training and supervision best practices, as each intervention and role nonspecialist provider is unique and requires some level of tailoring (Barnett et al., 2023). Nonetheless, specific aspects of training and supervision that have been found to be effective

include 1) a focus on content that extends beyond the intervention and includes competence skills that are relevant in broader MHPSS work and can lead to professional development, 2) role plays and session review, 3) past experience delivering MHPSS interventions, 4) sufficient compensation, and 5) nonspecialist buy-in to the intervention outcomes and theory of change (Barnett et al., 2023; Brown et al., 2023).

Theoretical Frameworks

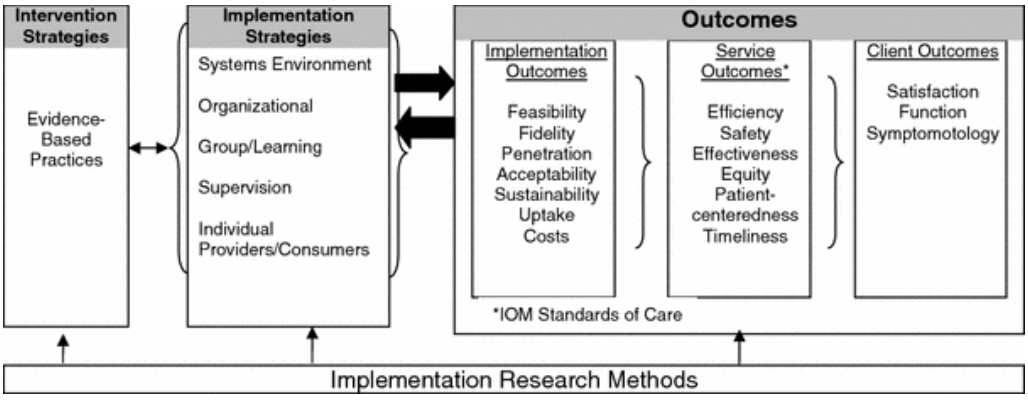
Despite the plethora of Implementation Science frameworks that exist (Nilson, 2020), until recently no framework has explicitly focused on critical components for task-sharing and promoting quality of delivery of nonspecialist-delivered interventions (Le et al., 2022). The Barriers and Facilitators in Implementation of Task-Sharing in Mental Health Interventions (BeFITS-MH) Framework, informed by the Consolidated Framework for Implementation Research and the Theoretical Domains Framework (Damschroder et al., 2009; Damschroder et al., 2022; Atkins et al., 2017), portrays how implementation barriers and facilitators in task-shared MHPSS interventions impact implementation outcomes (see Figure 1) (Yang et al., 2024). The BeFITS-MH Framework has a corresponding implementation measure that has been validated in LMICs (Yang et al., 2024). On a micro level, measurement domains include provider fit (being able to provide service and helping participants receive services), provider competence (understanding client needs, sympathizing, communicating well, and tailoring services to clients' unique needs), and provider congruence (being from the same community, demographic factors such as age, gender, social status).

Figure 1
Barriers and Facilitators in Implementation of Task-Sharing in Mental Health Interventions Framework



As the field of Implementation Science grows in its understanding of barriers and facilitators to quality of delivery, it is equally important for theory and evidence to portray the relationship between quality of delivery and intervention effectiveness (Ginsburg et al., 2021; O'Shea et al., 2016). Research teams have increasingly acknowledged that implementation factors, including quality of delivery, are key ingredients of implementation effectiveness within health programs (Durlak & DuPre, 2008; Bauer & Kirchner, 2020; Damschroder et al., 2022). The conceptual model of implementation research suggests that implementation outcomes directly affect effectiveness outcomes (see Figure 2).

Figure 2
Conceptual Model of Implementation Research (Proctor et al, 2009)



Remaining Gap

More empirical testing of the association between implementation and effectiveness outcomes is needed to strengthen this understanding. To my knowledge, no studies have been published that test the relationship between quality of delivery and MHPSS outcomes in LMICs. However, this has been done in parenting interventions and education interventions in high-income settings (Martin et al., 2023; Kim et al., 2018; Rojas-Andrade & Bahamondes, 2019; Scott et al., 2019). A comprehensive understanding of the association between quality of delivery and intervention effectiveness in task-shared MHPSS programming can better inform implementation strategies and lead to pathways to scale and the sustainment of evidence-based interventions delivered by nonspecialists in LMICs (Lewis et al., 2018; Singla et al., 2018).

Indeed, attention to quality of delivery of nonspecialists increases the burden on researchers and agencies, which requires greater investments in time, equipment, and personnel. Nonetheless, evidence suggests that assessment of quality of delivery is cost-effective in the long-term; leads to higher-quality, reliable care; and ensures an efficient translation of evidence-based practices into routine care (O'Shea et al., 2016; Ginsburg et al., 2021). According to the WHO, quality of delivery can also be improved when the training of nonspecialists delivering evidence-based MHPSS interventions is tied to certified career progression mechanisms (World Health Organization, 2007). As task-shared MHPSS interventions continue in LMICs, it is critical to prioritize the quality of delivery in order to expand access to equitable mental health and psychosocial care. Several research gaps still exist in this area and limit our ability to deliver evidence-based MHPSS interventions with quality. First, few studies in LMICs have examined factors associated with quality of delivery of MHPSS programs, and, thus far, none have taken place in Rwanda. Second, only a small number of studies have considered quality of delivery as a composite outcome that examines both fidelity and competence rather than one alone. Building

the evidence base in this area may help the field of Implementation Science identify patterns to determine which factors promote quality of delivery across settings and which are context-specific and to ultimately develop best practices for training and supervising nonspecialist providers. Third, no identified studies have modeled the relationship between quality of delivery of nonspecialist providers and MHPSS outcomes. Thus, we do not yet understand how MHPSS outcomes vary as a function of quality of delivery.

Dissertation Objectives and Aims

Aim 1: Assess which factors are most associated with nonspecialist quality of delivery in Sugira Muryango. I will examine characteristics of IZUs, including non-modifiable individual and community-level factors, that are associated with changes in fidelity and competence over time. Model designs will follow the BeFITs-MH Framework.

Aim 2: Evaluate the association of nonspecialist quality of delivery scores with intervention outcomes in Sugira Muryango. I will use multi-level growth models to model the average quality of delivery score (fidelity + competence) as the key predictor of changes in intervention outcomes. Intervention outcomes are nonviolent discipline and responsive caregiving of children – outcomes that have demonstrated significant improvements in the clinical trial. I will control for demographic variables of caregivers, such as level of education, age, gender, and district, in addition to any characteristics of IZUs (level two variables) that are significantly associated with IZU quality of delivery.

Aim 3: Describe how, if at all, CBV preparedness to deliver Sugira Muryango is a result of training and supervision experiences during intervention delivery. I will also examine what, if any, differences across CBV gender and/or district exist regarding supervision and training

experiences or CBV quality of delivery. Thematic content analysis will follow the BeFITS-MH Framework.

Data Origin

Background and History

The data for this dissertation will come from Sugira Muryango, an evidence-based, home-visiting intervention to promote early childhood development and prevent violence. It has been evaluated in Rwanda, Sierra Leone, and Colombia to date. In Rwanda, although the government has invested heavily in rehabilitating a post-genocide society, many families still face mental health challenges and cannot access specialized care (Rugema et al., 2015). Furthermore, rates of family violence, such as harsh child punishment and intimate partner violence, have remained high among families living in extreme poverty (Jensen et al., 2023; Gunarathne et al., 2023; Sardinha et al., 2018). Sugira Muryango was first implemented as a cluster-randomized controlled trial (CRT) that tested the intervention for families living in extreme poverty in Rwanda (targeting Ubehede 1 families – Rwanda's highest poverty categorization). Compared to the control group, families receiving the Sugira Muryango intervention have had greater improvements in responsive caregiving (d = 0.87, 95% CI: 0.74, 0.99) and decreases in violent discipline practices (OR = 0.30: 95% CI: 0.19, 0.47) (Barnhart et al., 2020; Betancourt et al., 2020; Betancourt et al., 2018).

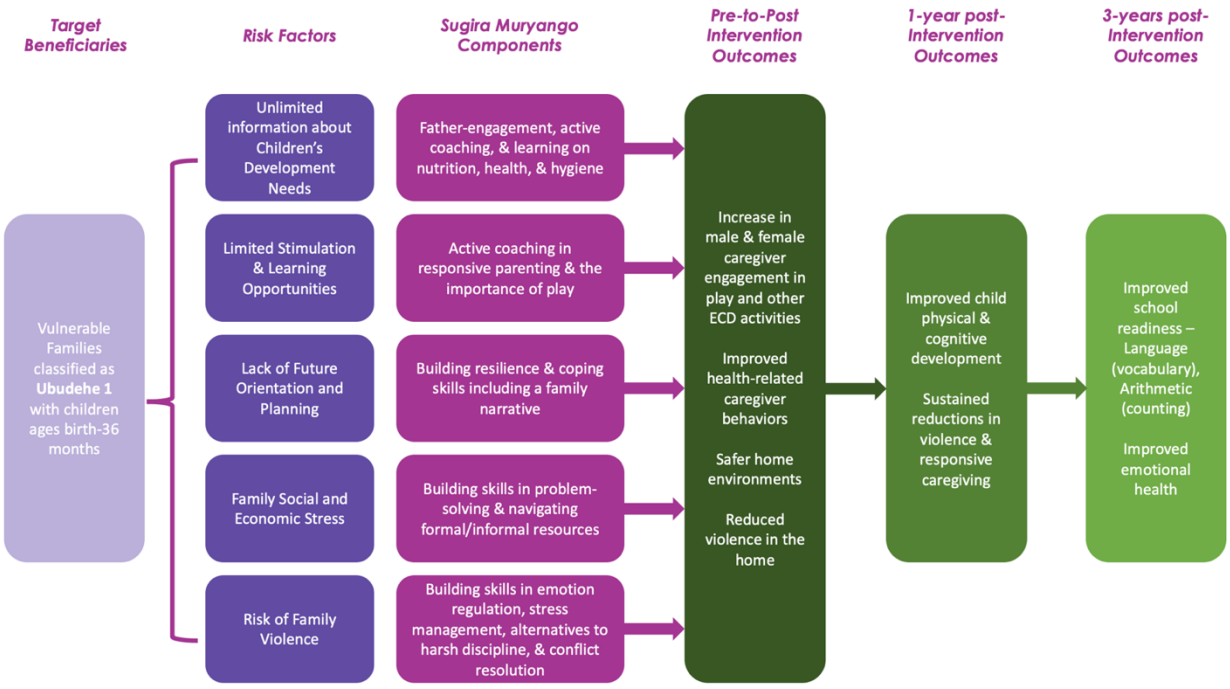
Design

The design of Sugira Muryango is guided by both the Exploration, Preparation, Implementation, and Sustainment (EPIS) framework and the World Health Organization's Nurturing Care Framework (Jensen et al., 2021; World Health Organization, 2018; Aarons et al., 2011). The EPIS framework portrays how bridging factors (such as local and international teams) and innovation factors (such as a digital dashboard, the IZU workforce, plan-do-study-act cycles,

etc.) link the outer context of the environment to the inner context of the evidence-based intervention. The Nurturing Care Framework illuminates five interrelated components representing the basic needs that children have in order to thrive: good health, adequate nutrition, safety and security, responsive caregiving, and opportunities for learning (World Health Organization, 2018). Sugira Muryango's family-level intervention format has proved to be an effective strategy for reducing family violence and promoting early child development, both of which are key aims of Sugira Muryango, as caregiver well-being and caregiving practices are highly linked to early child development outcomes (Pedersen et al., 2019; Rostila & Saarela, 2011; Wade et al., 2019; Tiechter et al., 2016; Mills et al., 2011; Walker et al., 2011; Jeong et al., 2020; WHO, 2018). See Figure 3 for the Sugira Muryango Theory of Change.

Figure 3

Sugira Muryango Theory of Change.



Approach

The structure of Sugira Muryango consists of 12 modules and two follow-up/booster sessions delivered to families in a home-visiting format. Modules are delivered on a weekly basis, and, thus, the duration of Sugira Muryango is about three to four months for a family. Sugira Muryango is unique in that it is designed for all types of family configurations (i.e. foster parents, grandparents, etc.) and with both male and female caregivers in delivering the module content and activities. Modules typically last between 60-90 minutes and include a 15-minute play activity where the home visitor uses "active coaching" to engage caregivers in play and understanding "serve and return" interactions as they engage with their young child.

Intervention Expansion in Rwanda

Now, Sugira Muryango is being expanded and implemented through the Promoting Lasting Anthropometric Change and Young Children's Development (PLAY) Collaborative, which intends to 1) scale up the evidence-based intervention to 10,000 Ubedehe 1 households in Ngoma, Rubavu, and Nyanza, and 2) assess intervention effectiveness in promoting early childhood development and reducing family violence while strengthening stakeholder engagement through a collaborative team approach. The program has strong ties to the Rwanda National Government and its social protection and policy goals (Government of Rwanda, 2020). Three key differences are noted between the original cluster-randomized trial to the PLAY Collaborative expansion study. First, a government workforce, the Inshuti z'Umuryango (IZUs), serves as nonspecialists delivering the intervention rather than other trained lay workers who were not affiliated with the government. Second, the randomization strata are by sector, and villages were selected within each sector to participate in the study. Third, families with children ages 0-24 months are included in the study rather than children 6-36 months. Although 10,000 households participated in the Sugira Muryango expansion study, the PLAY Collaborative, a subset (N = 212) of households will have

received the intervention by endline data collection and will have three timepoints of data collected on them.

Power Calculations

This study is estimated to have .8 power to detect a standardized effect of 0.29 for cross-sectional comparisons at either the posttest (3-month) or follow-up (12-month) time point. For linear growth curve models using all three timepoints, the minimal detectable effect size under the same assumption is estimated to be approximately .35. All families will have three timepoints: baseline, 3 months (post-intervention), and 12 months (follow-up).

Ethics Approval

In this study, data will be used from an ongoing study that has received approval from the Boston College Institutional Review Board and the Rwanda National Ethics Committee. See Appendix C for information regarding protection of human subjects throughout the study.

Key Terms

Evidence-Based Intervention

Evidence-based interventions are interventions that have an established causal relationship between the intervention outputs and the intended outcomes in the population and delivery setting (Leeman et al., 2017). Leeman and colleagues define evidence-based interventions as "any action or set of actions that delivery systems enact to improve health behaviors, health outcomes, or health-related environments (e.g., built and communication environments that support healthy behaviors)" (p. 3). In this dissertation, evidence-based intervention refers to an intervention in Rwanda that has been previously tested for effectiveness with a cluster-randomized trial and is now being scaled up via an alternate delivery platform.

Nonspecialists

A number of terms have been used in the literature to describe nonspecialists delivering an intervention, including but not limited to "layworkers," "paraprofessionals," "peer counselors," "community health workers," "lay counselors," "village health workers," "health promotores," and "auxiliary health staff" (Lehmann et al., 2017; Kanzler et al., 2021, p. 4). The World Health Organization defines nonspecialists as anyone who "was trained in some way in the context of the intervention; but has received no formal professional or paraprofessional certificate or tertiary education degree" (World Health Organization, 2007, p. 79). In this dissertation, nonspecialists are known as either Community-Based Volunteers (CBVs) or Inshuti z'Umuryango (IZUs), a pre-existing government volunteer child protection workforce in Rwanda.

Task-sharing

Task-sharing refers to specialists collaborating with nonspecialist providers to deliver health-related services that have been traditionally assigned to experts with professional training and certification (WHO, 2007). According to WHO, "specific tasks are moved, where appropriate, from highly qualified health workers to health workers with shorter training and fewer qualifications in order to make more efficient use of the available human resources for health" (WHO, 2007, p. 2). In this dissertation, the evidence-based intervention was never designed to be delivered by highly qualified health workers, but task-sharing is used to refer to the involvement of nonspecialist providers to deliver an intervention in areas where few or no specialist providers are available.

Mental Health and Psychosocial Support

"Mental health and psychosocial support" is a composite term labeled by the Inter-Agency Standing Committee (IASC) to refer to "any type of local or outside support that aims to protect or promote psychosocial well-being and/or prevent or treat mental disorders" (IASC, 2007, p. 16).

In humanitarian settings, some mental health and psychosocial support interventions are clinical in nature (treating mental disorders), but many focus on sectors like protection, social welfare, education, and community development (promoting psychosocial well-being). These psychosocial well-being interventions strengthen family and community resilience by targeting social determinants of distress, such as poverty, conflict, and lack of social support (Miller et al., 2021). In this dissertation, I focus on an intervention promoting psychosocial well-being by decreasing family violence and promoting early child development.

Fidelity

Fidelity was first identified as a critical issue after scholars noted distance between the intended purpose of a program and its implementation (Elmore, 1980; Crea et al., 2009). Later, several conceptual distinctions for implementation outcomes emerged. Proctor et al. defined the concept of fidelity as "the degree to which an intervention was implemented as it was prescribed in the original protocol or as it was intended by the program developers" (2011, p. 69), Resnick et al. (2005) also contribute to an operationalization of fidelity by defining fidelity as the "methodological strategies used to monitor and enhance the reliability and validity of behavioral interventions" (p. 139). In describing the defining characteristics of implementation research applied to global health settings, Theobald et al. (2018) explain how a focus on processes and outcomes allows implementation researchers to engage stakeholders and to assess fidelity, among other implementation outcomes. They define fidelity as "implementation according to its (the evidence-based intervention) design" (p. 2225). The term "adherence" is often used as a synonym for fidelity referring to "the extent to which a therapist used interventions and approaches prescribed by the treatment manual" (Waltz et al., 1993, p. 620). Carroll and colleagues (2007) suggest that adherence is a part of fidelity, not a synonym, and that fidelity also consists of other

outcomes that relate to overall quality of delivery, such as participant responsiveness and exposure or dosage. In this dissertation, fidelity is used to refer to the ability to deliver the components of an evidence-based intervention in Rwanda according to the manual and its intended design.

Competence

Competence speaks to the general skills required to implement MHPSS interventions (Kohrt et al., 2015). These skills are not intervention-specific but relevant to all mental health and psychosocial support interventions. Competencies may include skills such as showing empathy, active listening, or adapting an activity to better meet participants' needs.

Quality of Delivery: Fidelity and Competence

The overall quality of intervention delivery is dependent upon both fidelity and competence (Fairburn & Cooper, 2011). It is critical to distinguish competence from fidelity, as the terms are used interchangeably, and studies examining fidelity often examine competence instead of, and in addition to, fidelity (Ottman et al., 2020). Assessments of fidelity and competence each provide different information to the research team, and it is crucial to pay attention to both fidelity to the manual and awareness of contextual factors and common therapeutic attributes. Accurate measurement of competence could allow interventions to be adapted in real time to best fit the needs of the clients, considering all ecological factors at play. Intervention success often requires tailoring each function to the specific needs and the specific context of the intervention and its participants (Theobold et al., 2018; Perez Jolles et al., 2019; Waltz et al., 1993). Ultimately, adaptations can improve the effectiveness of MHPSS interventions when facilitators are trained to recognize different contexts and needs (Theobald et al., 2018). Murray et al. refer to the "flexibility within fidelity" that provides space for creativity and adaptation to account for context and ensure better intervention fit to the population (2011). This approach supports the idea that the concept of

fidelity cannot supersede competence, nor can competence supersede fidelity. Nonspecialists must be equipped with sufficient knowledge of the intervention and its manual to understand when, and how, to move beyond the manual and to deliver content in a contextually appropriate manner that remains focused on the overall purpose of the intervention while still meeting the needs of clients and participants. In this dissertation, quality of delivery refers to both fidelity and competence that have been measured via an intervention-specific checklist used to monitor nonspecialist providers In Rwanda. See Appendix A for the checklist used in the effectiveness trial, and Appendix B for the checklist used in the scale-up.

Chapter 2. Factors Associated with Nonspecialist Quality of Delivery within a Family Strengthening Intervention in Rwanda: A Parallel Latent Growth Model

Background

Task-sharing of evidence-based interventions is acknowledged as an effective and widely used strategy for addressing the mental health and psychosocial support (MHPSS) care gap in low-and-middle-income countries (LMICs) and has been shown to work well across studies with a diversity of geographical context, MHPSS outcomes, and provider category (Bolton et al., 2023; Kakuma et al., 2014; World Health Organization, 2007; World Health Organization and United Nations High Commissioner for Refugees, 2015; Singla et al., 2017). Task-sharing refers to the use of nonspecialist providers to deliver health-related services that have traditionally been assigned to experts with professional training and certification (World Health Organization, 2007). In LMICs, the dearth of qualified mental health and social service specialists is well documented (Keynejad et al., 2017; Rathod et al., 2017; Thornicroft et al., 2017). Formal training opportunities are inadequate for mental health specialties (Patel et al., 2008; Rathod et al., 2017), while qualified specialists, such as social workers, psychiatrists, psychologists, and nurses often choose to migrate to higher-income countries for better working conditions and higher pay (Oladeji & Gureri, 2016), and governments in LMICs provide very little budget for mental health services for the population (Rathod et al., 2017).

While 83% of the world's population lives in LMICs, these LMICs have historically received only a fraction of the global health resources for mental health (Liese et al., 2019; Kola et al., 2021; Ribeiro et al., 2023), which has led to an increase of disease burden. For example, one out of five persons with depression receive minimally adequate care in high-income countries. In contrast, only one out of 27 receive minimally adequate care in LMICs (Thornicroft et al., 2017). In LMICs, mental health and psychosocial issues account for 7% of the global disease burden

(Rhem & Shield, 2019) and 22% of the disease burden in conflict-affected settings (Charlson et al., 2019). Mental health and psychosocial issues in families are exacerbated by ecological factors such as poverty, stigma, and armed conflict (Osborn et al., 2020; Mesa-Vieira et al., 2022). LMICs exhibit many risks and as well as opportunities for protecting the mental health and well-being of children (Yu et al., 2023), particularly during the first 1000 days of a child's life when the brain is rapidly developing (Erskine, 2017; Klasen & Crombag, 2013; Patel, 2018). Risk and protective factors for child mental health and psychosocial well-being include the home environment, relationships with caregivers, and basic needs such as early stimulation and nutrition (de Leeuw et al., 2023; Seya et al., 2023; Draper et al., 2023). The important role that caregivers play in safeguarding child mental health and psychosocial well-being is well documented; therefore, ensuring caregiver mental health and wellbeing is an instrumental mechanism for reducing family violence and promoting early child development (Jeong et al., 2021; Pedersen et al., 2019; Rostila & Saarela, 2011; Wade et al., 2019; Tiechter et al., 2016; Mills et al., 2011; Walker et al., 2011; Jeong et al., 2020; WHO, 2018).

Ingredients for successful task-sharing of MHPSS interventions for families have included training, mentorship, and supervision from intervention experts or mental health specialists (Rocha et al., 2021; Murray et al., 2011; Munga et al., 2012; McGuillen et al., 2019; Leocata et al., 2021). Supervision often entails assessing the nonspecialist quality of delivery with a checklist during in-person monitoring or via audio or video recorders (Kemp et al., 2019). Quality of delivery includes both nonspecialist fidelity and competence. Fidelity refers to adherence to the specific intervention manual (Proctor et al., 2011; Resnick et al., 2005), while competence refers to the general skills that are relevant across all MHPSS interventions (Kohrt et al, 2015). For example, a mental health and family functioning intervention in Kenya used clinical psychology students to supervise

nonspecialists in-person and over the phone (Puffer et al., 2021). A perinatal depression intervention in India used expert therapists to supervise nonspecialists in person and to rate their audio recordings to provide further feedback (Singla et al., 2020).

Although the assessment of quality of delivery is common and critical for task-shared MHPSS interventions, very few studies report on the quality of delivery results (Bond et al., 2022; Kanzler et al., 2021; Shahmalak et al., 2019; Singla et al., 2017; Kohrt et al., 2018). When quality of delivery results are reported in studies, they are often reported in the form of brief summary scores or descriptive statistics (Bond et al., 2022). Therefore, although we understand that task-shared interventions are effective (Singla et al., 2017), and training, supervision, and mentorship are good practices that may ensure quality of delivery (Rocha et al., 2021; Murray et al., 2011; Munga et al., 2012; McGuillen et al., 2019; Leocata et al., 2021), very little empirical examination has occurred of factors associated with quality of delivery. This is in part due to the 1) lack of standardized tools or measures for these constructs that can be shared across interventions (O'Shea et al., 2016); and 2) small sample sizes of quality of delivery data in studies. Both barriers inhibit more complex analyses and generalizable findings (Bond et al., 2022).

Factors associated with quality of delivery for nonspecialist-delivered MHPSS interventions may include modifiable factors such as supervision or training, which have been examined only recently in the literature and typically qualitatively (Singla et al., 2017; Barnett et al., 2023; Barnett et al., 2018; Caulfield et al., 2019). Training and supervision are critical for promoting quality of delivery (Seegan et al., 2023). No "one size fits all" exists for training and supervision best practices, as each intervention and role nonspecialist provider is unique and requires some level of tailoring (Barnett et al., 2023). Nonetheless, specific aspects of training and supervision that have been found to be effective include 1) a focus on content that extends beyond

the intervention and includes competence skills that are relevant in broader MHPSS work and can lead to professional development, 2) role plays and session review, 3) past experience delivering MHPSS interventions, 4) sufficient compensation, and 5) nonspecialist buy-in to the intervention outcomes and theory of change (Barnett et al., 2023; Brown et al., 2023).

However, factors associated with quality of delivery outside of training and supervision approaches have had insufficient examination. Emerging literature suggests that non-modifiable factors, such as provider demographic characteristics, may play a significant role in quality of delivery as well. Some studies have noted that provider characteristics, such as membership of the same community as intervention participants, increase quality of delivery and intervention effectiveness due to pre-existing trust and partnership (Kohrt et al., 2018; Hoeft et al., 2018). The Barriers and Facilitators in Implementation of Task-Sharing in Mental Health Interventions (BeFITS-MH) Framework, informed by the Consolidated Framework for Implementation Research and the Theoretical Domains Framework (Damschroder et al., 2009; Damschroder et al., 2022; Atkins et al., 2017), portrays how implementation barriers and facilitators in task-shared MHPSS interventions impact implementation outcomes (see Figure 1) (Yang et al., 2024). BeFITS-MH was developed after exploring factors associated with quality of delivery via case studies in Chile, Africa, and Nepal (Yang et al., 2024). The BeFITS-MH Framework has a corresponding implementation measure that has been validated in LMICs (Yang et al., 2024). On a micro level, measurement domains include provider fit (being able to provide service and helping participants receive services), provider competence (understanding client needs, sympathizing, communicating well, and tailoring services to clients' unique needs), and provider congruence (being from the same community, demographic factors such as age, gender, social status).

Much conceptual confusion has also occurred between the two distinct aspects of quality of delivery: fidelity and competence (Bond et al., 2022). Both fidelity and competence are critical for quality of delivery and should both be assessed, but it is important that they are measured separately and that their conceptual differences and differential impact on the intervention are acknowledged (Theobald et al., 2018; Murray et al., 2011; Fairburn & Cooper, 2011). Otherwise, there may be conflicting findings in the literature regarding mechanisms of intervention effectiveness (Cross & West, 2011). In a recent systematic review examining fidelity and competence measurement of MHPSS interventions with a behavior change component (Bond et al., 2022), only five of the 16 included studies used a quality of delivery checklist that measured both fidelity and competence (Puffer et al., 2021; Singla et al., 2020; Cross et al., 2015; Johnson et al., 2021; Khan et al., 2019). In the fields of implementation science and global mental health, only recently has competence been separated and operationalized distinctly from fidelity. Tools such as the ENhancing Assessment of Common Therapeutic factors (ENACT) rating scale, and its adaptations for facilitators working with different populations (Jordan et al., 2019), have been monumental for moving the field ahead and developing reliable measures that can be shared across interventions (Kohrt et al., 2015).

As MHPSS programming continues to be task-shared with local communities and delivered by nonspecialist providers, it will become critical to ensure that quality is sustained and that the families and communities receiving MHPSS interventions from nonspecialists are able to continue benefitting. Thus, it is important to understand what enables nonspecialists to become effective intervention facilitators, including non-modifiable factors such as demographic characteristics and role in the community, which have been laid out in the BeFITS-MH Framework. Understanding what enables nonspecialists to become effective facilitators may

elucidate areas in which supervisors and study teams can provide greater support to nonspecialists throughout the course of the intervention. In order to support nonspecialists well, quality of delivery must be properly conceptualized or operationalized, and we must understand both modifiable and non-modifiable factors associated with quality of delivery.

Sugira Muryango – A Family Strengthening Intervention in Rwanda

Sugira Muryango is an evidence-based, early childhood development intervention to promote early child development and prevent violence. Although the government of Rwanda has invested heavily in rehabilitating a post-genocide society, many families still face mental health challenges and cannot access specialized care (Kayiteshonga et al., 2022; Rugema et al., 2015). Issues of intergenerational and community violence have remained high in Rwanda (Bahati et al., 2022). Children in Rwanda often face emotional, sexual, and physical violence in their homes and communities (Nyandwi et al., 2022a; Nyandwi et al., 2022b, Nyandwi et al., 2023).

Sugira Muryango was first implemented as a cluster-randomized controlled trial (CRT) that tested the intervention on families living in extreme poverty in Rwanda (Betancourt et al., 2018). Compared to the control group, families receiving the Sugira Muryango intervention have had greater improvements in responsive caregiving (d = 0.87, 95% CI: 0.74, 0.99) and decreases in violent discipline practices (OR = 0.30: 95% CI: 0.19, 0.47) (Barnhart et al., 2020; Betancourt et al., 2020; Betancourt et al., 2018).

The structure of Sugira Muryango consists of 12 modules that are delivered to families in a home-visiting format, in addition to two follow-up/booster sessions. Modules are delivered on a weekly basis, and, thus, the duration of Sugira Muryango is about three to four months for a family. Sugira Muryango is unique in the fact that it engages all caregivers and functions with all family configurations (including foster parents, fathers, and grandparents) and with both male and female

caregivers. Modules typically last between 60-90 minutes and include a 15-minute active playing session where the home visitor uses "active coaching" to engage caregivers in play and understanding "serve and return" interactions as they engage with their young child.

Now, Sugira Muryango is being expanded and implemented through the Promoting Lasting Anthropometric Change and Young Children's Development (PLAY) Collaborative, a Hybrid Type II implementation-effectiveness trial (Curran et al., 2012) that intends to 1) scale up the evidence-based intervention to 10,000 Ubedehe 1 households in Ngoma, Rubavu, and Nyanza, and 2) assess intervention effectiveness in promoting early childhood development and reducing family violence while strengthening stakeholder engagement through a collaborative team approach (Placencio-Castro et al., 2024; Johnson et al., 2020; Lansford et al., 2022). The program has strong ties to the Rwanda National Government's social protection and policy goals (Government of Rwanda, 2020). A government workforce, the Inshuti z'Umuryango (IZUs) meaning "friends of family," serve as nonspecialists delivering the intervention. IZUs are a volunteer, community-based workforce under the Rwandan Ministry of Gender and Family Promotion (MIGEPROF) and the National Child Development Agency (NCDA). Each of the three districts (Rubavu, Ngoma, and Nyanza) are situated in geographically distinct areas of the country. For example, Rubavu is located in the lake region in the northeast, in the Western province, situated closer to a national park with more tourism. Nyanza is located in the Southern province and is closer to a campus affiliated with the University of Rwanda. Ngoma is located in the Eastern province.

The IZU workforce delivering Sugira Muryango in the PLAY Collaborative expansion study (N = 2,510) is a child protection workforce affiliated with the Ministry of Gender and Family Promotion. IZUs often hold multiple roles in the communities, such as serving as community

health workers or on the National Women's Council. IZUs involved in the PLAY Collaborative are equally split across gender, and the majority (70%) have no more than a primary school education. IZUs received an initial 10-day group training from previous expert interventionists, known as the Seed Team, and were monitored and mentored throughout project implementation by designated supervisors, known as cell mentors. While some cell mentors had previous experience delivering Sugira Muryango in the cluster-randomized controlled trial (CRT) prior to the IZU training, all cell mentors received training on quality monitoring and intervention design. Cell mentors were available by phone to IZUs and met on a weekly basis with all IZUs in their geographic cell. In the weekly meetings, cell mentors provided feedback on ways to improve quality of delivery, helped IZUs problem-solve any challenges that arose during home visiting, and reviewed activities for the upcoming session. IZUs were also equipped to self-monitor by listening back to audio recorders provided during training.

Study Objective

As task-sharing evidence-based MHPSS interventions continues to be a widely used and effective strategy for addressing the care gap in LMICs, it will be critical to attain empirical evidence regarding the factors that are related to improvements in quality of delivery over time. This study is guided by the BeFITs-MH Framework that models how provider characteristics are associated with quality of delivery in task-shared interventions. Thus, the purpose of this study is to examine characteristics of IZUs, specifically non-modifiable individual and community-level factors, that are associated with changes in fidelity and competence over time. Supervision and training of nonspecialists and the impact of both on competence and fidelity will be examined qualitatively and reported in chapter 4 of the dissertation. This current study will also examine how changes in fidelity and competence are correlated with each other. I hypothesize that 1)

growth in competence and fidelity over time will be associated with each other; 2) competence and fidelity will increase over time; and 3) provider characteristics (age, gender, district of residence, and education) will be associated with changes in fidelity and competence over time.

Methods

Data Collection and Sampling

Quality of delivery data exists for all 2,510 IZU facilitators that actively participated in delivering Sugira Muryango. There were 179 cell mentors responsible for monitoring the quality of delivery (fidelity and competence) of IZUs via an intervention-specific checklist that was collected out during an observational visit of the IZU facilitating a Sugira Muryango module. The minimum number of required observational visits was 2 out of the 12 modules, which was lowered from 6 due to COVID-19 protocols. Nevertheless, a majority (79.3%) of IZUs still received at least 6 in-person observation visits. While it was originally planned that cell mentors would monitor the quality of delivery of randomly selected Sugira Muryango sessions per IZU in their cell, due to COVID-19 and travel logistics that affected feasibility, cell mentors were given the choice to amend their supervision schedule and decide which modules to monitor. Across all 12 modules of Sugira Muryango, there were 1152 to 1526 IZU quality of delivery data points (indicating number of IZUs monitored) per module.

Measures

Outcome Variable

Quality of delivery is assessed via an intervention-specific checklist that measured both the fidelity and competence of nonspecialist providers. Across all 12 modules of Sugira Muryango, 16 cross-cutting, repeated items measured competence, and between one to five fidelity items were unique to each module. Example competence items include “verbal communication skills,” “non-

verbal communication skills and active listening," and "rapport building and self-disclosure." Example fidelity items include "the IZU discussed the importance of stimulating a baby's brain by talking to one's baby, touching one's baby, and playing with one's baby," and "The IZU discussed the importance of having a clean, safe, and supportive home environment to support a child's learning." Both competence and fidelity items were rated on a 5-point Likert scale. On the scale, a score of 0 indicated "did not occur," 1 indicated "poor," 2 indicated "needs improvement," 3 indicated "average," and 4 indicated "excellent." These scales were intervention-specific and developed for the purpose of this study. The quality of delivery checklist indicated high internal consistency ($\alpha = 0.93$ for competence). See Appendix B for the full quality of delivery checklist used by cell mentors to monitor IZUs during the course of intervention delivery. In this study, a summative score of both fidelity and competence was used and then converted to percentages so both scores could be on the same scale and more easily compared.

Independent Variables

Independent variables include education, district, gender, and age. All demographic variables are derived from REDCap as well and inputted from the supervisor, at baseline, based on self-report profiles from IZUs. Education is an ordinal variable, defined as highest degree completed and measured on a 4-point Likert scale of "primary, secondary, technical, and university or higher." Other is also an option, but this response option will not be used for the purpose of this analysis. Gender and district are treated as categorical variables. District is defined as one of the three districts in which IZUs were implementing Sugira Muryango: Ngoma, Nyanza, and Rubavu. The gender variable is dichotomous with two possible values, male and female. Age is a continuous variable, computed based on birth dates provided, ranging from 22.44 to 79.91. IZUs across the three districts had similar ages and age variance. In Ngoma and Nyanza, the mean IZU

age was 45 with a standard deviation of 9.9. In Rubavu, the mean age was 42 with a standard deviation of 9.2.

Table 1
Descriptive statistics for covariates used in the study (N = 2,510)

Variable	*N*	(%)	M (SD)	Range
Gender				
Male	1261	50.2%		
Female	1249	49.8%		
Education				
Primary	1,758	71.5%		
Secondary	583	23.7%		
Technical	74	3.0%		
University or higher	45	1.8%		
District				
Rubavu	858	34.2%		
Nyanza	783	31.2%		
Ngoma	869	34.6%		
Age			44.3 (9.83)	22.44-79.91

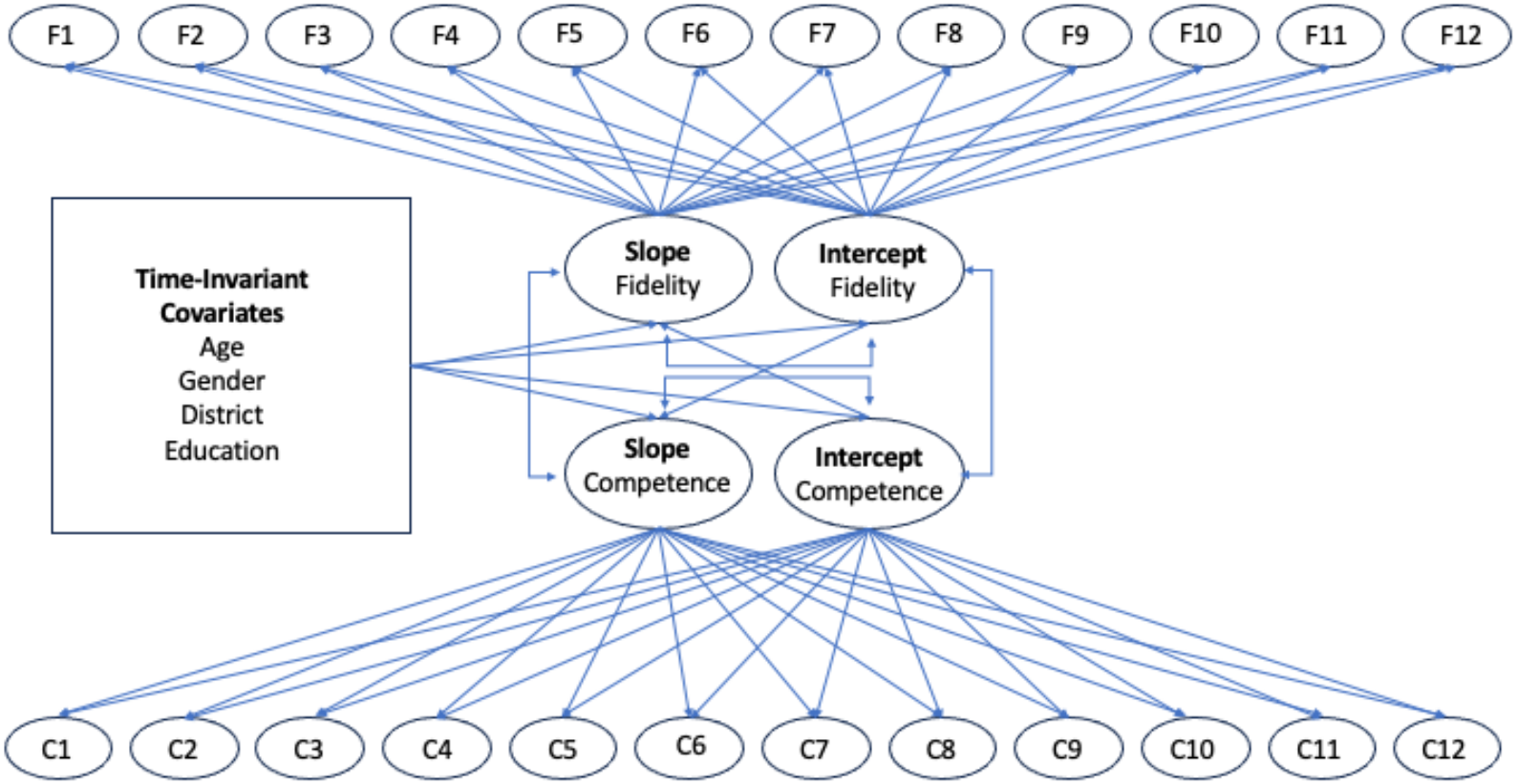
Data Analysis

Data was visually examined for patterns of missingness and determined to be missing at random; thus, maximum likelihood estimation was used to estimate the parameters of the models (Pan et al., 2002). It should be noted that missing data for the outcome variables is planned, as IZUs only received a quality of delivery score for the sessions observed by a cell mentor supervisor. Nonetheless, no patterns of missingness were observed across explanatory variables within each module. Individual trajectories were examined to determine if a quadratic or linear model was needed and to portray the mean quality of delivery scores at baseline and changes over time. Ultimately, a parallel process latent growth curve model was used to examine 1) the growth trajectories of both competence and fidelity across the 12 Sugira Muryango sessions, and 2) how, if at all, the growth of each quality of delivery outcome (fidelity or competence) is associated with the intercept and slope of the other quality of delivery outcome. In this model, two latent growth

models are developed simultaneously, and the growth factors are allowed to co-vary, which provides information regarding the association of growth in fidelity and growth in competence. In each model, the estimates of each independent variable were computed and allowed for examination of the relationship among variables such as age, gender, and district, and the changes in fidelity and competence over time. Model fit was evaluated by four fit indices, the CFI ("comparative fit index"), TLI ("Tucker–Lewis index"), RMSEA ("root mean square error of approximation"), and SRMR ("standardized root mean square residual"). I used the following criteria as a threshold for model fit: CFI and TFI should be greater than or equal to 0.95, and RMSEA and SRMR should be less than or equal to 0.06 (Kline, 2015). Figure 4, below, depicts the hypothesized model of the current study.

Figure 4

Hypothesized parallel latent growth model



Note: F = Fidelity, C = Competence, Numbers 1-12 = Module Scores

Results

On average, IZUs demonstrated greatest gains in both fidelity and competence scores between modules 1 and 2 (see Figures 5 and 6). Linear growth was observed for both fidelity and competence trajectories across modules; therefore, I proceeded with linear latent growth models.

Figure 5
IZU fidelity trajectories over time

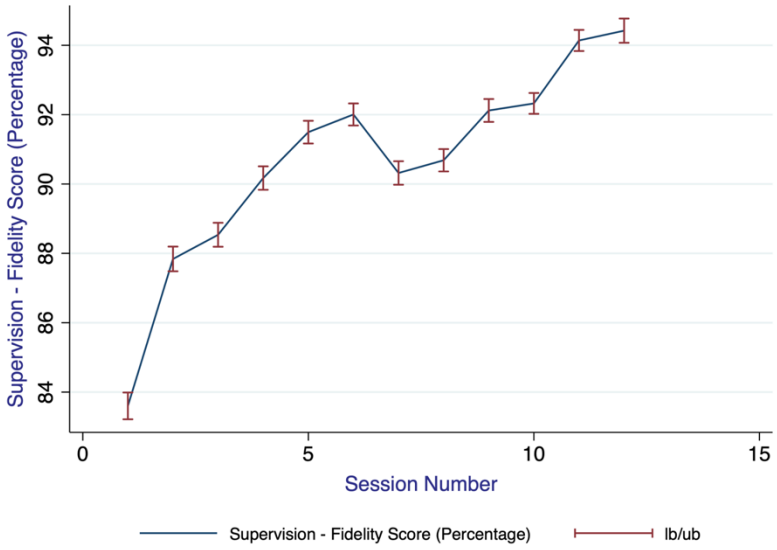
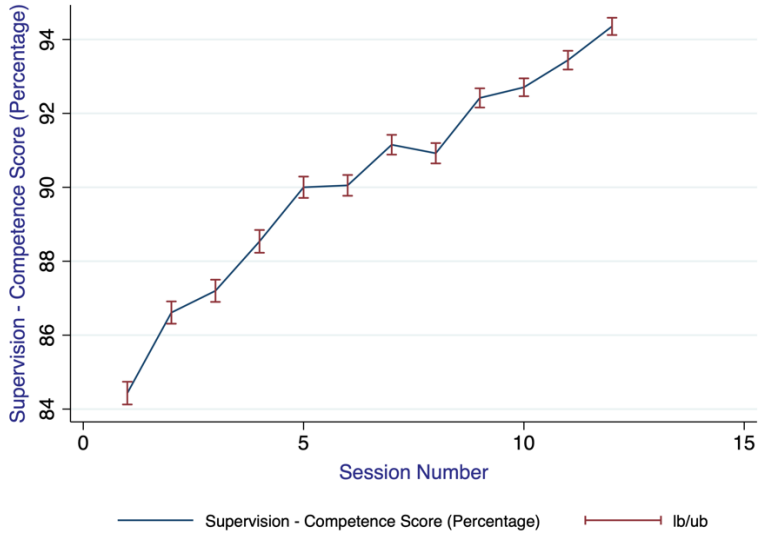


Figure 6
IZU competence trajectories over time



Before fitting the full parallel model, I examined both fidelity and competence latent growth models using all covariates in the study in both individual models. Unlike the parallel process model, these models do not account for the covariance of competence and fidelity. Results revealed that for IZU facilitators, on average, each additional year of age significantly predicted a higher initial fidelity score (b = 0.05, $p = 0.036$), and each additional year of age significantly predicted smaller changes in growth in fidelity (b = -0.01, p < 0.001) and competence (b = -0.01, $p < 0.008$) over time. Compared to Nyanza district, IZUs working in both Rubavu and Ngoma districts, on average, began intervention delivery with lower fidelity and competence scores but saw greater increases in both fidelity and competence over time. For the most part, level of education was not a significant predictor of fidelity or competence intercept and slope. However, compared to IZUs with a primary school education, IZUs with a secondary school education began intervention delivery with higher fidelity scores (b = 2.82, $p = 0.000$). Compared to male IZUs in the sample, female IZUs did not significantly differ in initial fidelity or competence scores nor in changes in fidelity or competence over time. See Table 2 for full results.

Both models demonstrated satisfactory model fit according to relevant fit indices, with the RMSEA and SRMR meeting the threshold and CFI and FLI falling just below the threshold. Thus, I proceeded with running the full parallel latent growth model, which examines the effect of each covariate, along with accounting for the covariance between fidelity and competence.

Table 2

Covariance effect estimates for fidelity and competence latent growth curve models (N = 2510)

		Intercept			Slope		
		b	*S.E.*	*P-Value*	*b*	*S.E.*	*P-Value*
Fidelity	Age	0.05	0.02	0.036	-0.01	0.00	0.001
	Gender						
	Female	-.40	0.46	0.382	0.02	0.06	0.660
	District						

	Rubavu	-6.78	0.60	0.000	0.26	0.07	0.000
	Ngoma	-4.47	0.56	0.000	0.00	0.07	0.978
	Education						
	Secondary	2.82	0.53	0.000	-0.11	0.07	0.100
	Technical	-0.31	1.59	0.844	0.07	0.18	0.700
	University	2.42	1.78	0.174	-0.14	0.24	0.561
Competence	Age	0.03	0.03	0.234	-0.01	0.00	0.008
	Gender						
	Female	-0.93	0.56	0.098	0.09	0.07	0.170
	District						
	Rubavu	-5.85	0.71	0.000	0.35	0.08	0.000
	Ngoma	-5.18	0.67	0.000	0.35	0.08	0.000
	Education						
	Secondary	1.20	0.69	0.079	0.03	0.08	0.735
	Technical	-1.60	1.92	0.404	0.11	0.23	0.653
	University	2.01	2.50	0.422	-0.23	0.37	0.537
	Model Fit Fidelity						
	CFI = 0.87						
	TLI = 0.86						
	RMSEA = 0.04						
	SRMR = 0.05						
	Model Fit Competence						
	CFI = 0.78						
	TLI = 0.77						
	RMSEA = 0.03						
	SRMR = 0.05						

Notes:
CFI = Comparative Fit Index; TLI = Tucker-Lewis Index; RMSEA = Root Mean Square Error of Estimation; SRMR = Standardized Root Mean Square Residual
The estimates are unstandardized regression coefficients.

Overall, the relationship among predictor variables and fidelity and competence scores remained similar when the individual models were combined into a parallel model. The results of the parallel process model demonstrated that for each additional year of age, IZUs had on average significantly smaller changes in growth in fidelity and competence over time (b = -0.01, p = *0.00*; b = -0.01; p = *009*, respectively) and significantly higher initial fidelity scores (b = 0.05, p = *0.039*). Compared to IZUs in Nyanza, IZUs in Rubavu and Ngoma had significantly greater growth in competence (b = 0.37, p = *0.000*; b = 0.37, p = *0.000*), and IZUs in Rubavu had greater growth in fidelity as well (b = 0.25, p = *0.001*). In comparison to IZUs who had completed primary school,

IZUs who had completed secondary school had marginally significant greater initial fidelity scores (b = 1.31, p = *0.055*). However, secondary education did not significantly predict changes in fidelity over time nor did it significantly predict initial competence scores or changes in competence over time. Gender remained an insignificant predictor of both initial starting points for fidelity and competence and changes over time. The model fit decreased slightly as I proceeded with the parallel process model, with only the RMSEA falling within the desired threshold. See Table 3 for full results.

Table 3
Covariance and variance effect estimates for parallel process model (N = 2510)

		Intercept			Slope		
		b	*S.E.*	*P-Value*	*b*	*S.E.*	*P-Value*
Fidelity	Age	0.05	0.02	0.039	-0.01	0.00	0.001
	Gender						
	Female	-0.37	0.46	0.426	0.016	0.06	0.299
	District						
	Rubavu	-6.73	0.60	0.000	0.25	0.07	0.001
	Ngoma	-4.43	0.56	0.000	-0.00	0.07	0.991
	Education						
	Secondary	2.78	0.53	0.000	-0.10	0.07	0.149
	Technical	-0.44	1.60	0.783	0.07	0.18	0.677
	University	2.38	1.80	0.186	-0.11	0.24	0.641
Competence	Age	0.04	0.03	0.223	-0.01	0.00	0.009
	Gender						
	Female	-0.94	0.56	0.091	0.10	0.07	0.129
	District						
	Rubavu	-5.86	0.70	0.000	0.37	0.08	0.000
	Ngoma	-5.28	0.67	0.000	0.37	0.08	0.000
	Education						
	Secondary	1.31	0.69	0.055	0.02	0.08	0.833
	Technical	-1.11	1.91	0.560	0.05	0.23	0.845
	University	2.11	2.47	0.390	-0.27	0.36	0.452
Variances	Fidelity	64.40	4.25	0.000	0.71	0.06	0.000
	Competence	59.52	6.11	0.000	0.59	0.10	0.000
	Model Fit						

	CFI = 0.80 TLI = 0.79 RMSEA = 0.04 SRMR = 0.08

Notes:
CFI = Comparative Fit Index; TLI = Tucker-Lewis Index; RMSEA = Root Mean Square Error of Estimation; SRMR = Standardized Root Mean Square Residual
The estimates are unstandardized regression coefficients.

The variances for the intercept and slope of fidelity were 64.40 ($p < 0.001$) and 0.71 ($p < 0.001$), respectively, which indicated significant variation across individuals for initial fidelity scores and change rates for fidelity. Likewise, the variance for the slope and intercept of competence were 59.5 ($p < 0.001$) and 0.59 ($p < 0.001$), which indicated significant variation across individuals for initial fidelity scores and change rates for competence scores as well. Higher initial fidelity scores were associated with higher initial competence scores of IZUs, and positive growth in fidelity scores was associated with positive growth in competence scores (see Table 4).

Table 4
Covariance and variance estimates for parallel process model

		Estimate	*S.E.*
Covariance	$I_{(Fidelity)} \leftrightarrow I_{(Competence)}$	46.29***	3.68
	$S_{(Fidelity)} \leftrightarrow S_{(Competence)}$	0.24***	0.04
	$I_{(Fidelity)} \rightarrow S_{(Fidelity)}$	-2.86***	0.49
	$I_{(Competence)} \rightarrow S_{(Competence)}$	-2.09**	0.71
Variances	$I_{(Fidelity)}$	64.40***	4.25
	$I_{(Competence)}$	59.52***	6.11
	$S_{(Fidelity)}$	0.71***	0.06
	$S_{(Competence)}$	0.59***	0.10

Notes: ***$p < 0.001$; ** $p < 0.01$; *$p < 0.05$
I = Intercept, S = Slope
Double-headed arrows represent correlations and single-headed arrows represent regression effects.

Discussion

Findings suggest that IZU competence and fidelity are closely related and significantly co-vary: on average, the higher the initial fidelity score for IZUs, the higher their initial competence scores are as well. In addition, as IZUs improve in their fidelity over time, their competence scores

also improve, suggesting that the two concepts are closely related and influence each other's growth trajectories. This finding confirms my initial hypotheses that fidelity and competence will be associated with each other, and that growth will improve over time. As the field of implementation science continues to expand in its understanding of quality of delivery, this finding may be helpful for adding conceptual clarification. Currently, ongoing conceptual confusion exists regarding fidelity and competence (Perez Jolles et al., 2019). Studies with psychosocial outcomes measuring fidelity and/or competence often measure either fidelity or competence and use these terms interchangeably (Bond et al., 2022; Martin et al., 2023). This study suggests that fidelity and competence are two distinct concepts that are highly related and both critical parts of quality of delivery. Future research studies that use a composite "Quality of Delivery" measure must include both fidelity and competence items. It would be erroneous to interpret their correlation as evidence that fidelity and competence can be measured and assessed in lieu of each other. While this study contributes empirical evidence that fidelity and competence are indeed closely associated with each other in Sugira Muryango, prior theory and conceptual work have already suggested that fidelity and competence are both critical to overall quality of delivery, and, while they influence each other, they are discrete concepts (Ottman et al., 2020; Fairburn and Cooper, 2011; Kohrt et al., 2015; Proctor et al., 2011).

This study also examined non-modifiable demographic predictors (district, gender, and age) of IZU fidelity and competence. Education and gender did not significantly predict either initial starting points in fidelity and competence scores or growth over time. Because a strong majority (71.5%) of IZUs had a primary education and no further education, and the intervention was designed to be implemented by nonspecialists without advanced degrees, additional education was likely unnecessary or irrelevant for delivering Sugira Muryango with quality. Furthermore,

female IZUs in this study did not have significantly different competence or fidelity scores compared to their male counterparts. This finding makes sense given the Rwandan context and the decades of gender-transformative work on behalf of the Rwandan government and multiple Rwandan social service organizations (Carlson & Randell, 2013; McLean et al., 2020; Stern et al., 2018; Ministry of Gender and Family Promotion, 2021). Thus, male and female IZUs may have had similar access to resources for learning and support. In addition, the design of Sugira Muryango may have contributed to this finding. The research team intentionally utilized an implementation model that relied on women in positions of leadership, which ensured that cell mentors; members of the training team; and members of leadership teams at cell, district, and national levels had equal gender representation. Moreover, Sugira Muryango's theory of change (see Figure 3) targets secondary caregivers, which largely consist of fathers. Therefore, IZUs were working with both same and opposite-gender caregivers in the homes regardless of their gender.

The results of the parallel latent growth model revealed two significant predictors for growth in fidelity and competence: IZU age and IZU district of residence. Older IZUs are more likely to have higher initial fidelity and competence scores; however, their growth over time is slower than that of their younger counterparts. This finding does align with broader adult learning theory, which suggests that as adults age, physical limitations may affect their overall ability to learn (Knowles, 2014). It could also be that older IZUs had higher initial fidelity and competence scores due to their additional experience but had lower rates of change as a result of either ceiling effects (less room to grow) (Feng et al., 2019) or perhaps less comfort with using the technology required (audio recorders and cell phones) to self-monitor and engage with supervisors in Sugira Muryango (Naslund et al., 2019). The mean age of IZUs was 44 with significant variability in age (SD = 9.83, age range 22-79). The upper quartile of age ranged from 50-79.

Additionally, IZUs in Ngoma and Rubavu districts had lower initial fidelity and competence scores but grew at a faster rate compared to their counterparts in Nyanza. District was considered a non-modifiable factor in this study because IZUs were already living and working in the districts in which they were implementing, and the study team did not control which IZUs were located in which district. However, it is important to clarify that any across-district differences are not necessarily because of the district itself (a non-modifiable factor) but what is happening within the districts (which in some cases could be modified). The University of Rwanda has a campus located in a district adjacent to Nyanza district; therefore, this finding could be due to additional resources for further educational support that exists outside of the intervention in Nyanza. In addition, qualitative data from the Sugira Muryango cluster-randomized trial indicated that community-based volunteers in Nyanza had received previous training on HIV and community reconciliation, which helped them to feel prepared when entering Sugira Muryango training (see Chapter 4). This could be the case for IZUs in Nyanza as well. The higher rates of growth for IZUs in Rubavu and Ngoma may also be due to ceiling effects for IZUs in Nyanza, which suggests that there may have been less room for growth for IZUs who started with higher competence and fidelity.

Findings from future analyses exploring factors associated with fidelity and competence should also be interpreted in the context in which that intervention took place. For example, while district significantly predicted IZU fidelity and competence scores in Rwanda, this may not be the case in other programs, countries, and regions. Utilizing qualitative data to supplement statistical examination of factors that contribute to fidelity and competence could unpack the above results and aid our understanding of which results may be generalizable and which may not. To illustrate, while research regarding factors associated with fidelity and competence remains rare in the field

of global mental health, individual characteristics of providers have not predicted quality of delivery in school-based programming (Domitrovich et al., 2019). More exploratory research should be done in the field of global mental health to generate enough empirical evidence to examine patterns of when and where individual-level characteristics influence quality of delivery.

While future research is certainly needed to confirm and explain patterns observed in this study, important practice implications can be noted. (1) Careful examination of any differences in resources that exist across districts can inform training and supervision approaches for nonspecialists, such as IZUs. If efforts can be made to identify what district-level tools and resources lead to higher initial fidelity and competence, these tools and resources could be replicated across districts prior to training and intervention delivery. (2) Strategies such as a pre-test to examine existing areas of strength and weakness for nonspecialists could inform more targeted training approaches, which could in turn lead to less variance in initial starting points of both fidelity and competence. (3) Furthermore, supervisors can make efforts to provide older nonspecialists with additional support as needed, such as more training in technology. The administration of a pre-test or qualitative data collected from both nonspecialists, and their supervisors, can inform on the specific needs that older IZUs have compared to their younger counterparts.

Limitations

This study has many limitations. First, there are very few fidelity items per module (between one to five items), and many aspects of adherence to the Sugira Muryango intervention are not able to be captured in my computation of fidelity. This also may affect the variability that exists in fidelity data, as mean scores were generated across modules. Second, there is little conceptual guidance from prior literature or theory that informs us whether competence should

differ depending on the session or the content that IZUs are delivering. If I believed that it did, the changes in session and content would need to be accounted for in the analysis, and this would also affect the interpretation of growth over time. However, for the sake of this study, I assume that competence, which is defined by the general skills required for all MHPSS interventions and should not be intervention-specific or topic-specific. I am hopeful that as the empirical data base builds in this field, theoretical guidance will be available. Finally, this study is limited in the data available to explore factors associated with IZU fidelity and competence. There is no quantitative data available regarding experiences or quality of training and supervision, which limits my analysis to non-modifiable demographic factors (gender, age, district, and education level). However, I hypothesize that training and supervision will have a significant impact on fidelity and competence of IZUs. Thus, I recommend that future research explore these topics qualitatively or by using mixed methods.

Conclusion

Overall, IZUs see positive, linear growth in fidelity and competence over time when delivering the Sugira Muryango intervention. District and age are factors that significantly predict fidelity and competence trajectories. While fidelity and competence co-vary, these terms are theoretically distinct and must be equal components, measured together, when computing quality of delivery scores. In the field of global mental health, more research is needed to confirm patterns of which factors are generally associated with quality of delivery. The field can also benefit from mixed methods studies that first examine factors that are associated with quality of delivery and then use qualitative data to unpack and explain any identified patterns. Research regarding quality of delivery is contingent upon proper measurement and conceptualization of quality of delivery. Studies must move beyond reporting reliability statistics and first ensure that quality of delivery

checklists measure both fidelity and competence. More research is needed to examine modifiable and non-modifiable factors associated with quality of delivery and begin to identify patterns in LMICs.

Chapter 3. Association of Nonspecialist Quality of Delivery and Intervention Outcomes within a Family Strengthening Intervention in Rwanda

Background

In recent years, mental health and psychosocial support (MHPSS) interventions have utilized a nonspecialist workforce to deliver evidence-based interventions in low- and middle-income countries (LMICs) where there is often a dearth of specialized mental health services (Keynejad et al., 2018; Thornicroft et al., 2017; Rathod et al., 2017). This approach is known as task-sharing, which refers to specialists collaborating with nonspecialist providers to deliver health-related services that have traditionally been assigned to experts with professional training and certification (WHO, 2007). Task-shared interventions have demonstrated effectiveness with moderate to large effect sizes and have been found to be cost-effective (Singla et al., 2017; Perry & Zulliger, 2012; Patel et al., 2017; Joshi et al., 2014; Freeman, 2016; O'Shea et al., 2016). Separately, international institutions such as the World Health Organization have called for approaches that strengthen local capacity and equip community members to provide MHPSS services (World Health Organization and United Nations High Commissioner for Refugees, 2015; Kohrt et al., 2018; Becket et al., 2013; Patel et al., 2011). Therefore, task-sharing has become considered a best practice for implementation (Amarasekera et al., 2021; Shahmalak et al., 2019). Researchers and practitioners have now shifted priorities toward identifying best practices for scaling out and sustaining task-shared MHPSS interventions (Singla et al., 2018).

To successfully scale and sustain MHPSS interventions, it is critical to understand the active ingredients of effectiveness that must be planned for and invested in over the long-term (Troup et al., 2021). Although the outcomes of evidence-based practice are known to vary as a function of the quality of delivery in other interventions (George & Childs, 2012), this can be challenging to test in MHPSS interventions due to the small sample sizes of quality of delivery

data (Bond et al., 2022). Quality of delivery is a twofold concept consisting of fidelity, the ability to adhere to the original design of the intervention (Proctor et al., 2011), and competence, the general skills relevant in all MHPSS interventions, such as empathy, active listening, and rapport building (Kohrt et al., 2015). Often, small numbers of nonspecialist facilitators are delivering MHPSS interventions; for example, between 10 and 45 nonspecialists in MHPSS studies reported quality of delivery outcomes using primarily descriptive statistics (Bond et al., 2022). This inhibits our ability to run complex models and empirically examine the association between quality of delivery outcomes and MHPSS effectiveness outcomes, even though quality of delivery and effectiveness have been tested in evidence-based interventions with education outcomes and caregiving interventions in higher-income settings (Martin et al., 2023; Kim et al., 2018; Rojas-Andrade & Bahamondes, 2019; Scott et al., 2019). In these settings, quality of delivery is associated with positive changes in key intervention outcomes, including behavior in classrooms, academic outcomes, caregiving behaviors and skills, and family functioning. However, these studies primarily focus on fidelity alone as a quality of delivery predictor rather than both fidelity and competence. Therefore, gaps in knowledge remain regarding the association between quality of delivery and MHPSS outcomes, particularly in low-resource settings, and in understanding how both fidelity and competence separately predict MHPSS outcomes.

Nevertheless, we understand theoretically that the quality of delivery is associated with intervention effectiveness (O'Shea et al., 2016; Proctor et al., 2011; Yang et al., 2024). The field of implementation science has grown as research teams have increasingly acknowledged that implementation factors, including quality of delivery, are key ingredients of implementation effectiveness within health programs (Durlak & DuPre, 2008; Bauer & Kirchner, 2020; Damschroder et al., 2022). The conceptual model of implementation research suggests that

implementation outcomes directly affect effectiveness outcomes (see Figure 2). More empirical testing of the association between implementation and effectiveness outcomes in LMICs will strengthen and provide evidence of what we understand theoretically. Ultimately, this knowledge could provide more targeted guidance as researchers and practitioners pivot to focus more on scale and sustainment of MHPSS programs.

Study Objective

The objective of this study is to examine the association between nonspecialist quality of delivery scores (fidelity and competence) and changes in psychosocial intervention outcomes (responsive caregiving and child discipline practices) within an evidence-based, early child development and family strengthening intervention. I hypothesize that quality of delivery, both fidelity and competence, will be associated with both responsive caregiving and child discipline practices.

Study Context

Sugira Muryango is an evidence-based, early childhood development intervention to promote early child development and prevent violence, and the intervention targets families living in extreme poverty in Rwanda (Betancourt et al., 2018). In Rwanda, high rates of family and community violence abound (Bahati et al., 2022). Recent studies have shown that children in Rwanda experience emotional, sexual, and physical violence in their homes and communities (Nyandwi et al., 2022a; Nyandwi et al., 2022b, Nyandwi et al., 2023). Violence in the home predicts long-term challenges with child cognitive, psychological, and physical development (Strathearn et al., 2020).

The design of Sugira Muryango is guided by both the Exploration, Preparation, Implementation, and Sustainment (EPIS) framework and the World Health Organization's

Nurturing Care Framework (Jensen et al., 2021; World Health Organization, 2018; Aarons et al., 2011) and is aligned with a comprehensive early child development (ECD) policy developed by the Government of Rwanda (Rwanda Ministry of Gender and Family Promotion, 2016). The EPIS framework portrays how bridging factors (such as local and international teams) and innovation factors (such as a digital dashboard, the nonspecialist workforce, plan-do-study-act cycles, etc.) link the outer context of the environment to the inner context of the evidence-based intervention. The Nurturing Care Framework illuminates five interrelated components representing the basic needs of children that must be met in order to thrive: good health, adequate nutrition, safety and security, responsive caregiving, and opportunities for learning (World Health Organization, 2018). Furthermore, the Rwandan government's ECD policy includes pillars that relate directly to Sugira Muryango components, such as gender equality, caregiver involvement in child development, and holistic service provision (Rwanda Ministry of Gender and Family Promotion, 2016).

Sugira Muryango's family-level intervention format has proved to be an effective strategy for reducing family violence and promoting early child development, both of which are key aims of Sugira Muryango, as caregiver well-being and caregiving practices are highly linked to early child development outcomes (Pedersen et al., 2019; Rostila & Saarela, 2011; Wade et al., 2019; Tiechter et al., 2016; Mills et al., 2011; Walker et al., 2011; Jeong et al., 2020; WHO, 2018). The structure of Sugira Muryango has been reported elsewhere (Placencio-Castro et al., 2024).

Compared to the control group, families receiving the Sugira Muryango intervention have had greater improvements in responsive caregiving (d = 0.87, 95% CI: 0.74, 0.99) and decreases in violent discipline practices (OR = 0.30: 95% CI: 0.19, 0.47) (Barnhart et al., 2020; Betancourt et al., 2020; Betancourt et al., 2018). Other significant study outcomes included decreases of intimate partner violence (OR = 0.49, 95% CI: 0.24, 1.00), increased care seeking for diarrhea and

fever (OR = 4.43, 95% CI: 1.95, 10.10; OR = 3.28, 95% CI: 1.82, 5.89), and improved household sanitation behaviors (OR = 3.39, 95% CI: 2.16, 5.30) compared to the control group. Children in families receiving Sugira Muryango also had an increase in dietary diversity (Cohen's d = 0.35, 95% CI: 0.22, 0.47). For caregivers, Sugira Muryango was associated with decreased caregiver depression and anxiety (OR = 0.58, 95% CI: 0.38, 0.88) (Betancourt et al., 2020). Finally, equal decision-making between mothers and fathers on what to do when a child is sick increased from baseline to post-assessment (Wilcoxon signed rank: z = 2.121; *p = 0.034*) (Betancourt et al., 2018).

From 2021 to 2023, Sugira Muryango was expanded and implemented through the Promoting Lasting Anthropometric Change and Young Children's Development (PLAY) Collaborative, a Hybrid Type II implementation-effectiveness trial (Curran et al., 2012) that intends to 1) scale up the evidence-based intervention to 10,000 Ubedehe 1 households (families living in extreme poverty) in Ngoma, Rubavu, and Nyanza, and 2) assess intervention effectiveness in promoting early childhood development and reducing family violence while strengthening stakeholder engagement through a collaborative team approach. While the components of Sugira Muryango modules are the same, three key differences can be seen between the original CRT to the PLAY Collaborative expansion study, which includes an embedded effectiveness trial. First, a government workforce, the Inshuti z'Umuryango (IZUs), serves as nonspecialists delivering the intervention rather than other Community-Based Volunteers (CBVs) who were not affiliated with the government. Second, the randomization strata are by sector (geographic cluster), and villages were selected within each sector to participate in the study. Third, families with children ages 0-24 months are included in the study rather than children 6-36 months (Placencio-Castro et al., 2024).

The IZU workforce delivering Sugira Muryango in the PLAY Collaborative expansion study is affiliated with the Ministry of Gender and Family promotion. IZUs received a 10-day group training prior to intervention delivery and were supervised and mentored throughout Sugira Muryango delivery by previous expert interventionists known as cell mentors, many of whom had previous intervention experience. Cell mentors were responsible for conducting at least two in-person monitoring sessions per IZU supervised. Prior to intervention delivery, cell mentors received training on quality monitoring and intervention design, where they were introduced to the quality of delivery checklist and taught to utilize it during monitoring sessions. Throughout Sugira Muryango, cell mentors also met weekly with IZUs in group sessions to provide feedback on quality of delivery, help IZUs problem-solve any challenges that arose during home visiting, and review activities for the upcoming session (Placencio-Castro et al., 2024).

Data for this study will come from three timepoints of the Sugira Muryango embedded trial. Quality of delivery scores were assessed by supervisors (known as cell mentors) of IZUs during at least two random sessions throughout the 12-module intervention. Data is collected in all three intervention districts: Nyanza, Ngoma, and Rubavu.

Methods

Data Collection and Sampling

Data from this study includes all households participating in the embedded trial. Thus, quality of delivery data will be restricted to the scores of IZUs who delivered the Sugira Muryango intervention to the participating households in the embedded trial. A total of 231 households participated, and among these 231 households were 128 different IZUs supervised by 19 different cell mentors. The embedded trial had three timepoints of data (see Table 5). Less than 10% of households were lost to attrition, with N=212 at follow-up. While secondary caregivers (mostly

fathers or grandparents) did participate in Sugira Muryango in 47% of the households, the analysis was limited to primary caregivers who were responsible for reporting on participating children. Primary caregivers in the embedded trial were 100% female.

Table 5
Household attrition from baseline to post-intervention data collection timepoints

Timepoint	Data collection date	No. of households
Baseline (Pre-intervention)	May 17th - June 6th, 2021	231
Post-Intervention	October 25th to November 30th, 2021	225
Follow-Up	October 24th – November 4th, 2022	212

Table 6, below, shows key characteristics of primary caregivers involved in the Sugira Muryango embedded trial. Caregiver age represents baseline values. See Table 1 for IZU characteristics.

Table 6
Primary caregiver characteristics (N = 231)

Variable	*N*	(%)	M (SD)	Range
Education				
No formal school	30	12.99%		
Primary or less	172	74.46%		
Secondary or less	23	9.96%		
Higher Education	6	2.60%		
District				
Rubavu	95	41.13%		
Nyanza	58	25.11%		
Ngoma	78	33.77%		
Caregiver Age			31.8 (7.87)	18-56

Ethical Considerations

Assessments were carried out in the homes of the families or at a central point in the village. The Laterite data collection team consists of male and female trained enumerators who are Rwandan and speak the local language. Enumerators first received informed consent from caregivers at each wave of data collection, which was read aloud in Kinyarwanda due to the low

literacy level of study participants. Consenting participants either signed the form or provided a thumbprint, and participants were offered a copy of the consent form to keep for themselves.

Measures

Outcome Variables

Responsive caregiving is measured via the Home Observation for Measurement of the Environment (HOME) Inventory. The HOME inventory is a 45-item observational and caregiver self-report measure that assesses both caregiving/parenting behaviors and household conditions and has been previously adapted for Uganda and East Africa (Caldwell & Bradley, 1979; Singla et al., 2015). The HOME consists of six subscales: 1) parental responsivity, 2) acceptance of the child, 3) organization of the environment, 4) learning materials, 5) parental involvement, and 6) variety in experience.[1] Response options are binary using either yes/no responses or else ordinal with frequency options ranging from "at least once per week" to "never". A summative score is used for scoring purposes in this study with higher scores indicating more responsive caregiving. Several items were reverse-coded prior to scaling. Summative scores follow best practices established in prior studies using the inventory (Singla et al., 2015; Jensen et al., 2021), which has demonstrated moderate internal reliability at follow-up ($\alpha = 0.67$).

Child discipline is measured via the Multiple Indicator Cluster Survey (MICS) Child Discipline Module. The MICS is a 12-item caregiver report-on-child measure that assesses the prevalence of three child discipline practices: non-violent discipline, psychological aggression, and physical aggression (UNICEF, 2013). The MICS has often been integrated into the global

[1] 1. Responsivity: Extent of the parent's emotional and verbal responsiveness to the child. 2. Acceptance: Parental acceptance of undesirable behavior and avoidance of restriction/punishment; how the parent disciplines the child. 3. Organization: How the child's time is organized outside the family's house (extent of regularity/predictability), and what the child's personal space looks like. 4. Learning Materials: Presence of several types of toys and activities that are available to the child, age-appropriate, and directed towards intellectual development. 5. Involvement: Extent of parental involvement; how parent interacts physically with the child. 6. Variety: Amount and range of daily stimulation, particularly how daily routine is designed to incorporate social meetings with people other than the mother (e.g. father, other family members).

Demographic and Health Survey (DHS) and has previously been used in Rwanda ($\alpha = 0.65$). The MICS5 is intended to be used for children ages one and older (UNICEF, 2014); therefore, caregivers in the study with children under the age of one at baseline have been omitted from the analysis for all models examining child discipline outcomes. Response options are binary (yes/no) for each of the sub-scales. Child discipline practices are treated as four separate outcomes: non-violent discipline, deprivation, psychological aggression, and physical punishment. The four "non-violent discipline" items include 1) deprived the child of things that they desired, 2) explained to the child why something (the behavior) was wrong, 3) deprived the child of food, and 4) gave the child work as a form of punishment. For the purposes of this study, only "explained to the child why something was wrong" is used to define non-violent discipline, and this outcome is treated as a binary variable. Two other items, depriving the children of food and/or things that they desired, have been included as a separate "deprivation" binary variable. Responses are coded zero if the caregiver did not use this discipline practice in the last 30 days, and responses are coded 1 if the caregiver did use this discipline practice. Two items pertaining to psychological aggression include "shouted, yelled, or screamed at the child" and "called him/her dumb or lazy, or another name like that." Psychological aggression is used as a binary variable as well, in which responses are coded 1 if any form of psychological aggression is indicated in the past 30 days and 0 if no forms of psychological aggression are indicated in the past 30 days. Finally, physical punishment is used as a binary variable as well with scores being marked 1 if there was any form of physical punishment reported in the past 30 days, and 0 if no forms of physical punishment were reported in the past 30 days. The inventory has demonstrated moderate internal reliability at follow-up ($\alpha = 0.58$).

Key Independent Variable

Quality of delivery is assessed via an intervention-specific checklist that measured both fidelity and competence of nonspecialist providers. Across all 12 modules of Sugira Muryango, competence was measured by 16 cross-cutting, repeated items, and between one to five fidelity items were unique to each module. Example competence items include "verbal communication skills," "non-verbal communication skills and active listening," and "rapport building and self-disclosure." Example fidelity items include "the IZU discussed the importance of stimulating a baby's brain by talking to one's baby, touching one's baby, and playing with one's baby," and "The IZU discussed the importance of having a clean, safe, and supportive home environment to support a child's learning." Both competence and fidelity items were rated on a 5-point Likert scale ranging from 0 ("did not occur") to 4 ("excellent"). For the purpose of this study, average scores of both fidelity and competence across modules, converted to percentages for the purpose of comparison, will be used as the two key independent variables. Average quality of delivery scores across multiple sessions have been used in past literature examining associations between quality of delivery and effectiveness outcomes (Kim et al., 2018; Cantu et al., 2010; Chiapa et al., 2015; Giannotta et al., 2019; Maaskant et al., 2016; Roggman et al., 2016; St. George et al., 2016). The quality of delivery checklist indicated high internal consistency ($\alpha = 0.93$ for competence). IZU competence scores ranged from 54-100 with a mean score of 86.20 and a standard deviation of 10.4. IZU fidelity scores were similar, ranging from 54-100, with a mean score of 89.56 and a standard deviation of 8.28 (see Figures 5 and 6).

Demographic data of nonspecialist providers, such as gender, age, education level, and district, were included in quality of delivery data (see Table 1). Gender is a dichotomous categorical variable with response options of "male" and "female;" age is a continuous variable; education is an ordinal variable measured on a Likert scale with response options of "none,

primary, secondary, and institutional degree/certificate;" and district is a categorical variable with three options: Nyanza, Rubavu, and Ngoma. Because age and district were the only significant predictors of IZU quality of delivery (see Chapter 2), these variables were the only demographic data included in statistical models.

Data Analysis

Data from the quality of delivery checklist (quality of delivery scores with IZU and cell mentor identification variables) were merged with longitudinal data containing caregiver report-on-child items using matched household IDs. Patterns of missing data were examined and determined to be missing at random with less than 10% of missing data, most of which was due to attrition across timepoints. Multi-level logistic growth and mixed effect growth models were used to model the average quality of delivery scores (fidelity and competence) as the key predictors to evaluate the association between fidelity and competence and key intervention outcomes across three timepoints (baseline, post-intervention, and follow-up). For mixed-effect growth models, restricted maximum likelihood was used. Multi-level growth models have been used in previous studies to examine associations between implementer fidelity and intervention outcomes (Kim et al., 2018). Multi-level growth models include two levels of nesting: primary caregivers nested within IZUs, and IZUs nested within cell mentors. Because the number of districts is too small (N = 3) to be treated as a level in multilevel modeling, these are treated as fixed effects (represented by dummy variables in the models). In the models, I controlled for time-invariant demographic variables such as caregiver level of education, age at baseline, and district. Gender was not used, as 100% of primary caregivers were female. In addition, because IZU age significantly predicted competence and fidelity scores (see Chapter 2), this has been included as a fixed effect as well. Goodness of fit statistics are assessed using a Wald test.

Results

Multi-level growth models revealed that IZU fidelity was not a significant predictor of changes in any child discipline outcomes nor of any responsive caregiving outcomes, while accounting for caregiver district of residence, level of education, and age as well as IZU age. IZU competence significantly predicted changes in some responsive caregiving practices, specifically acceptance and learning materials, and predicted changes in the child discipline practice of physical punishment. Tables portray odds ratios (OR) for child discipline outcomes and unstandardized coefficients (*b)* for responsive caregiving outcomes, in addition to 95% confidence intervals (CI) and statistical significance (*p*). A Wald test indicated good fit statistics of all statistical models used in the study (ranging from $p = 0.045$ to $p = 0.000$). See Appendix A for full results of all covariates used in the models.

For each additional percentage point of average IZU competence in the household, primary caregivers had, on average, a 0.05% decrease in the odds of using physical punishment for child discipline (OR = 0.95; CI = 0.92-0.99; $p = 0.020$). Higher competence scores were also associated with greater changes in caregiver acceptance of the child and learning materials in the home. For each additional percentage point of IZU competence, caregivers saw a 0.011 increase in acceptance scores (b = 0.011; CI = 0.000-0.022; $p = 0.054$) and a 0.032 increase in learning materials (b = 0.005, CI = 0.005-0.059; $p = 0.019$). See Table 7 for full results of child discipline outcomes and Table 8 for full results of response caregiving outcomes.

Table 7

Multi-level logistic growth models for child discipline outcomes (N = 135)

	Non-violent punishment			Deprivation			Psychological aggression			Physical punishment		
	O.R.	95% C.I.	*p*	O.R.	95% C.I.	*p*	O.R.	95% C.I.	*p*	O.R.	95% C.I.	*p*
IZU Fidelity	1.03	(0.97, 1.09)	0.255	(1.04)	(0.99, 1.09)	0.145	1.02	(0.97, 1.07)	0.322	1.04	(0.97, 1.09)	0.070
IZU Competence	0.96	(0.92, 1.01)	0.171	(0.99)	(0.95, 1.03)	0.724	0.99	(0.96, 1.01)	0.340	**0.95**	**(0.92, 0.99)**	**0.020**

Note: Models control for caregiver district of residence, level of education, and age, in addition to IZU age. See Appendix D for full results of all covariates used in the model.

Table 8

Linear multi-level growth models for responsive caregiving outcomes (N = 231)

	Acceptance			Organization			Responsiveness		
	b	95% C.I.	*p*	*b*	95% C.I.	*p*	*b*	95% C.I.	*p*
IZU Fidelity	-0.005	(-0.019, 0.008)	0.442	0.027	(-0.009, 0.064)	0.142	-0.007	(-0.032, 0.18)	0.585
IZU Competence	**0.011**	**(-0.000, 0.022)**	**0.054**	-0.015	(-0.037, 0.007)	0.188	0.010	(-0.011, 0.031)	0.346
	Variety			Learning Materials			Involvement		
	b	95% C.I.	*p*	*b*	95% C.I.	*p*	*b*	95% C.I.	*p*
IZU Fidelity	-0.002	(-0.015, 0.009)	0.683	-0.007	(-0.038, 0.025)	0.675	-0.008	(-0.028, 0.013)	0.453
IZU Competence	0.005	(-0.003, 0.013)	0.196	**0.032**	**(0.005, 0.059)**	**0.019**	0.006	(-0.011, 0.025)	0.460

Note: Models control for caregiver district of residence, level of education, and age, in addition to IZU age. See Appendix D for full results of all covariates used in the model.

Discussion

Results demonstrated that higher IZU competence was associated with caregiver decreases in physical punishment as a discipline tactic, higher acceptance of the child, and more learning materials in the home. Although IZUs were monitored and trained on both fidelity and competence throughout Sugira Muryango intervention delivery, only competence was a significant predictor of Sugira Muryango intervention effectiveness outcomes. IZU competence was associated with three intervention outcomes: decreased violent punishment, caregiver acceptance of the child in the home environment, and caregiver use of learning materials in the home environment. This confirms my hypothesis that higher IZU competence will be associated with improved child discipline practices and responsive caregiving; however, I cannot reject the null hypothesis that fidelity is associated with such changes as well.

While qualitative data from the Sugira Muryango embedded trial is still forthcoming, key informant interviews from nonspecialist providers delivering Sugira Muryango during the prior CRT may offer insight as to why the associations with intervention effectiveness are only seen with IZU competence (see Chapter 4). CBVs, the nonspecialists delivering Sugira Muryango in the CRT, provided concrete examples of competence skills, such as active listening, empathy, and rapport building, which made them more effective at delivering Sugira Muryango. Fidelity was rarely mentioned by CBVs. In addition, when asked about training and supervision experiences, CBVs were more likely to mention what they had learned about competence rather than fidelity (see Chapter 4). A recent meta-analytic review of therapist adherence and competence in higher-income, clinical settings reveals that competence is associated with clinical changes, but fidelity is not (Power et al., 2022). Qualitative data in Chapter 4 describes the impact that rapport and relationship-building had on CRT families—it could be that MHPSS outcomes are much more

dependent on feeling known, comfortable, and understood by the therapist or intervention facilitator rather than the specific modality used or how well the interventionist adheres to the manual.

Taken together, these findings highlight an emerging trend that may affect our understanding of quality of delivery. Thus far, conceptual literature has suggested that both competence and fidelity are critical components for ensuring that MHPSS interventions are delivered with quality (Bond et al., 2022; Chapman et al., 2022; Fairburn & Cooper, 2011; Ottman et al., 2020; Theobald et al., 2018; Murray et al., 2011). However, very little empirical research has been done to examine the impact of quality of delivery in MHPSS interventions in LMICS (Bond et al., 2022). Sugira Muryango, implemented through the PLAY Collaborative, is a unique, evidenced-based intervention as it is situated in a context of heavy government buy-in and involvement in local communities.

To build implementation science theory, more research is needed to continue exploring if competence is repeatedly more associated with intervention outcomes than fidelity, and, if so, where is this happening and why? This will help determine if the study findings are generalizable beyond the context of Rwanda. Mixed methods studies may be particularly effective in continuing to identify trends and investigating why we see this trend. It is also possible that errors in measuring fidelity and competence may lead to type 1 or type II errors, which will cloud our understanding of the true relationship between intervention effectiveness and implementation (Lewis et al., 2015). The development of the ENACT tool (and its iterations) and training platforms such as EMPOWER and EQUIP are important moves towards establishing best practices in quality of delivering measurement (Kohrt et al., 2015; Pedersen et al., 2021; Jordans et al., 2019; The President and Fellows of Harvard College, 2022; World Health Organization, 2022), but much

more work remains to be done to ensure that quality of delivery instruments are reliable (Bond et al., 2022).

The finding that competence is more associated with MHPSS outcomes than fidelity may have implications for training and supervising nonspecialists in Rwanda. As Sugira Muryango expands and scales up, potentially transitioning to more government leadership and ownership, training, and supervision best practices must be refined and honed. Future study teams may consider focusing more heavily on the soft skills needed to deliver Sugira Muryango and deeply integrating skills such as empathy, active listening, and communication into role plays, weekly supervision meetings, and monitoring visits. It could be that even if the intervention is not delivered perfectly according to the manual (high fidelity), skills in competence may overcome this issue and still lead to effective delivery of MHPSS interventions.

Although no association was found between fidelity and intervention outcomes in this study, this finding must be interpreted cautiously given current measurement concerns in the embedded trial. The fidelity checklist used in the Sugira Muryango embedded trial may not have fully operationalized the concept of fidelity. There were between one to five fidelity items per module, and many aspects of the manual and the Sugira Muryango intervention were not captured in the checklist (see Appendix B). For example, in module 11, two fidelity items are titled: “The IZU reminded the caregivers that for a baby’s brain to grow, the baby needs opportunities to play, practice new skills, see new things, and copy what others do” and “The IZU discussed the importance of having a clean, safe and supportive home environment to support a child’s learning.” However, the Sugira Muryango manual is much more comprehensive in Module 11, guiding the IZUs to conduct activities that allow caregivers to identify images capturing stimulating learning environments for children and engaging the caregivers in multiple discussions that apply practices

to their own lives. Overall, the intention of Sugira Muryango is to be much more interactive with caregivers, which is captured in detail in the manual. However, the fidelity items in module 11, and most other modules, do not adequately capture the interactive nature of the intervention and what it would look like to truly adhere to the manual. If the fidelity items on the quality of delivery checklist had been more comprehensive, findings from this study could be interpreted more confidently. Improvements in the measurement of fidelity can aid in our understanding of the relationship between fidelity and quality of delivery in global mental health. Items that reflect the key components of the intervention and response options that allow for accurate reflection and variability in the data are necessary ingredients in a fidelity measure (Bond & Drake, 2020; Hughes et al., 2018; Schoenwald et al., 2011; Teague et al., 2012).

The Sugira Muryango team is already in the process of improving the quality of delivery checklist with a focus on the fidelity items and response options. Based on findings from an external evaluator, the team has identified several other areas for improving data reliability. First, the response options have been shifted to a three-point Likert scale rather than a five-point Likert scale. This may improve data variability and avoid ceiling effects, particularly because the previous Likert scale moved from “4 = excellent” to “3 = average”, with three of the five potential response options falling below average and causing a skewed distribution. Second, the fidelity items have been expanded and specific items are now focused on active play sessions and items that reflect more engagement with caregivers, according to the manual, rather than one-way interactions. Finally, the team identified inter-rater reliability issues that can be modified through improved training and supervision practices. Cell mentors and external evaluators, using the same tool, rated IZU quality of delivery much differently and operationalized active play sessions differently as well. Specifically, cell mentors on average rated quality of delivery much higher and

assumed that there should be no interaction between IZUs and families during active play sessions. On the other hand, research assistants from the external evaluator rated IZU quality of delivery lower, including docking points for the lack of interaction during active play sessions. According to the Sugira Muryango design, the IZUs should be coaching and engaging families during 15-minute active play sessions in order to serve as examples of how to play with young children in a stimulating and nurturing manner. Future opportunities for training cell mentors and other supervisors to conduct active play sessions correctly and use the quality of delivery tool consistently will improve data reliability. The new tool will be piloted soon and is intended to ensure that Sugira Muryango is being delivered with quality at scale. This will be particularly relevant if the program expands to a continuous enrollment model whereby IZUs deliver Sugira Muryango to new families on a rolling basis, which will embed intervention delivery into ongoing service provision in communities. In this model, IZUs may have additional opportunities for expanding their skills in fidelity. For example, rather than delivering module 1 of Sugira Muryango all in the same week to families and then moving on to module 2, IZUs will continue to return to module 1 when new families are enrolled. This will allow IZUs to hone their fidelity skills with continued practice and necessitates that fidelity is accurately measured, trained on, and supervised.

Ultimately, once fidelity measurement is improved, future studies must again test the relationship between quality of delivery and intervention effectiveness to confirm findings from this study. Nonetheless, this study serves as the first example for empirically testing the relationship between implementation and effectiveness in MHPSS interventions. As researchers and practitioners plan for sustainment and scale of nonspecialist-delivered, MHPSS interventions, it is important to understand the role that quality of delivery plays in changes in mental health outcomes. This can help guide the investment in resources, for example, that will lead to more

attention paid to the training, mentorship, and supervision of nonspecialists and investments in their professional growth beyond the scope of the project timeline. In addition, as researchers and practitioners continue to report on the effectiveness of MHPSS interventions and move towards mechanistic work, this study argues that measuring and including quality of delivery as a variable in modeling may present a fuller picture of effectiveness and allow us to account for more of the variation in the data.

Limitations

This study has several limitations regarding measurement. The MICS and parts of the HOME inventory are caregiver self-report data on their caregiving practices, which could impact social desirability as caregivers may be more inclined to report more positive behaviors (Durmaz et al., 2020). In addition, response options on both instruments are binary, which limits the variability, and, thus, the reliability of the data collected (Lozano et al., 2008). For example, a binary score is used for each item, which ends up causing challenges for analysis and scoring of the data since the items are not necessarily "good" or "bad" behavior at all times. For example, the MICS child discipline non-violent discipline sub-scale has items such as "depriving children of things" and "making children do work" when they do something wrong. These behaviors could be considered positive caregiving in some cases but negative caregiving in others. No current best practices are available from the literature or scoring instructions from the scale developers, and future research should explore better ways to utilize and analyze the MICS. Both measures, the HOME inventory and the MICS, demonstrated only moderate reliability, which could be due to measurement errors.

Furthermore, limitations in measuring fidelity may lead to a type II error in this study. The fidelity checklist in the embedded trial had few fidelity items—sometimes just one or two fidelity

items per module, which does not capture the range of skills in fidelity that were needed to deliver Sugira Muryango. Since the embedded trial, the study team has made improvements in the conceptualization and operationalization of fidelity, and future iterations of the fidelity checklist will have more items and a different Likert scale, which is intended to produce more reliability and variability in the data.

Conclusion

In the Sugira Muryango intervention, higher nonspecialist competence scores were associated with positive psychosocial changes (responsive caregiving and child discipline practices), and no association was seen between nonspecialist fidelity scores and psychosocial changes. While this finding may suggest that skills such as active listening or empathy lead to greater effectiveness of MHPSS interventions than adherence to the manual, future research is needed that tests the validity and reliability of fidelity measurements. This study includes suggestions for future research to confirm findings, identify patterns, and improve the measurement of fidelity. Ultimately, studies examining associations between quality of delivery and MHPSS intervention outcomes will move the field of implementation science towards greater theory-building and help establish best practices for training and supervising nonspecialist providers delivering MHPSS interventions.

Chapter 4. Exploring Nonspecialist Preparedness to Deliver an Evidence-Based, Family Strengthening Intervention in Rwanda: A Qualitative Study

Background

The mental health and psychosocial support (MHPSS) care gap is well-documented in low- and middle-income countries (LMICs) (Jack et al., 2020; World Health Organization and United Nations High Commissioner for Refugees, 2015; World Health Organization, 2007; Singla et al., 2017; Murray et al., 2011; Keynejad et al, 2017). Given a dearth of specialized providers in LMICs, nonspecialists are critical for delivering evidence-based interventions (EBIs), including caregiving and family-focused interventions that holistically support family well-being and early child development (Cherewick et al., 2023; Healy et al., 2018). Evidence is growing that trained nonspecialists can deliver evidence-based MHPSS interventions with effectiveness (Perry & Zulliger, 2012; Singla et al., 2017; Patel et al., 2017). Utilizing nonspecialist-providers, who are often deeply embedded into local communities, provides an opportunity for those living in LMICs to receive accessible, evidence-based interventions from members of their own community (Kohrt et al., 2018) and for researchers and practitioners to have a cost-effective solution to addressing the MHPSS care gap in LMICs (Joshi et al., 2014; Freeman, 2016; O'Shea et al., 2016).

Training and supervision are key components of ensuring that nonspecialist providers can deliver evidence-based interventions with quality. Ingredients for equipping nonspecialist providers have included training, mentorship, and supervision from intervention experts or mental health specialists (Rocha et al., 2021; Murray et al., 2011; Munga et al., 2012; McGuillen et al., 2019; Leocata et al, 2021; Singla et al., 2020). Supervision often entails assessing the nonspecialist quality of delivery with a checklist during in-person monitoring or via audio or video recorders (Kemp et al., 2019). Quality of delivery is defined as both fidelity, which is "the degree to which an intervention was implemented as it was prescribed in the original protocol or as it was intended

by the program developers," (Proctor et al., 2011) and competence, which is general soft skills that equip facilitators to manage problems and tailor intervention strategies to the specific context (Kohrt et al., 2015; Barber et al., 2007; Ottman et al., 2020).

In the field of global mental health, barriers to supervision and training of nonspecialist providers have included geographical and communication challenges that are common in low-resource settings (Singla et al., 2020). Facilitators to supervision and training of nonspecialist includes the availability of experts to provide mentorship and support, peer learning and group feedback sessions, role plays, and digital technology (Singla et al., 2020; Collier et al., 2021; Naslund et al., 2019; Healy et al., 2018; Barnett et al., 2023; Brown et al., 2023). In addition, recent studies have shown that training is most effective when content is included that is relevant to the broader MHPSS field beyond the specific intervention (competence skills) and when nonspecialist providers have previous experience delivering MHPSS interventions, feel they are compensated fairly, and are interested in the content of the intervention itself (Barnett et al., 2023; Brown et al., 2023).

However, the empirical research remains scant with much of the existing studies focusing on treatment outcomes rather than implementation outcomes. Insufficient research exists on training and supervision approaches for nonspecialist providers or on experiences that nonspecialist providers have with training and supervision (Singla et al., 2017; Barnett et al., 2023; Barnett et al., 2018; Caulfield et al., 2019; Seegan et al., 2023). Few studies have examined the relationship among supervision, training, and quality of delivery while conceptually distinguishing between fidelity and competence. In addition, even fewer studies have discussed experiences of training and supervision from the perspectives of nonspecialist providers. Further research is needed to illuminate the relationship among supervision, training, and quality of delivery and to

propose recommendations for supporting nonspecialists to deliver evidence-based interventions with fidelity and competence that are effective across contexts.

While a plethora of implementation science frameworks exist (Nilsen, 2020), thus far none speak specifically about both fidelity and competence and the inputs and output affected by fidelity and competence. The conceptual framework for implementation fidelity portrays how facilitation strategies affect adherence (a synonym for fidelity) but does not discuss competence at all (Carroll et al., 2007). Other common implementation science frameworks discuss generally how successful implementation is dependent upon the personnel involved but do not mention fidelity or competence specifically (Aarons et al., 2011; Damschroder et al., 2022). The Barriers and Facilitators in Implementation of Task-Sharing in Mental Health Interventions (BeFITS-MH) Framework suggests that macro, meso, and micro-level factors serve as barriers and facilitators to implementation outcomes. Micro-level barriers and facilitators include provider fit (being able to provide service and helping participants receive services), provider competence (understanding client needs, sympathizing, communicating well, and tailoring services to clients' unique needs), and provider congruence (being from the same community, demographic factors such as age, gender, social status). However, the BeFITS-MH Framework does not discuss training or supervision and their role in preparing nonspecialists. Therefore, while this study is informed by the BeFITS-MH Framework, findings from this study and others can expand upon existing implementation frameworks and further our understanding of quality of delivery, a key component to ensuring that implementations are effective.

Study Objective

This study builds upon emerging research in the field of global mental health to identify how, if at all, Community-Based Volunteers' (CBVs) supervision and training experiences

equipped CBVs to deliver Sugira Muryango with quality, including both fidelity and competence. This study will use qualitative data from key informant interviews to illuminate barriers and facilitators to supervision and training and describe how such factors have impacted overall quality of delivery. This study will also describe how, if at all, CBV preparedness to deliver Sugira Muryango is a result of training and supervision experiences during intervention delivery. Finally, this study will examine what, if any, differences across CBV gender and/or district exist regarding supervision and training experiences or CBV quality of delivery.

Study Context: Sugira Muryango Cluster-Randomized Trial

Sugira Muryango is an evidence-based early childhood development and family strengthening intervention with mental health outcomes. Although the government of Rwanda has invested heavily in rehabilitating a post-genocide society, many families still face mental health challenges and cannot access specialized care (Kayiteshonga et al., 2022; Rugema et al., 2015). Sugira Muryango was first implemented as a four-arm, cluster randomized controlled trial (CRT) that tested the intervention on Ubedehe 1 families in Rwanda (the Rwandan government's highest poverty categorization). The purpose of the CRT was to assess the effectiveness of Sugira Muryango in promoting responsive caregiving, reducing violence and harsh punishment, and promoting early child development in families living in poverty. Compared to the control group, caregivers receiving the Sugira Muryango intervention have had greater decreases in depression and anxiety and improvements in emotion regulation (Betancourt et al., 2020; Barnhart et al., 2020). More details of the design of Sugira Muryango are reported elsewhere (Johnson et al., 2020; Jensen et al., 2021; Betancourt et al., 2020; Barnhart et al., 2020).

Community-Based Volunteers (CBVs) delivering Sugira Muryango were selected for the purpose of the study using the following eligibility criteria: 1) Rwandan nationals, 2) over 18 years

of age, 3) sufficient time to deliver Sugira Muryango, and 4) recommendation from a local authority such as a village chief. Prior to intervention delivery, CBVs attended a three-week training on Sugira Muryango. During intervention delivery, CBVs were assigned a designated supervisor with a bachelor's degree in clinical psychology or social work. Most supervisors were affiliates of the local implementing partner, FXB Rwanda, and had helped develop training and monitoring tools. In addition, many supervisors had previous intervention experience delivering Sugira Muryango in its earlier iteration as a family strengthening intervention for HIV-affected families (Betancourt et al., 2017; Chaudhury et al., 2016).

Supervision entailed two in-person monitoring sessions (ideally during the third and sixth week) and monthly group supervision sessions with all CBVs in a geographic cell whereby common implementation challenges were discussed and problem-solved. There were six total supervisors, half male and half female, with one supervisor taking on a larger workload and supervising CBVs across two districts. On average, each supervisor had 24 CBVs. CBVs received a monthly stipend to cover airtime to call supervisors, transportation to and from participant homes and supervision sessions, and compensation for three hours of work per day (Barnhart et al., 2020).

Supervisors assessed CBV quality of delivery during in-person monitoring sessions, which included both competence and fidelity. In both smaller groups and individually, supervisors worked with CBVs throughout the process of implementation to improve both their adherence to the Sugira Muryango manual and problem-solving (fidelity) and their ability to relate with families through active listening, showing empathy, and clear communication (competence).

Methods

Data Collection and Sampling

In 2019, the study team conducted 69 qualitative key informant interviews to identify core competencies of CBVs, effective training and supervision strategies, and mentorship that enables CBVs to function optimally within health, education, and other delivery systems. The study team used a semi-structured interview guide, which included questions such as *tell me about your experience with Sugira Muryango training/supervision*; *in what ways, if at all, did you feel prepared when you began?* and *what could we do to improve training/supervision?*

CBVs were selected for key informant interviews using a sampling matrix to ensure representation across three districts of implementation and to capture the experiences of both male and female CBVs. Table 9 portrays the matrix based on gender and district. While the study team originally aimed for at least 10 CBVs of each gender per district (60 total), budget and time allowed for several back-up candidates to be interviewed as well, which resulted in a total of 69 interviews. More male CBVs were interviewed in Rubavu district while more female CBVs were interviewed in Ngoma and Nyanza districts due to CBV availability and schedule. However, the sampling matrix still allowed for variation and representation across both gender and district strata.

Table 9

Sampling matrix for key informant interviews

Rubavu District		Ngoma District		Nyanza District	
16 Male CBVs	12 Female CBVs	8 Male CBVs	13 Female CBVs	8 Male CBVs	12 Female CBVs

The study team conducting the interviews consisted of a research scientist employed through Boston College and six staff members of a partner agency, FXB Rwanda. Staff members had been trained on best practices for data collection during the pilot phase of Sugira Muryango. All interviews were recorded and transcribed by the study team prior to analysis.

Data Analysis Strategy

Data was analyzed using thematic content analysis (Anderson, 2007) with a combination of both deductive and inductive approaches. Codebook development was guided by the Boyatzis approach (Boyatzis, 1998). Examples of deductively-generated codes include implementation outcomes, such as fidelity and competence (Proctor et al., 2011; Kohrt et al., 2015; Barber et al., 2007; Ottman et al., 2020). Specifically, components of fidelity and competence that were operationalized by the study team, according to the quality of delivery checklist, were included as sub-codes (see Appendix A for the checklist). Additional codes, including tools, resources, and CBV pre-existing relationship with the community, were generated inductively via an *in vivo* coding process during transcript review. These codes capture themes of other factors influencing CBV preparedness and influencing the relationship between training and supervision and fidelity and competence.

Interviews were transcribed and translated by local research assistants in Rwanda and transferred to the research team at Boston College via a secure platform. To begin thematic content analysis, two coders used MAXQDA software for *in vivo* coding, in which coders took notes on emerging themes, patterns, and questions that they have based on data from the transcripts. The two coders included a doctoral candidate at Boston College with experience working on the research team implementing Sugira Muryango and a staff member of the University of Rwanda research team, an implementation partner, based in Kigali, Rwanda. An iterative process was then used to develop an initial codebook that captures themes emerging in the transcripts from *in vivo* coding. Aligned with the Boyatzis approach, the codebook included three levels of codes: a definition for each code and inclusion and exclusion criteria for each code using examples from the data (Boyatzis, 1998). The codebook was tested and re-tested on subsets of transcripts, and edits were made until both coders found that the codebook was accurately capturing all themes

emerging in the data relevant to the research question. The codebook was referred to throughout the coding process to ensure that both coders applied codes correctly.

After the codebook was developed and finalized by both coders, an inter-coder agreement analysis was run using MAXQDA software. Coders achieved 80% agreement at a threshold of 20% minimum overlapping and 69% agreement at a threshold of 60% overlapping. After establishing inter-coder agreement, both coders divided the remaining transcripts and coded them according to the codebook developed. The coders met weekly to discuss emerging themes, reflect on the data, and troubleshoot any confusing sections of the transcripts. After transcript coding was completed, themes and relationships among themes were identified through an axial coding process. The axial coding process included efforts to identify differences in thematic patterns across gender and district groups.

Results

Training and Supervision Experiences

Almost all male and female CBVs across the three districts stated that training and supervision helped them feel more prepared to deliver Sugira Muryango. CBVs who did not feel prepared after the training often mentioned feeling nervous at first, but, after delivering their first session or feeling support from their supervisor, they felt more confident. One CBV described their experience during the initial Sugira Muryango training: “They helped us solve the problems we could encounter, and they gave us explanations on the things we didn’t understand. We were able to give clear discussions to these families” (Female CBV in Ngoma). Another remarked that “I was trained enough…before, I was shy, but now I am no longer shy and I can facilitate a discussion, even in public” (Female CBV in Nyanza).

CBVs recalled the content of the training well. Most provided generic responses and remembered that it was about child development or how families should relate to each other. However, others described what they learned with more detail: “In the trainings, we developed our knowledge and ability. We learned the advantages of early stimulation, and we learned how to handle different issues without causing any trouble. The trainings were absolutely helpful” (Male CBV in Rubavu).

CBVs frequently mentioned refresher trainings, stating that these were helpful for reinforcing knowledge as they delivered Sugira Muryango over the course of several months. When asked what could be done to improve trainings, most feedback included continuing the refresher trainings or adding more. One CBV in Rubavu who mentioned how the Sugira Muryango training built on her previous experience: “I already had an experience in working with children with HIV and working as a volunteer, so Sugira Muryango trainings I received helped me become more knowledgeable and confident” (Female CBV in Rubavu). Many CBVs in Nyanza referenced past trainings about HIV or community reconciliation that they received, describing how Sugira Muryango was more relevant to them:

> *The other training was about fighting HIV. I was a youth leader and they requested me to go for those trainings. I learned to be a wise person with those who have it and those who don’t. With Sugira Muryango, the training was much more deep. I never knew how to take care of our children before, but I learned that, and it added on to what I already knew. Things were great* (Male CBV in Nyanza).

Outside of training, regular supervision was intended to support CBVs on a weekly basis and help them adhere to the skills that were taught during training. Several CBVs described they were nervous to begin conducting sessions at first, but supervision reassured them:

> *After the training, I was not ready to start facilitating sessions. When you are doing something for the first time, you are afraid. The supervisors accompanied us to the families and assured the families that we had enough training, and we knew what we were going to talk about with them* (Male CBV in Ngoma).

Most CBVs felt supported by their supervisors and described how supervision helped them feel more prepared throughout intervention delivery, which resulted in greater quality of delivery. One CBV described how she appreciated the way the supervisor corrected her and provided advice:

> *My supervisor used to support me wherever needed. When I asked him to come to the field for visiting the families, he always did. Another thing that I appreciate from him was that if something was wrong with my work, he never corrected me in front of the family, he did it privately. This was really good, because families could lose trust in me if it was done publicly. My supervisor even called me to remind me of our appointments with the families, even when he couldn't come. When our stipends were delayed, he told us to be patient. He was always there for us* (Female CBV in Nyanza).

Other CBVs described how the supervisor provided helpful explanations on elements of the Sugira Muryango intervention, which would result in greater fidelity. For example:

> *During the intervention, the supervisor took me to each of the families to introduce me to them. He followed up on our activities and he had a fixed time to give me a call. Whenever I had a challenge, he advised me. He took enough time and explained the aspects of nutrition, well-being, health insurance, and children's immunizations. In any case of confusion, he always directed me* (Female CBV in Rubavu).

Another CBV echoed these sentiments and described how the supervisor helped her conduct a referral:

(Supervision) helped us so much because in the case of any problem, the supervisor used to help me. For instance, I had a family which had a child with a physical disability. I sought advice from my supervisor, and it ended with the support of local leaders. The child was taken to the Gahini hospital (Female CBV in Ngoma).

In-person quality monitoring visits from supervisors were described as helpful:

What helped me and boosted my confidence is when my supervisor came to visit me. They followed how I led the session and at the end they gave me helpful advice. It helped me be where I am now. (Male CBV in Rubavu).

However, several CBVs in both Ngoma and Rubavu mentioned issues getting ahold of supervisors or getting the support they needed, particularly requesting more in-person supervision. Several examples from CBVs are below:

We would like to meet our supervisors more regularly. I know they have many responsibilities and many coaches in other areas to supervise, but it would be helpful if our supervisors gave us guidance or advice in-person, not doing everything on the phone. It would be great if they were available anytime we need them (Male CBV in Ngoma).

We did not get enough supervision, apart from the phone calls. For example, a supervisor visited me once, and the other families were asking why the supervisor did not show up for their families. They were promised to be visited at some point. I asked the supervisor about it, and I was told that there were other people that were going to visit them, apart from her. So, supervision did not go well (Female CBV in Ngoma).

In all three months I spent working with families, (name of supervisor) visited me only once. After a month and a half, the families were asking "why don't those other people visit us?" Therefore, I think the supervisors should visit the families at least once a month.

> *For supervision to go well, we should increase how often you accompany the coach to visit families* (Female CBV in Rubavu).

Weekly group sessions also allowed CBVs to build relationships with peers who were CBVs as well. These relationships also served as an additional source of support for several CBVs. One CBV described how he would receive advice from a fellow CBV:

> *When going through the sessions I was about to give, sometimes I could see that there was something I was not understanding. There were times that I would call the supervisor and find that they were busy, so then I called a fellow facilitator, who advised me how to go about it* (Male CBV in Ngoma).

Fidelity and Competence

Across all three districts, CBVs discussed how being a member of the same community as the Sugira Muryango families made it easier to build rapport and gain trust when delivering Sugira Muryango, which are two key components of competence. In addition, many CBVs felt that their position as Sugira Muryango facilitators helped them become recognized as leaders in the community. Both male and female CBVs in each district provided illustrative examples of their relationship with their communities. Several examples are below:

> *I used to ask myself 'These families are my neighbors, how are they going to like the fact that I am the coach? Were they going to be neutral, or will they bring in feelings because they know me already?' But it didn't happen that way. They were happy about me being their coach* (Female CBV in Nyanza).

> *The good thing is that the families and parents that I have worked with have made me their friend. They were familiar to me, therefore whoever had a problem could come to*

me and tell me whatever the problem was and ask me for advice. It is good when you talk with people who love you. I got the knowledge to help them (Male CBV in Rubavu).

Before I became coach in this program, (the Sugira Muryango families) and I lived well together. We were familiar, we had no problems, and when they saw that I was their coach, they trusted me (Male CBV in Rubavu).

Being a coach helped me to be known in the community at the village level and cell level. Because of what I have been teaching in this program, I am now considered someone who is an expert in this domain. Therefore, local leaders have asked me to sensitize about this subject and build awareness in the community (Male CBV in Ngoma).

Many CBVs referenced setting an example and how it was important to embody the skills that they were teaching to the families. For example, a female CBV in Nyanza mentioned that "To build rapport with families, first of all, you have to be a trustworthy person and an honest person. It is all about a good reputation. They had trust in me."

The majority of CBVs discussed how the training provided them with skills in competence, often referring to staying humble and calm, using communication techniques such as active listening, and showing empathy to the families with whom they were working. One CBV stated that:

What was helpful to me during the trainings is listening. That way of alternating in the conversation/discussion and relating yourself to whom you are having a conversation with. (Female CBV in Rubavu).

Another described how they would use calm responses when delivering Sugira Muryango:

I have learned to talk with people in a calm way, no matter the situation. You may go visit the family and once you are there you see that the person that you had an appointment with

> *is already drunk, or, at the end of the session you realize the family didn't understand anything from what you were coaching them. There is a phrase, 'gusubiza neza bihosha uburukari', which means a calm response reduces anger. Sugira Muryango training has provided me with some techniques like active listening, showing empathy, and putting yourself in someone else's shoes. This gives us more skills for helping others* (Female CBV in Nyanza).

Less IZUs in Nyanza mentioned fidelity specifically. In general, fewer comments were about preparedness in terms of fidelity compared to competence. Several CBVs referenced their ability to deliver Sugira Muryango with fidelity because of the support they received through training. For example:

> *They trained us to humble yourself when you are sitting in (the families') homes…I first went and discussed with them slowly and humbly, and I showed them that I have nothing, and they started to see me as one among them. They started to converse with me, and they feel free with me. I didn't have to tell them (the Sugira Muryango content) by force, but with discussions…the community leaders used to catch them with not enough hygiene, but because we have spent a lot of time working on it, no one catches them. The goats no longer sleep in their house. If a child gets sick, they know to see a doctor. Because we humbled ourselves, we can discuss (these topics) with us" (Male CBV in Ngoma). This CBV later added "If someone asks me a question about…how a child is educated, how to have hygiene, how someone can be confident and develop, I can explain it. Before, I didn't know anything about it. I know it because I was trained on it.*

Other CBVs mentioned their ability to deliver the intervention with fidelity but did not directly tie these skills to the training or supervision received during Sugira Muryango. For

example, one CBV discussed the changes they saw in a family that they were working with and stated that they witnessed these changes "because I explained to them that a balanced diet does not require you to be rich and showed them that we can eat a balanced diet from the vegetables we cultivate here" (Male CBV in Nyanza). Another CBV of a different gender and district referenced the manual and how it helped with fidelity, stating that "I felt confident when I was coaching the families. when I would forget something, the book would help remind me" (Female CBV in Ngoma).

Tools and Resources

CBVs described other tools and resources that affected their ability to delivery Sugira Muryango with quality. Some of the tools and resources were included in training and supervision, such as the Sugira Muryango manual, while others were provided to CBVs upon hire (stipends for airtime, travel, and time spent delivering Sugira Muryango).

The Sugira Muryango manual was referenced in the majority of CBV interviews as a key resource that helped them facilitate Sugira Muryango with quality and stay true to how they were taught in training.

Nearly all CBVs requested greater compensation, specifically a travel stipend and airtime. One CBV described how a lack of airtime affected his ability to communicate with his supervisor:

> *We received airtime once a month, which is not enough. We always face a challenge of airtime scarcity. Sometimes, we wouldn't have enough airtime to call our supervisors when it was urgent. If you improve communication means, this will help us as coaches to share information on time and achieve our work* (Male CBV in Ngoma).

The majority of CBVs frequently complained about their stipends arriving late, and described how this affected their ability to deliver Sugira Muryango. When asked for what they

needed in order to feel more prepared, nearly all CBVs asked for greater compensation or more timely compensation, for example: “what you can do for us as coaches is to give us our compensation on time” (Male CBV in Ngoma) and “we needed airtime, but they didn’t get it to us on time” (Male CBV in Rubavu).

Two CBVs stated that a bicycle would be helpful for traveling between family homes. For example, one CBV mentioned that “There was a program called (name of program), and their volunteers had bicycles that they were given. It could be good if we were also provided bicycles for transport. There are places that are hard to reach” (Male CBV in Nyanza). Another described how far distances required him to use a motorbike, but this strained him financially: “One family is located 6 kilometers from here…this was hard for me because I had to take a bike…I had to pay 2000 RWF round trip, and my salary would not cover that” (Male CBV in Ngoma).

The audio recorders used for recording each of the Sugira Muryango sessions in home were mentioned as both facilitators of quality of delivery by nearly half of the CBVs. CBVs discussed the benefits of describing how they “used recorders in order for the supervisors to hear how we provided the sessions, and in case of any mistakes, they corrected us” (Female CBV in Ngoma), and for self-correction because “you could see where you were not good, and you could correct yourself” (Male CBV in Rubavu). However, some CBVs requested more support and training for integration of the tablets. For example:

> *We left the training without being familiar with the tablets. It was difficult for us to synchronize data. The supervisor used to come late, and we didn’t have enough time to do proper follow up…we continued conducting the sessions with tablet difficulties. We realized we needed like two days of training to get familiar with the use of the tablets* (Female CBV in Nyanza).

Without being prompted, nearly two-thirds of interviewed CBVs provided examples of how Sugira Muryango changed their personal lives and helped them relate better in their own households. The personal benefits of the Sugira Muryango content created greater buy-in to the merit of the intervention, which helped CBVs feel more enthusiastic about delivering it well, and giving them confidence that they were setting a good example to the families they worked with. One CBV described this in his own life:

> *There are things that I realized I had to apply in my own household. We taught them, but we taught ourselves as well… you cannot quarrel with your wife at home and then go in another household and teach them about good relationships. They could know about it. (Being a coach) required us to be blameless in our village* (Male CBV in Ngoma).

Out of the 37 female CBVs interviewed, one female CBV stated that she did not have the support from her husband to facilitate the Sugira Muryango intervention. She stated that:

> *I felt good after the training and it helped me achieve the goals of my work, but suddenly my husband asked me to resign from this work with no reason. He said, 'this work takes all your time, it is hard for you to take care of the children who have to go to school, you have to stop the work.' For me, I wanted to continue, but I respected my husband and I resigned and gave back all the materials to my supervisors* (Female CBV in Nyanza).

Two CBVs mentioned how participating in Sugira Muryango helped them heal from the genocide and build back relationships with neighbors. One remarked:

> *I was punishing children with anger. I have learned how to be humble, leaving behind the genocide ideology. Among the families I was in charge of, some participated in the killing of my family members during the 1994 genocide. Their wives took away everything from our house as well. With Sugira Muryango, I tried to relate to them in order to coach them.*

Everyone who was seeing me heading to their households noticed a change within myself. I learned a lot from Sugira Muryango (Female CBV in Ngoma).

Discussion

These findings provide important implications for moving towards developing a best practice for training and supervising nonspecialists to deliver evidence-based, MHPSS and family strengthening interventions with quality. The purpose of this study was to examine how, if at all, CBV preparedness to deliver Sugira Muryango was a result of training and supervision experiences. This study's unique contribution is that it is from the perspective of CBVs and defines preparedness as both fidelity and competence.

Overall, the majority of CBVs self-reported their ability to deliver Sugira Muryango with both fidelity and competence and pointed towards the supervision and training that they received as reasons for their success. Specific elements of training that were helpful were the provision of the manual and the refresher training received. Regarding supervision, factors that made supervision helpful included opportunities for peer learning, regular meetings with supervisors (preferably in-person), and correction in private. When asked about their preparedness, more CBVs described their skills in competence rather than in fidelity, particularly in Nyanza, which could be a result of what stood out to CBVs personally, or it could indicate that CBVs had greater skills in competence than fidelity. If so, this could be a result of the training and supervision content received, or this could be due to interviewing techniques providing incomplete data. While CBVs often provided examples of families improving in child development, nutrition, and hygiene and decreasing family violence, the interviewers did not probe to ask if this was a result of their fidelity to the manual. Future research should use mixed methods to compare quantitative fidelity and

competence scores with detailed qualitative descriptions of CBV performance in both fidelity and competence.

This study also explored what, if any, differences across CBV gender and/or district existed regarding supervision and training experiences or CBV quality of delivery. Data did not reveal any significant gender differences between supervision or training experiences nor their ability to deliver Sugira Muryango with quality. This finding is consistent with what is seen quantitatively in a study using data from a later iteration of Sugira Muryango, also delivered by male and female nonspecialists (see Chapter 2). Some differences in themes existed across district: namely, CBVs in Nyanza provided examples of other trainings they had received. These trainings were about HIV prevention and reconciliation after the genocide.

In the future, it may be helpful for research teams to seek out information regarding previous training received during an initial landscape analysis or baseline data collection or through networking with other agencies working in communities. This could help clarify in training how this information builds upon or complements what nonspecialists have learned before. In the case of Sugira Muryango, CBVs felt that the Sugira Muryango training complemented what they had previously learned. The training went deeper into skills they already had and provided new skills without negating what they had learned previously. Ideally, all training that nonspecialists receive is complementary; however, it is possible that in the future this may not be the case, and it may be necessary to rectify any information learned previously that is not evidence-based or consistent with the latest evidence. In addition, some interventions use implementation strategies such as an expert Seed Team (Hurlburt et al., 2014), in which previous facilitators train and supervise new facilitators. When this is the case, it will also be important to ensure that all knowledge that could be transferred is evidence-based.

In addition, CBVs in Ngoma and Rubavu districts mentioned challenges getting ahold of their supervisors on the phone or in person. In Rwanda, Ngoma is more remote and more difficult to traverse; however, some of these issues may be due to the supervisors themselves and their workstyle during the interventions. Most CBVs within a district had the same supervisor. In-person training was largely considered to be preferable and tied to competence and fidelity. However, this may be difficult to achieve in low-resource settings. Though some MHPSS interventions in low-resource settings have utilized in-person supervision methods (Zuilkowski et al., 2016; Singla et al., 2020), many opt for remote supervision or a hybrid approach (Atif et al., 2019; Puffer et al., 2021; Rahman et al., 2019; Freeman et al., 2023). CBVs also frequently cited a lack of airtime and delayed transport stipends as factors that influenced the quality of their work. While compensation is not directly connected to training and supervision, it may influence the effectiveness of training and supervision (Brown et al., 2023). In situations where remote supervision is required, it may be helpful to provide these resources adequately so that calls can be made regularly to supervisors and to ensure that the ratio of supervisors to nonspecialists remains small. For example, in a later iteration of Sugira Muryango, about three nonspecialists were assigned to one supervisor. In addition, supervision was done weekly instead of monthly. Preliminary data from the PLAY Collaborative, whereby Sugira Muryango is tested with a multi-level implementation strategy, has revealed that nonspecialists were satisfied with the amount of supervision received during intervention delivery. This suggests that lower ratios of supervisor to nonspecialists and more regular meetings are a better supervision strategy. Few studies examine best practices for supervision, but one study testing supervision modalities suggests that a smaller case load may improve supervision functionality (Dorsey et al., 2017).

Many interventions delivered by nonspecialists use audio or video recorders to monitor quality (Bond et al., 2022). In Sugira Muryango, CBVs referenced the recorders as helpful tools that allowed supervisors to self-monitor. In addition, the Sugira Muryango manual, which was discussed in-depth during the initial two-week training, was the most useful tool for helping CBVs stay prepared. However, greater technology support may be needed regarding the integration of tablets, which were used by CBVs to record data about the families.

Nonspecialists may be likely to perform better when they believe in the content of the intervention itself and its goals. Almost all CBVs delivering Sugira Muryango mentioned seeing personal benefits in their own families because of what they were learning in the manual. This was a particularly salient finding because this data was often provided unprompted and when asked open-ended questions such as "what did you like about delivering Sugira Muryango?" While this is not a topic that, to my knowledge, has been explicitly explored in literature, a recent study provides examples of nonspecialists using skills in their own lives from the intervention that they were delivering (Desrosiers et al., 2023). Future research can explore the connection between personal satisfaction with the intervention and fidelity and competence. Likely, a mixed methods study would be able to answer this question best—by first examining patterns of observed fidelity and competence in nonspecialists and then comparing nonspecialist experiences with personal satisfaction with their scores.

A plethora of reasons exist for using nonspecialists to deliver evidence-based MHPSS interventions, including cost-effectiveness (Joshi et al., 2014; Freeman, 2016; O'Shea et al., 2016), clinical effectiveness (Perry & Zulliger, 2012; Singla et al., 2017; Patel et a., 2017); access to communities (Kohrt et al., 2018); and capacity-building and power-shifting (WHO, 2007; Rose & Kalathil, 2019; Fricchione et al., 2012). CBVs across all districts of Sugira Muryango provided

examples of being seen as leaders in the community because of their position delivering the intervention. In addition, CBVs spoke to community access—suggesting that trust and rapport were easier to build when they had pre-existing relationships with their neighbors to whom they were delivering the intervention. This aligns with the BeFITS-MH Framework, which suggests that provider characteristics, such as role in community, serve as factors facilitating implementation.

Task-sharing to nonspecialist providers can catapult CBVs into leadership positions in communities, which can result in capacity building and shifting power and knowledge to local communities. This has implications for recruitment strategies and selection of nonspecialists. The PLAY Collaborative has engaged community leaders at multiple levels, and MHPSS interventions that deeply involve local leaders can be helpful in cementing the relationship between nonspecialists and leaders and providing future opportunities for nonspecialists. For example, if community leaders are also involved in or aware of the intervention, they may be more likely to provide future opportunities for nonspecialists to continue sharing the skills learned in the intervention. This could also lead to greater sustainability of evidence-based interventions (Singla et al., 2018). Future research should explore this topic further and perhaps delve into the nuance of what should come first—are interventions more effective and sustainable when nonspecialists are selected who are already seen as leaders in the community or should evidence-based interventions seek out nonspecialists who are not yet seen as leaders in order to propel those with potential into the next steps of their career and provide career opportunities?

Limitations

This study has limitations. First, due to the nature of secondary data, the key informant interview guides were designed for various purposes without the forethought of this specific

research question. While the guides do include many questions on training and supervision experiences, for this study, it would have been beneficial to have included probes explicitly about CBV preparedness with both fidelity and competence, separately. Secondly, as Rwandan culture is incredibly hierarchical, the practice of constructive feedback or sharing negative experiences with those above you is discouraged. This may affect the reliability of the data and lead to social desirability bias, particularly when the study team conducting the interviews is associated with implementation.

Conclusion

This study demonstrates that supervision and training enable nonspecialist providers, CBVs, to deliver an evidence-based intervention in Rwanda, Sugira Muryango, with both competence and fidelity. Improvements to training and supervision, including more in-person monitoring, greater and more timely compensation, and technological support may help nonspecialist providers feel more equipped when delivering evidence-based interventions.

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Appendices

Appendix A. Quality of Delivery Checklist in Sugira Muryango Cluster-Randomized Trial

Assessing Quality of Delivery in Sugira Muryango	
Competence: empathy, encouragement, motivation, praise, active listening, goal setting	Fidelity: active coaching with serve and return, problem solving, emotional regulation and processing, communication skills, restructuring, relaxation
The CBV engaged the family in a discussion	The CBV greeted the family and asked how the family has been since the last meeting
The CBV uses suggestions and reminders to encourage the caregivers	The CBV reviewed material from the previous session
The CBV used active coaching to explain, model and coach caregivers in age-appropriate early stimulation activities with the child	The CBV asked family what activities they have practiced with their child since the last session
The CBV does not interrupt the family while they are practicing the activity	The CBV asked family what new skills they have used since the last session
The CBV gives good feedback to the caregivers (no more than 2-3 suggestions at a time)	The CBV shared knowledge with the caregivers (related to the intervention)
The CBV established a good rapport with the family	The CBV asked the caregivers if there were any issues when attempting the new activities or skills
The CBV praised the caregivers for participating	The CBV asked caregivers which information is new or most interesting to them
The CBV communicates and demonstrates empathy and warmth with family	The CBV checked out with the family regarding what they liked most about the session
The CBV was prepared and well-organized	The CBV and caregivers agreed on activities the caregiver would adopt between now and the next session
The CBV was able to employ flexibility and creativity when delivering the intervention	The CBV and caregivers discussed what new skills the caregiver would adopt between now and the next session
The CBV did not deviate from active coaching guidelines	The CBV problem solved issues with the family
The CBV answered the caregivers' questions appropriately	The CBV recapped key message from the day's session
	The CBV maintained professionalism when interacting with the family

Appendix B. Quality of Delivery Checklist in Sugira Muryango Embedded Trial in the PLAY Collaborative

Module Specific Questions: Module 1						
1.	The IZU facilitated discussion with the caregiver(s) in order to construct the family story or narrative.	0 Did not occur	1 Poor	2 Needs Improvement	3 Average	4 Excellent
2.	The IZU facilitated a discussion of family challenges and strengths.	0 Did not occur	1 Poor	2 Needs Improvement	3 Average	4 Excellent
3.	The IZU supported the caregiver(s) as they made homemade toys together.	0 Did not occur	1 Poor	2 Needs Improvement	3 Average	4 Excellent
4.	The IZU discussed what it means to be a strong family.	0 Did not occur	1 Poor	2 Needs Improvement	3 Average	4 Excellent

Module Specific Questions: Module 2						
1.	The IZU discussed the importance of stimulating a baby's brain by talking to one's baby, touching one's baby, and playing with one's baby.	0 Did not occur	1 Poor	2 Needs Improvement	3 Average	4 Excellent
2.	The IZU described the baby's brain as a sponge that will absorb both positive and negative things in their environment.	0 Did not occur	1 Poor	2 Needs Improvement	3 Average	4 Excellent
3.	The IZU discussed the importance that play activities and toys change as the child grows older for continued learning and growth.	0 Did not occur	1 Poor	2 Needs Improvement	3 Average	4 Excellent

Module Specific Questions: Module 3						
1.	The IZU discussed how children learn language.	0 Did not occur	1 Poor	2 Needs Improvement	3 Average	4 Excellent
2.	The IZU discussed the importance of building a baby's language and communication skills.	0 Did not occur	1 Poor	2 Needs Improvement	3 Average	4 Excellent
3.	The IZU discussed different ways caregiver(s) can help their child develop language skills.	0 Did not occur	1 Poor	2 Needs Improvement	3 Average	4 Excellent

Module Specific Questions: Module 4						
12.	The IZU discussed hygiene practices like washing hands, using clean water, cooking food properly, keeping the house clean, properly disposing of rubbish, and washing clothing.	0 Did not occur	1 Poor	2 Needs Improvement	3 Average	4 Excellent
13.	The IZU discussed the importance of using soap and water to keep children and themselves clean.	0 Did not occur	1 Poor	2 Needs Improvement	3 Average	4 Excellent
14.	The IZU checked for the presence of a tippy tap.	0 Did not occur	1 Poor	2 Needs Improvement	3 Average	4 Excellent
15.	The IZU did a handwashing demonstration with the caregiver(s).	0 Did not occur	1 Poor	2 Needs Improvement	3 Average	4 Excellent
16.	The IZU checked to see where the caregiver(s) dispose of rubbish.	0 Did not occur	1 Poor	2 Needs Improvement	3 Average	4 Excellent
17.	The IZU checked to see the latrine and ensure it is kept clean.	0 Did not occur	1 Poor	2 Needs Improvement	3 Average	4 Excellent

Module Specific Questions: Module 5						
1.	The IZU discussed the importance of breastfeeding for children under 6 months.	0 Did not occur	1 Poor	2 Needs Improvement	3 Average	4 Excellent
2.	The IZU discussed the importance of eating a variety of foods in order to support their children's growth and development.	0 Did not occur	1 Poor	2 Needs Improvement	3 Average	4 Excellent
3.	The IZU discussed different types of nutritious foods that children older than 6 months old can eat.	0 Did not occur	1 Poor	2 Needs Improvement	3 Average	4 Excellent

Module Specific Questions: Module 6						
12.	The IZU discussed the importance of good health and hygiene and what to do if your child is sick.	0 Did not occur	1 Poor	2 Needs Improvement	3 Average	4 Excellent
13.	The IZU observed if the family has a mosquito net and if not, made a note to discuss this issue with the Community Health Worker.	0 Did not occur	1 Poor	2 Needs Improvement	3 Average	4 Excellent
14.	The IZU discussed the Mutuelle de Santé Health Insurance Program.	0 Did not occur	1 Poor	2 Needs Improvement	3 Average	4 Excellent
15.	The IZU discussed immunizations with the caregiver(s).	0 Did not occur	1 Poor	2 Needs Improvement	3 Average	4 Excellent

Module Specific Questions: Module 7						
12.	The IZU practiced different stress reduction activities like Deep Breathing and Positive Imagery with the caregiver(s).	0 Did not occur	1 Poor	2 Needs Improvement	3 Average	4 Excellent
13.	The IZU discussed the impact of stress on children	0 Did not occur	1 Poor	2 Needs Improvement	3 Average	4 Excellent
14.	The IZU discussed positive discipline strategies, like rewarding good behavior, that caregivers can use.	0 Did not occur	1 Poor	2 Needs Improvement	3 Average	4 Excellent

Module Specific Questions: Module 8						
12.	The IZU appropriately used the vignette of the Mugabo family, of Tabitha, or the Kanyamahane family to engage the caregiver(s) in a discussion.	0 Did not occur	1 Poor	2 Needs Improvement	3 Average	4 Excellent
13.	The IZU discussed how violence in the home can affect family members in unhealthy ways.	0 Did not occur	1 Poor	2 Needs Improvement	3 Average	4 Excellent
14.	The IZU discussed conflict resolution strategies like positive communication and deep breathing.	0 Did not occur	1 Poor	2 Needs Improvement	3 Average	4 Excellent
15.	The IZU coached the caregiver(s) in an active listening activity.	0 Did not occur	1 Poor	2 Needs Improvement	3 Average	4 Excellent

Module Specific Questions: Module 9						
1.	The IZU discussed the importance of healthy relationships and sharing responsibilities in the home.	0 Did not occur	1 Poor	2 Needs Improvement	3 Average	4 Excellent
2.	The IZU appropriately used the vignette of the Ntakirutimana and Ntirushwamaboko family or the vignette of Kanyange to engage the caregiver(s) in a discussion.	0 Did not occur	1 Poor	2 Needs Improvement	3 Average	4 Excellent
3.	The IZU discussed positive discipline strategies, like rewarding good behavior, that caregivers can use.	0 Did not occur	1 Poor	2 Needs Improvement	3 Average	4 Excellent

Module Specific Questions: Module 10						
1.	The IZU appropriately used the vignette of Kamaliza to engage the caregiver(s) in a discussion.	0 Did not occur	1 Poor	2 Needs Improvement	3 Average	4 Excellent
2.	The IZU discussed that positive caregiving involves responding to and communicating with one's child.	0 Did not occur	1 Poor	2 Needs Improvement	3 Average	4 Excellent
3.	The IZU discussed how stressors can affect responsive parenting and the importance of practicing self-care.	0 Did not occur	1 Poor	2 Needs Improvement	3 Average	4 Excellent
4.	The IZU discussed the concept of "serve and return" with the caregiver(s) and suggested "serve and return" interactions the caregiver(s) can do with their child.	0 Did not occur	1 Poor	2 Needs Improvement	3 Average	4 Excellent

Module Specific Questions: Module 11						
1.	The IZU reminded the caregiver(s) that for a baby's brain to grow the baby needs opportunities to play, practice new skills, see new things, and copy what others do.	0 Did not occur	1 Poor	2 Needs Improvement	3 Average	4 Excellent
2.	The IZU discussed the importance of having a clean, safe and supportive home environment to support a child's learning.	0 Did not occur	1 Poor	2 Needs Improvement	3 Average	4 Excellent

Module Specific Questions: Module 12						
1.	The IZU discussed resources in the community and helped the caregiver(s) develop a safety plan.	0 Did not occur	1 Poor	2 Needs Improvement	3 Average	4 Excellent

General Module Questions (Competence)						
1	The IZU reviewed material from the previous session with the family	0 (did not occur)	1 (Poor)	2 (Needs Improvement)	3 (Average)	4 (Excellent)
2	The IZU asked the family what activities and skills they have practiced with their child or in their household since the last session.					
3	The IZU engaged the family in a discussion about the module topic(s) and encouraged participation from all caregivers					
4	The IZU used active listening to support caregiver-led discussion.					
5	The IZU and caregivers discussed what new skills and activities the caregiver would adopt between now and the next session.					
6	The IZU checked out with the family regarding what they liked most about the session					

	and addressed any concerns.					
7	The IZU praised and encouraged the caregivers.					
8	The IZU problem solved issues with the family.					
9	The IZU was well prepared for the session.					
10	The IZU answered the caregivers' questions appropriately.					
11	The IZU appropriately used the Sugira Muryango manual, images and vignettes to support session delivery.					
12	The IZU was able to customize the intervention to the needs of the family.					
13	IZU communicates and demonstrates empathy and warmth with the family.					
14	The IZU was confident and comfortable when delivering intervention content.					
15	**For the 15-minute active play session:** The IZU followed active coaching guidelines when coaching the caregivers during the active play session.					
16	**For the 15-minute active play session:** The IZU allowed both caregivers to independently practice the activity with the child.					

Appendix C. Protection of Human Subjects

Risks to Human Subjects

There are minimal risks to human subjects. During data collection regarding mental health and household dynamic outcomes, participants may become triggered or agitated by reporting on negative psychosocial experiences that they have had. In the case that participants become uncomfortable, the enumerator or research assistant collecting data will be trained to ask the participant if they wish to cease or pause the survey or interview.

Recruitment and Informed Consent

For baseline and midline data collection in the PLAY Collaborative Expansion study, research assistants trained by a local partner, Laterite, were assigned to complete four households per day. Research assistants worked in a sub-team of three people composed of two female and one male enumerator(s). During household interviews, female enumerators were responsible for completing the CGRS surveys with female caregivers, and male enumerators with male caregivers. The same data collection procedures will be repeated at endline.

Enumerators will administer the D&I survey to IZUs and PLAY Collaborative members at a central location, including churches or open spaces. No more than four IZUs and 11 members of the PLAY Collaborative will be invited at a time, in waves, to the central location. Sub-teams of enumerators will travel together to these sites, composed of a field supervisor, field coordinator, and three to four enumerators.

To receive informed consent from both caregivers and IZUs caregivers, the research team will call the participant prior to endline data collection to provide a refresher on the purposes of the study and ask for permission to re-enroll the participant in the study. If the participant provides oral consent over the telephone, the research team will re-consent the participant and receive either

a signature or a fingerprint at the time of in-person data collection. Study participants will be read a preamble that will explain the study purposes, the risks of participation, and explicitly state that participation is voluntary and there will be no negative consequences to removing oneself from the study. Participants will also have the chance to ask the enumerator or the interviewer any questions. If consent is received, the semi-structured interview or the survey will continue. For qualitative data, participants will be asked permission for the interview to be audio-recorded. Participants are able to opt out of audio recording, in which case, the interviewer will take notes instead. Consent will be recorded in both a tablet/mobile phone and in hard copy forms. Two hard copy consent forms will be signed – one will remain with the participant, and the other will remain with the research team.

Data Management and Confidentiality

All data will be de-identified and stored in secure servers. The research team collecting quantitative data for the endline survey of the PLAY Collaborative Expansion will use android mobile devices. by trained independent, local enumerators who were blinded to intervention status and supervised by the Principal Investigator, the Program Manager, and Boston College School of Social Work staff in partnership with FXB—Rwanda.

All quantitative data will be collected using SurveyCTO, a secure mobile data collection platform that can be used offline and will allow enumerators to collect participant data using a password protected mobile phone or tablet. Once each interview is marked as finalized by the respective enumerator the Survey CTO platform will automatically encrypt the data. The data on the tablets then cannot be read without the private decryption key, which will only be known by management team directly working on the project. Then, data will be uploaded to the secure SurveyCTO cloud-based server. Whenever form data is transmitted via a 3G or other internet

network, it is encrypted in transit. Field Coordinators and Supervisors are able to utilize a built-in SurveyCTO monitoring and visualization function to review any inconsistencies in data.

In order to protect subjects' personal information, all the data has been anonymized by assigning each participant a unique alphanumeric identifier for both quantitative and qualitative data. This identifier is later used in place of a name or any other personal information in both qualitative and quantitative data processing and analyses. Further, when names of participants or their family members are stated in qualitative transcripts, these transcripts are redacted, and all the information is properly anonymized as well. For qualitative data, electronic audio recordings will be encrypted, loaded onto a Boston College encrypted computer, and uploaded to the Boston College network via a secure connection (Accellion). All data transmission will use HTTPS secure protocol.

Potential Benefits to Research Participants

Study participants will be compensated the equivalent of $5 USD for participating in the study. This amount will be delivered to participants via a local, Mobile Money app. Nonmonetary potential benefits to research participants include the gratification of contributing to a study designed to support vulnerable households and to feed data back into a large, national, poverty reduction scheme throughout the country.

Appendix D. Full Results of Multi-Level Growth Models

	Non-violent punishment			Deprivation			Psychological aggression			Physical punishment		
	O.R.	95% C.I.	*p*	O.R.	95% C.I.	*p*	O.R.	95% C.I.	*p*	O.R.	95% C.I.	*p*
District[a]												
Rubavu	0.63	(0.26, 1.53)	0.308	0.95	(0.57, 1.58)	0.858	1.42	(0.51, 4.00)	0.504	1.17	(0.58, 2.34)	0.666
Ngoma	1.49	(0.54, 4.09)	0.437	0.76	(0.25, 2.26)	0.626	1.95	(0.72, 5.34)	0.191	2.09	(0.93, 4.65)	0.071
Education[b]												
Primary	1.28	(0.58, 2.82)	0.62	**9.11**	**(1.49, 55.65)**	**0.017**	0.70	(0.28, 1.71)	0.433	1.05	(0.52, 2.13)	0.881
Secondary	1.15	(0.36, 3.60)	0.24	3.40	(0.32, 36.34)	0.311	0.44	(0.19, 1.04)	0.062	1.11	(0.41, 3.02)	0.843
Religious	3.62	(0.62, 21.35)	1.42	**13.95**	**(1.09, 176.95)**	**0.042**	0.93	(0.08, 10.38)	0.955	4.59	(0.82, 25.80)	0.084
Caregiver Age	1.00	(0.97, 1.03)	0.974	0.98	(0.94, 1.03)	0.415	**0.96**	**(0.93, 0.99)**	**0.009**	**0.97**	**(0.94, 0.99)**	**0.009**
IZU Age	0.98	(0.94, 1.02)	0.259	0.99	(0.95, 1.04)	0.735	1.02	(0.99, 1.05)	0.073	1.00	(0.97, 1.03)	0.933

[a]Base value is Nyanza district
[b]Base value is no education

	Acceptance			Organization			Responsiveness		
	b	95% C.I.	*p*	*b*	95% C.I.	*p*	*b*	95% C.I.	*p*
District[a]									
Rubavu	0.041	(-0.161, 0.244)	0.692	0.161	(-0.328, 0.651)	0.518	**-0.467**	**(-0.852, -0.082)**	**0.017**
Ngoma	-0.078	(-0.312, 0.156)	0.515	**-0.643**	**(-1.19, -0.093)**	**0.022**	-0.078	(-0.520, 0.364)	0.731
Education[b]									
Primary	**0.224**	**(0.058, 0.390)**	**0.008**	**0.406**	**(0.126, 0.687)**	**0.005**	**0.751**	**(0.382, 1.120)**	**0.000**
Secondary	**0.498**	**(0.250, 0.746)**	**0.000**	**0.506**	**(0.006, 1.00)**	**0.047**	**1.019**	**(0.469, 1.570)**	**0.000**

Religious	0.354	(-0.312, 0.157)	0.075	**0.890**	**(0.129, 1.65)**	**0.022**	0.817	-0.052, 1.687)	0.065
Caregiver Age	0.005	(-0.000, 0.013)	0.087	**-0.033**	**(-0.044, -0.021)**	**0.000**	0.014	(-0.001, 0.029)	0.065
IZU Age	-0.002	(-0.011, 0.006)	0.596	0.003	(-0.010, 0.017)	0.612	-0.009	(-0.024, 0.007)	0.276
		Variety			Learning Materials			Involvement	
	b	95% C.I.	*p*	*b*	95% C.I.	*p*	*b*	95% C.I.	*p*
District[a]									
Rubavu	**0.379**	**(0.181, 0.579)**	**0.000**	-0.091	(-0.571, 0.389)	0.710	-0.044	(-0.359, 0.271)	0.784
Ngoma	-0.068	(-0.227, 0.091)	0.401	-0.479	(-1.03, 0.075)	0.090	-0.178	(-0.542, 0.186)	0.338
Education[b]									
Primary	0.012	(-0.138, 0.162)	0.872	0.298	(-0.115, 0.710)	0.157	**0.348**	**(0.090, 0.606)**	**0.008**
Secondary	-0.073	(-0.331, 0.183)	0.574	0.436	(-0.180, 1.05)	0.166	**0.534**	**(0.149, 0.919)**	**0.007**
Religious	**0.423**	**(0.098, 0.748)**	**0.011**	-0.109	(-1.07, 0.860)	0.825	**0.837**	**(0.231, 1.443)**	**0.007**
Caregiver Age	**-0.010**	**(-0.018, -0.001)**	**0.027**	-0.010	(-0.027, 0.007)	0.241	0.000	(-0.010, 0.011)	0.939
IZU Age	**0.007**	**(0.000, 0.013)**	**0.035**	0.013	(-0.006, 0.033)	0.180	0.000	(-0.013, 0.013)	0.984

[a]Base value is Nyanza district
[b]Base value is no education