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Exploring mediators of the Amaka Amasanyufu Multiple Family Group Intervention (2016–2022) on parenting stress reduction among caregivers of children with disruptive behavior disorders in Uganda

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Abstract

Residing in poverty-impacted Ugandan communities and raising children with disruptive behavior disorders (DBDs) is associated with above heightened parenting stress. An evidence-based intervention designed to help parents tailor their parenting style to effectively manage children with DBDs was implemented in Uganda between 2017 and 2023. At the end of the intervention, caregivers displayed lower levels of parenting stress than controls, however the mechanisms by which stress reduction occurred is unknown. We investigated whether the intervention's effect on parenting stress was mediated by parenting practices, family cohesion, or mental health.

Mediation was assessed using Mitchell and Maxwell's cross-lagged auto-regressive approach. Each mediation model regressed the outcome parenting stress score at each time point onto intervention group assignment (0 = Control; 1 = Multiple Family Group (MFG) intervention) and

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CRedit authorship contribution statement

Fred M. Ssewamala, Mary M. McKay, Kimberly Hoagwood: conceptualization, supervision, implementation, writing. Rachel Brathwaite, Torsten B. Neilands, Massy Mutumba: data analysis, writing, reviewing, editing. Ozge Sensoy Bahar, Phionah Namatovu: implementation, supervision, writing, reviewing, editing.

Declaration of competing interest

All authors declare there is no competing interest.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.ssmmh.2024.100338>.

parenting stress score at the preceding time point. Each mediator was investigated one at a time and regressed onto intervention group assignment and the mediator score at the preceding time point. Parenting stress score was also regressed onto the preceding time point mediator score. The residuals for mediators and parenting stress were allowed to correlate at each time point. We included regression pathways from each covariate to the mediators and outcomes at subsequent waves and were included in the model as random variables.

The findings show that the intervention had a significant direct effect on parenting stress at 16 weeks post intervention initiation and was partially mediated by parenting practices, caregiver mental health, and parenting stress at 8 weeks, but we found no evidence it was mediated by family cohesion, supporting two of our hypotheses.

Equipping caregivers with parenting skills and strategies to improve mental health can go a long way in reducing overall parenting stress among caregivers with DBDs. Our findings could be leveraged to enhance stress reduction among caregivers of children with DBDs in the long-term.

Keywords

Parenting stress; Disruptive behavior disorders; Mediation effects; Caregivers; Low resource settings

1. Introduction

Parenting stress, defined as the experience of distress or discomfort that arises from the excessive demands related to parenting (Deater-Deckard, 2008), is considered normal and inevitable during the parenting process. Yet, experiencing persistent challenges associated with parenting in the absence of sufficient coping skills and resources can compound the would-be “normal” parenting stress, negatively affecting parents’ emotional well-being (Smith, 2010), and contributing to sub-optimal developmental outcomes in children (Neece et al., 2012). For parents and caregivers, factors that increase the risk of parenting stress include poor mental health such as depression and anxiety (Gray et al., 2012), limited support from partners and family members (Park and Lee, 2022), and economic factors, including food insecurity (Berge et al., 2020).

Sub-Saharan Africa (SSA) is considered the least developed region in the world, with approximately 27% of the world’s poorest countries (Atangana, 2022). SSA also has the world’s largest youth population (Abramova, 2022). Epidemiological data highlights an increasing burden of mental health problems among youth in SSA - especially in Uganda (GBD Mental Disorders Collaborators, 2022), the focus of this paper. Residing in poverty-impacted communities can expose families to numerous stressors including material hardship, hunger and food insecurity, adverse environmental exposures (e.g. community violence, infectious diseases) (Ceccarelli et al., 2022; Lund, 2023; Lund et al., 2018; Oswald et al., 2024; The Lancet Child and Adolescent Health, 2019), and risk-taking behaviors (e.g. substance abuse and sexual risk-taking) (Leung and Shek, 2011; McBride Murry et al., 2011). Parenting stress can also lead to adverse caregiver outcomes and parenting challenges such as insecure parent-child attachment relationships that undermine family cohesion and

poor parenting practices such as harsher parenting conditions (Conger et al., 2010). Children residing in poverty-impacted environments are more likely to experience toxic stress that increases their risk of mental health problems (Garner et al., 2012; Shonkoff et al., 2012).

Disruptive Behavior Disorders (DBDs) are one of the most prevalent mental health challenges observed among school-aged children in SSA (Ashenafi et al., 2001; Cortina et al., 2012; Kivumbi et al., 2019; H. Liang et al., 2002; Polanczyk et al., 2015). In Uganda, approximately 6–10% of primary school-going children in a poverty-impacted region screened positive for oppositional defiant disorder, 2% for conduct disorder and approximately 3% displayed attention deficient hyperactive disorder (Kivumbi et al., 2019). Higher prevalences have been observed in neighboring countries e.g. 16% prevalence of conduct problems in Ethiopia (Hunduma et al., 2024) and ~40% prevalence of DBDs in Kenya (Okaba, 2019). DBDs can negatively affect children's academic performance (Sayal et al., 2015), and social relationships with family, friends and those in authority (Loeber et al., 2000). If untreated in childhood, DBDs can persist into late adolescence and adulthood resulting in school dropout, delinquency, unemployment, and substance use - all at a high cost to society (Savolainen et al., 2015). As a parent, residing in poverty-impacted Ugandan communities and raising children with DBDs is associated with above heightened parenting stress (Brathwaite et al., 2023), which if not managed effectively, can lead to adverse child (Neece et al., 2012) and parental/caregiver outcomes (Smith, 2010).

An evidence-based intervention designed to help parents tailor their parenting style to effectively manage children with DBDs was implemented in Uganda between 2017 and 2023 (Ssewamala et al., 2018). The Amaka Amasanyufu (meaning Happy Families in Luganda, the local language spoken in the study area) Multiple Family Group (MFG) intervention was culturally adapted from the original 4Rs (Rules, Responsibility, Relationships, and Respectful Communication) and 2Ss intervention and 2Ss (Stress and Social Support) intervention that was developed in the United States (Sensoy Bahar et al., 2020). Children and their families (including adult caregivers and siblings older than six years of age) were invited to attend a total of 16 sessions, with one session delivered every week at the school setting. The sessions were designed to last for a maximum of 1 h and 30 min and included role-plays, group discussions, and activities. Within each session, children and caregivers may split up complete some activities separately, then reconvene for sharing and discussing as a larger group. Each session was divided into five components which were incorporated by the facilitators (trained parent peers or community health workers) during delivery: Family social, Main discussion, Let's share, Let's practice, Roadwork (Sensoy Bahar et al., 2020). The topics of the 16-session curriculum are available in Table S1 in the supplementary file. This intervention was informed by several theories including family systems, structural family, and social learning theories, infused with psycho-education and social group work (Dennison, 2005; McKay et al., 2011). These multiple theories allowed for a flexible intervention delivery and the inclusion of other components shown to improve parental management, mental health, and strengthen families (McKay et al., 2011). The Amaka Amasanyufu intervention (Sensoy Bahar et al., 2020) incorporated evidence-based principles to enhance parenting skills for raising children with DBDs. These included practicing appropriate behaviors, modeling and role playing, coaching, setting goals, improving family communication and building family strengths (Chorpita et al., 2007;

Jones and Prinz, 2005). The MFG delivery format created opportunities for communication, sharing of experiences, building support and managing mental health while acknowledging the stressors of living in low-resource communities and raising children with DBDs.

In Uganda, children who participated in this intervention displayed lower oppositional defiant disorders, and impaired functioning (Brathwaite et al., 2022), lower depressive symptoms and higher self-concept compared to children in the control group (Brathwaite et al., 2023). Additionally, caregivers displayed fewer mental health problems and lower levels of parenting stress than controls (Brathwaite et al., 2023).

However, the mechanisms through which the intervention achieved a reduction in parenting stress are unclear, as it is unknown whether the intervention's effect on parenting stress was mediated by changes in parenting practices, family cohesion, or mental health. By examining these mechanistic pathways, we can clarify how the intervention achieved a reduction in parenting stress and improve our understanding of the mechanisms of treatment, and perhaps identify alternative, more efficient, intervention strategies (Gunzler et al., 2013). Thus, this paper aims to assess the effect of the MFG intervention on parenting stress (16 weeks post intervention initiation) and identify potential underlying mechanisms (e.g. parenting practices, family cohesion and caregiver mental health) at 8 weeks (mid-intervention). We hypothesize that the MFG intervention would lead to a decline in parenting stress, and this effect will be mediated through positive parenting practices, enhanced family cohesion, and improved caregiver mental health.

2. Methods

2.1. Study design and data

We utilized longitudinal data from the SMART Africa Uganda study, a cluster-randomized controlled trial, which implemented the Amaka Amasanyufu MFG intervention in 26 public/government-supported primary schools in the greater Masaka region of Uganda. This region is characterized by high levels of poverty, a significant burden of HIV, and numerous other risk factors that can increase parenting stress and disruptive behavior disorders (DBDs) in children. Originally, the study included 30 schools; however, 4 schools were dropped during the COVID-19 lockdown in Uganda, which lasted over a year and prevented implementation in those locations.

To be included in the study, children had to be: aged between 8 and 13 years (grades 2 to 7); caregiver completed a screening assessment for DBDs (Disruptive Behavior Disorder Rating Scale (Pelham et al., 2005), Iowa Conners Scale (Waschbusch and Willoughby, 2007), and Impairment Rating Scale (Fabiano et al., 2006)); caregiver provided written consent; and child provided assent to participate. Participants were randomized to a MFG intervention delivered via parent peers (MFG-PP), MFG delivered via community health workers (MFG-CHW) or a control condition and followed up at 8-weeks (mid-intervention) and 16-weeks (end-intervention). Given that previous findings found no significant differences in parenting stress between the two intervention groups (Brathwaite et al., 2023), we combined the MFG-PP and MFG-CHW intervention groups into one arm for this analysis.

2.2. Ethics

The SMART Africa-Uganda study was approved by the Uganda Virus Research Institute (GC/127/16/05/555), the Uganda National Council of Science and Technology (SS4090), and the Washington University in St. Louis Institutional Review Board (#2016011088). The study is registered in the Clinical Trials database: [NCT03081195](#); registration date: March 16, 2017.

2.3. Outcome measure

Parenting stress was assessed among primary caregivers using Abidin's 36-item Parenting Stress Index-Short Form (PSI-SF) (Abidin, 1990). The measure has been used previously among caregivers in Uganda (Nabunya et al., 2014), with high levels of internal consistency at baseline, 8 weeks and 16 weeks (Cronbach alpha = 0.88, 0.89, and 0.89, respectively). In addition to overall stress, the PSI-SF detects stress arising from three domains: 1) Parental Distress; 2) Parent-Child Dysfunctional Interaction and; 3) Difficult Child. Higher scores meant higher stress levels.

2.4. Mediators

Parenting practices was measured using the 9-item short form of the Alabama Parenting Questionnaire (APQ-9) which was designed to assess parenting practices related to disruptive behaviors (Elgar et al., 2007). The APQ-9 comprises three sub-scales with three items in each scale: Positive Parenting, Inconsistent Discipline, and Poor Supervision. Caregivers rated each of the nine items on a five-point Likert scale ranging from never (1) to always (5). Scores in the positive parenting subscale were reverse coded to reflect less positive parenting practices, to be consistent with other sub-scales before computing the total scale score. Higher raw scores in each sub scale represented less positive parenting, higher inconsistent discipline, and lower parental supervision. Thus, higher scores on the total scale are indicative of poorer parenting practices. Internal consistency of the total scale was moderate ranging from $\alpha = 0.52$ at baseline, 0.58 at 8 weeks, 0.57 at 16 weeks.

Family cohesion was measured using an 8-item scale adapted from the Family Environment Scale (Moos, 1994) and the Family Assessment measure (Skinner et al., 2009). This assesses how well family members are committed to supporting and helping each other. Each item is rated on a five-point Likert scale ranging from never (1) to always (5), with higher raw scores representing greater family cohesion ($\alpha = 0.74, 0.82, 0.77$).

Caregiver mental health was evaluated using the 34-item Brief Symptom Inventory (BSI) (Drobnjak, 2013). The BSI measures nine domains of mental health functioning: somatization, obsession-compulsion, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation and psychoticism. Caregivers rated each symptom on a Likert scale ranging from never (1) to always (5), with higher scores indicative of more mental health distress. The BSI showed high reliability at baseline (Cronbach $\alpha = 0.92$), 8 weeks ($\alpha = 0.94$) and 16 weeks ($\alpha = 0.94$).

2.5. Covariates

We included caregiver educational level, caregiver employment status and asset ownership as control variables in the models. These variables have been associated with parenting practices and caregiver mental health in prior studies (Fang et al., 2022; Nagy et al., 2022; Pappin et al., 2015). Education level was categorized into a series of indicator variables according to none, primary, secondary, certificate/diploma/vocational/tertiary level (reference level: none). Employment status was categorized into a binary variable with the options employed vs unemployed (including retired, disabled and student caregivers). Asset ownership was a count variable describing ownership of 18 different assets including property, small businesses, types of transportation vehicles, crop gardens, and animal husbandry (Ssewamala et al., 2009).

2.6. Statistical analysis

Mediation was assessed using Mitchell and Maxwell's cross-lagged auto-regressive approach (Mitchell and Maxwell, 2013). This approach reduces bias since it includes mediators and outcomes at all time points and their autoregressive associations. Each mediation model regressed the outcome parenting stress score at each time point onto intervention group assignment (0 = Control; 1 = MFG intervention) and parenting stress score at the preceding time point. Each mediator (family cohesion, parenting practices and caregiver mental health) was investigated one at a time to allow for different indirect effect directions and magnitudes to emerge for each mediator. Each mediator was regressed onto intervention group assignment and the mediator score at the preceding time point. Parenting stress score was also regressed onto the preceding time point mediator score. The residuals for mediators and parenting stress were allowed to correlate at each time point.

We included regression pathways from each covariate to the mediators and outcomes at subsequent waves (Fig. 1). In other words, a covariate at time 1 predicted the mediator and the outcome at time 2 as well as at time 3 and the covariate at time 2 predicted the mediator and the outcome at time 3. Covariates were included in the model as random variables so that cases with partial covariate data were still included in the analysis via full-information maximum likelihood estimation (FIML) such that the analysis was able to include the full sample. This also means that the covariates were correlated with each other as well as with the intervention group variable and the baseline mediator and outcome variables. According to Mitchell and Maxwell's recommended parameterization of the autoregressive mediation model, regression coefficients, residual variances and correlations among residuals were set as equal across time. The autoregressive mediation models were fitted using *Mplus 8.8*, a structural equation modeling program. Estimation was performed using maximum likelihood with cluster-adjusted robust standard errors (*Mplus* estimator MLR).

We evaluated global model fit using the following fit criteria: Comparative Fit Index (CFI), Root Mean Square Error of Approximation (RMSEA), and Standardized Root Mean Square Error (SRMR). We referred to Hu and Bentler's cutoff criteria, which states that meeting any two out of the following three criteria is indicative of satisfactory global model fit: CFI 0.95, RMSEA 0.06, and SRMR 0.08 (Hu and Bentler, 1999). We examined the results and modification indices from the unmodified starting Mitchell and Maxwell

mediation models for expected improvement in fit via reduction in chi-square model fit if particular parameter constraints were released. Starting models were modified to a minimal extent to attain satisfactory global model fit. For each model, we added two modifications pathways for a) the mediator at time 1 to the mediator at time 3 and (b) the outcome at time 1 to the outcome at time 3 (autoregressive lag-2 pathways). For each model, we reported the direct effect of intervention participation on parenting stress and the total and specific indirect effects of intervention participation on parenting stress via each mediator. Since indirect effects were asymmetrically distributed, we calculated 95% confidence intervals from 5000 bias-corrected bootstrap resamples (Mackinnon et al., 2004).

3. Results

3.1. Sample characteristics

A total of 636 children were considered positive for DBD, 243 were in the control condition, 199 in the MFG-CHW group and 194 in the MFG-PP group, thus the total number of caregivers in the combined MFG group was 393 (Table 1). Caregivers' average age was 42 years, and the majority were female (~83%). Approximately 95% were formally employed, and primary school was the highest level of education completed for most caregivers (~61%).

The means and standard deviations of the outcome and mediators by study group and time point are presented in Table 2.

Using Hu and Bentler's cutoff criteria, all models met at least two of the three criteria indicating adequate model fit (Table 3).

3.2. Indirect and direct effects

Compared to controls, caregivers who received the MFG intervention had lower levels of parenting stress regardless of which mediator was being evaluated. (Table 4).

3.2.1. Parenting practices—The total indirect effect was negative and significant ($B = -2.16$; 95% CI: 2.78, -1.53). Specifically, there was an indirect effect of the MFG intervention on parenting stress at 16 weeks through parenting practices at 8 weeks ($B = -0.29$; 95% CI: 0.59, -0.11) (Table 3). For every one unit change in intervention group assignment (being in the MFG intervention group vs. controls), there was a -0.29 raw unit change in the outcome via parenting practices. There was also an indirect effect of the intervention on parenting stress at 16 weeks via parenting stress at 8 weeks, ($B = -1.87$; 95% CI: 2.39, -1.32). There was also a direct effect of the intervention on parenting stress ($B = -6.42$; 95% CI: 8.29, -4.37) at 16 weeks, which represents the variance in parenting stress at 16 weeks explained by the intervention that is unaccounted for by the mediation structure of the model, indicating partial mediation. $B = -6.42$ refers to the regression coefficient, indicating the magnitude of the effect. A negative value (-6.42) suggests that the intervention reduced parenting stress. The partial mediation indicates that the intervention not only had a direct effect on reducing parenting stress but also influenced parenting practices, which in turn further reduced parenting stress.

3.2.2. Caregiver mental health—The total indirect effect was negative and significant ($B = -2.00$; 95% CI: 2.60, -1.52). Specifically, there was an indirect effect of the MFG intervention on parenting stress at 16 weeks through caregiver mental health at 8 weeks ($B = -0.42$; 95% CI: 0.77, -0.21). Compared to controls, caregivers in the MFG intervention group had 0.42 lower parenting stress scores via caregiver mental health. There was also an indirect effect of the intervention on parenting stress at 16 weeks via parenting stress at 8 weeks, ($B = -1.58$; 95% CI: 2.03, -1.19). There was still a direct effect of the intervention on parenting stress ($B = -6.07$; 95% CI: 7.73, -4.40) at 16 weeks, which indicated caregiver mental health and parenting stress at 8 weeks only partially mediated the relationship between the MFG intervention and parenting stress. This means that the intervention reduces parenting stress by 6.07 units. Although improvements in caregiver mental health and reductions in parenting stress at 8 weeks help explain some of this reduction, they do not account for all of it. Therefore, the relationship between the intervention and reduced parenting stress is only partially mediated by these factors.

3.2.3. Family cohesion—The total indirect effect was negative and significant ($B = -2.15$; 95% CI: 2.84, -1.54). However, there was no indirect effect of the MFG intervention on parenting stress at 16 weeks through family cohesion at 8 weeks ($B = -0.26$; 95% CI: 0.75, 0.12). There was an indirect effect of the intervention on parenting stress at 16 weeks via parenting stress at 8 weeks, ($B = -1.90$; 95% CI: 2.44, -1.44). Since there was a direct effect of the intervention on parenting stress ($B = -6.37$; 95% CI: 8.12, -4.71) at 16 weeks, this indicated partial mediation. The regression coefficient indicates that the intervention reduced parenting stress by 6.37 units. The intervention significantly reduced parenting stress by 16 weeks, and while family cohesion helps explain some of this reduction, it did not account for all of it. Standardized results are presented in Table S2 in the supplemental file.

4. Discussion

This paper investigated the mediating role of parenting practices, family cohesion, and caregiver mental health between the MFG intervention and parenting stress among caregivers of children with DBDs residing in low-resource settings in Uganda. We hypothesized that the effect of the MFG intervention on parenting stress would be mediated by parenting practices, family cohesion and caregiver mental health. The findings show that the intervention had a significant direct effect on parenting stress at 16 weeks post intervention initiation and was partially mediated by parenting practices, caregiver mental health, and parenting stress at 8 weeks, but we found no evidence it was mediated by family cohesion, supporting two of our hypotheses. Our findings represent an initial and important step in outlining the mechanisms of change through which the MFG intervention improved parenting stress at the end of the intervention and can inform future attempts to reduce parenting stress among caregivers in other low-income settings.

To our knowledge, this is the first study that investigated mediating pathways between the MFG intervention and parenting stress among caregivers of children with DBDs participating in a randomized controlled trial in Uganda, contributing to the knowledge base on the mechanisms through which the MFG intervention affects changes in parenting stress.

In our study, one pathway through which the intervention improved parenting stress was by improving caregivers' parenting practices. The partial mediation by parenting practices is consistent with previous research which shows that poor parenting practices (inclusive of harsh, inconsistent and ineffective parenting) are associated with higher parenting stress (Crnic and Low, 2002). This emphasizes the importance of interventions that enhance parenting skills among caregivers of children with DBDs to cope better with parenting stress.

We also observed that poor mental health played a mediating role between the MFG intervention and caregiver parenting stress. The intervention was specifically designed to enhance parenting skills and to deal with stress in families and the environment (Chorpita et al., 2007; Jones and Prinz, 2005). In particular, caregivers and children were encouraged to discuss and explore alternative ways of dealing with frustration and anger in the household, and to discuss behaviors that may be emotionally harmful to family members including children (Sensoy Bahar et al., 2020). Additionally, sessions addressed setting rules in the home, problem solving for broken rules, responsibilities at home, good family practices, including alternative ways of disciplining children, respectful communication, and strengthening social supports for caregivers and children, which all influence parenting practices and mental health. The content discussed in the sessions seemed to have contributed to better mental health functioning, which lowered their stress levels. Although the MFG intervention sessions addressed issues related to building on family strengths, family relationships, and building families up, our hypothesis on family cohesion playing a mediating role was not supported. However, given the partial mediation observed, there may be other active ingredients such as improved social support that operated to reduce parenting stress that were not investigated in this analysis (Nyoni et al., 2019).

To our knowledge there have been no previous interventions to reduce DBDs or parenting stress in this Ugandan population. However, general evidence-based approaches like Parent Management Training and Parent-Child Interaction Therapy have shown effectiveness globally, including in low-resource settings similar to Uganda (Helander et al., 2024; Kaminski and Claussen, 2017). Similar to the 4Rs (Rules, Responsibility, Relationships, and Respectful Communication) and 2Ss (Stress and Social Support) principles reinforced in our study, these interventions focus on training parents to manage behavior through consistent discipline, positive reinforcement, and improved communication, significantly reducing parental stress and child behavior issues.

This study had numerous strengths, including the use of a longitudinal model containing autoregressive paths to and from earlier and later measures of the same mediator and outcome variables, thereby eliminating the bias encountered when using sequential mediation models (Mitchell and Maxwell, 2013). We used data from a robust cluster-randomized controlled trial, which tested an evidence-based intervention designed to address DBDs (Ssewamala et al., 2018). We also used measures that were previously validated and tested among adult populations in similar settings. However, given that these measures were based on self-reports, there is a possibility responses may be affected by social desirability bias. In our sample, the internal consistency of the APQ-9 was lower than the other scales used, however we argue that this could be attributed to the language version, and population

in which it was administered. This is also consistent with the large variability observed in Cronbach's alpha coefficients of the APQ-9 from previous studies (J. Liang et al., 2021). Nonetheless, our findings make an important contribution to the literature on family wellbeing. Findings indicate that improvements in parenting practices and caregiver mental health are important mechanisms through which the MFG intervention reduced parenting stress. Equipping caregivers with parenting skills and strategies to improve mental health can go a long way in reducing overall parenting stress among caregivers with DBDs. Our findings could be leveraged to enhance stress reduction among caregivers of children with DBDs in the long-term.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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References

- Abidin RR, 1990. Parenting Stress Index (PSI) Pediatric Psychology Press, Charlottesville, VA.
- Abramova IO, 2022. The population of Africa under the conditions of transformation of the world order. *Herald Russ. Acad. Sci* 92, S1306–S1315.
- Ashenafi Y, Kebede D, Desta M, Alem A, 2001. Prevalence of mental and behavioural disorders in Ethiopian children. *East Afr. Med. J* 78, 308–311. [PubMed: 12002109]
- Atangana E, 2022. With the continuing increase in sub-saharan african countries, will sustainable development of goal 1 ever Be achieved by 2030? *Sustainability* 14, 10304.
- Berge JM, Fertig AR, Trofholz A, Neumark-Sztainer D, Rogers E, Loth K, 2020. Associations between parental stress, parent feeding practices, and child eating behaviors within the context of food insecurity. *Prev Med Rep* 19, 101146. [PubMed: 32642403]
- Brathwaite R, Magorokosho N, Namuwonge F, Tutlam N, Neilands TB, McKay MM, Ssewamala FM, 2023. Typology and correlates of parental stress among caregivers of children with DBDs in low-resourced communities in Uganda. *PLOS Glob Public Health* 3 (8), e0002306. [PubMed: 37610998]
- Brathwaite R, Sensoy Bahar O, Mutumba M, Byansi W, Namatovu P, Namuwonge F, et al. , 2023. Short-term impact of “Amaka Amasanyufu” multiple family group intervention on mental health functioning of children with disruptive behavior disorders in Uganda. *J. Am. Acad. Child Adolesc. Psychiatr*
- Brathwaite R, Ssewamala FM, Sensoy Bahar O, McKay MM, Neilands TB, Namatovu P, et al. , 2022. The longitudinal impact of an evidence-based multiple family group intervention (Amaka Amasanyufu) on oppositional defiant disorder and impaired functioning among children in Uganda: analysis of a cluster randomized trial from the SMART Africa-Uganda scale-up study (2016–2022). *JCPP (J. Child Psychol. Psychiatry)*

- Ceccarelli C, Prina E, Muneghina O, Jordans M, Barker E, Miller K, et al. , 2022. Adverse childhood experiences and global mental health: avenues to reduce the burden of child and adolescent mental disorders. *Epidemiol. Psychiatr. Sci* 31, e75. [PubMed: 36245402]
- Chorpita BF, Becker KD, Daleiden EL, 2007. Understanding the common elements of evidence-based practice: misconceptions and clinical examples. *J. Am. Acad. Child Adolesc. Psychiatr* 46, 647–652.
- Conger RD, Conger KJ, Martin MJ, 2010. Socioeconomic status, family processes, and individual development. *J. Marriage Fam* 72, 685–704. [PubMed: 20676350]
- Cortina MA, Sodha A, Fazel M, Ramchandani PG, 2012. Prevalence of child mental health problems in sub-Saharan Africa: a systematic review. *Arch. Pediatr. Adolesc. Med* 166, 276–281. [PubMed: 22393184]
- Crnic K, Low C, 2002. Everyday Stresses and Parenting. *Handbook of Parenting: Practical Issues in Parenting*, second ed. vol. 5. Lawrence Erlbaum Associates Publishers, Mahwah, NJ, US, pp. 243–267.
- Deater-Deckard K, 2008. *Parenting Stress* Yale University Press.
- Dennison ST, 2005. *A Multiple Family Group Therapy Program for at Risk Adolescents and Their Families* Charles C Thomas Publisher.
- Drobnjak S, 2013. Brief symptom inventory. In: Gellman MD, Turner JR (Eds.), *Encyclopedia of Behavioral Medicine* Springer New York, New York, NY, pp. 269–270.
- Elgar FJ, Waschbusch DA, Dadds MR, Sigvaldason N, 2007. Development and validation of a short form of the Alabama parenting Questionnaire. *J. Child Fam. Stud* 16, 243–259.
- Fabiano GA, Pelham WE Jr., Waschbusch DA, Gnagy EM, Lahey BB, Chronis AM, et al. , 2006. A practical measure of impairment: psychometric properties of the impairment rating scale in samples of children with attention deficit hyperactivity disorder and two school-based samples. *J. Clin. Child Adolesc. Psychol* 35, 369–385. [PubMed: 16836475]
- Fang Y, Luo J, Boele M, Windhorst D, van Grieken A, Raat H, 2022. Parent, child, and situational factors associated with parenting stress: a systematic review. *Eur. Child Adolesc. Psychiatr.* 1–19
- Garner A, Shonkoff J, Child, C.o.P.A.o., Health, F., 2012. Section on Developmental and Behavioral Pediatrics. Early childhood adversity, toxic stress, and the role of the pediatrician: translating developmental science into lifelong health. *Pediatrics* 129, e224–e231. [PubMed: 22201148]
- GBD Mental Disorders Collaborators, 2022. Global, regional, and national burden of 12 mental disorders in 204 countries and territories, 1990–2019: a systematic analysis for the Global Burden of Disease Study 2019. *Lancet Psychiatr* 9, 137–150.
- Gray PH, Edwards DM, O'Callaghan MJ, Cuskelly M, 2012. Parenting stress in mothers of preterm infants during early infancy. *Early Hum. Dev* 88, 45–49. [PubMed: 21782361]
- Gunzler D, Chen T, Wu P, Zhang H, 2013. Introduction to mediation analysis with structural equation modeling. *Shanghai Arch Psychiatry* 25, 390–394. [PubMed: 24991183]
- Helander M, Asperholm M, Wetterborg D, Öst L-G, Hellner C, Herlitz A, et al. , 2024. The efficacy of parent management training with or without involving the child in the treatment among children with clinical levels of disruptive behavior: a meta-analysis. *Child Psychiatr. Hum. Dev* 55, 164–181.
- Hu L.t., Bentler PM, 1999. Cutoff criteria for fit indexes in covariance structure analysis: conventional criteria versus new alternatives. *Struct. Equ. Model.: A Multidiscip. J* 6, 1–55.
- Hunduma G, Dessie Y, Geda B, Yadeta TA, Deyessa N, 2024. Prevalence and correlates of internalizing and externalizing mental health problems among inschool adolescents in eastern Ethiopia: a cross-sectional study. *Sci. Rep* 14, 3574. [PubMed: 38347112]
- Jones TL, Prinz RJ, 2005. Potential roles of parental self-efficacy in parent and child adjustment: a review. *Clin. Psychol. Rev* 25, 341–363. [PubMed: 15792853]
- Kaminski JW, Claussen AH, 2017. Evidence base update for psychosocial treatments for disruptive behaviors in children. *J. Clin. Child Adolesc. Psychol* 46, 477–499. [PubMed: 28459280]
- Kivumbi A, Byansi W, Damulira C, Namatovu P, Mugisha J, Sensoy Bahar O, et al. , 2019. Prevalence of behavioral disorders and attention deficit/hyperactive disorder among school going children in Southwestern Uganda. *BMC Psychiatr* 19, 105.

- Leung JTY, Shek DTL, 2011. Poverty and adolescent developmental outcomes: a critical review, 23, 109–114.
- Liang H, Flisher AJ, Chalton DO, 2002. Mental and physical health of out of school children in a South African township. *Eur. Child Adolesc. Psychiatr* 11, 257–260.
- Liang J, Shou Y, Wang M-C, Deng J, Luo J, 2021. Alabama Parenting Questionnaire-9: a reliability generalization meta-analysis. *Psychol. Assess* 33, 940–951. [PubMed: 33939455]
- Loeber R, Burke JD, Lahey BB, Winters A, Zera M, 2000. Oppositional defiant and conduct disorder: a review of the past 10 Years, Part I. *J. Am. Acad. Child Adolesc. Psychiatr* 39, 1468–1484.
- Lund C, 2023. Global mental health and its social determinants: how should we intervene? *Behav. Res. Ther* 169, 104402. [PubMed: 37677893]
- Lund C, Brooke-Sumner C, Baingana F, Baron EC, Breuer E, Chandra P, et al. , 2018. Social determinants of mental disorders and the Sustainable Development Goals: a systematic review of reviews. *Lancet Psychiatr* 5, 357–369.
- Mackinnon DP, Lockwood CM, Williams J, 2004. Confidence limits for the indirect effect: distribution of the product and resampling methods. *Multivariate Behav. Res* 39, 99. [PubMed: 20157642]
- McBride Murry V, Berkel C, Gaylord-Harden NK, Copeland-Linder N, Nation M, 2011. Neighborhood poverty and adolescent development. *J. Res. Adolesc* 21, 114–128.
- McKay MM, Gopalan G, Franco L, Assael KD, Chacko A, Jackson J, et al. , 2011. A collaboratively designed child mental health service model: multiple family groups for urban children with conduct difficulties. *Res. Soc. Work. Pract* 21, 664–674. [PubMed: 22194642]
- Mitchell MA, Maxwell SE, 2013. A comparison of the cross-sectional and sequential designs when assessing longitudinal mediation. *Multivariate Behav. Res* 48, 301–339. [PubMed: 26741846]
- Moos RH, 1994. *Family Environment Scale Manual: Development, Applications, Research Consulting Psychologists Press.*
- Nabunya P, Ssewamala FM, Illic V, 2014. Family economic strengthening and parenting stress among caregivers of AIDS-orphaned children: results from a cluster randomized clinical trial in Uganda. *Child. Youth Serv. Rev* 44, 417–421. [PubMed: 25136142]
- Nagy E, Moore S, Silveira PP, Meaney MJ, Levitan RD, Dubé L, 2022. Low socioeconomic status, parental stress, depression, and the buffering role of network social capital in mothers. *J. Ment. Health* 31, 340–347. [PubMed: 32691647]
- Neece CL, Green SA, Baker BL, 2012. Parenting stress and child behavior problems: a transactional relationship across time. *Am. J. Intellect. Dev. Disabil* 117, 48–66. [PubMed: 22264112]
- Nyoni T, Nabunya P, Ssewamala FM, 2019. Perceived social support and psychological wellbeing of children orphaned by HIV/AIDS in Southwestern Uganda. *Vulnerable Child. Youth Stud* 14, 351–363. [PubMed: 32719723]
- Okaka GK, 2019. *Disruptive Behavior Disorders Among School-Going Children Aged 6–12 Years in Nairobi County University of Nairobi.*
- Oswald TK, Nguyen MT, Mirza L, Lund C, Jones HG, Crowley G, et al. , 2024. Interventions targeting social determinants of mental disorders and the Sustainable Development Goals: a systematic review of reviews. *Psychol. Med* 54, 1475–1499. [PubMed: 38523245]
- Pappin M, Marais L, Sharp C, Lenka M, Cloete J, Skinner D, et al. , 2015. Socioeconomic status and socio-emotional health of orphans in South Africa. *J. Community Health* 40, 92–102. [PubMed: 24968757]
- Park GA, Lee ON, 2022. The moderating effect of social support on parental stress and depression in mothers of children with disabilities. *Occup. Ther. Int* 2022, 5162954. [PubMed: 35359427]
- Pelham WE Jr., Fabiano GA, Massetti GM, 2005. Evidence-based assessment of attention deficit hyperactivity disorder in children and adolescents. *J. Clin. Child Adolesc. Psychol* 34, 449–476. [PubMed: 16026214]
- Polanczyk GV, Salum GA, Sugaya LS, Caye A, Rohde LA, 2015. Annual research review: a meta-analysis of the worldwide prevalence of mental disorders in children and adolescents. *JCPP (J. Child Psychol. Psychiatry)* 56, 345–365. [PubMed: 25649325]
- Savolainen J, Mason WA, Bolen JD, Chmelka MB, Hurtig T, Ebeling H, et al. , 2015. The path from childhood behavioural disorders to felony offending: investigating the role of adolescent drinking,

peer marginalisation and school failure. *Crim. Behav. Ment. Health* 25, 375–388. [PubMed: 25250918]

Sayal K, Washbrook E, Propper C, 2015. Childhood behavior problems and academic outcomes in adolescence: longitudinal population-based study. *J. Am. Acad. Child Adolesc. Psychiatr* 54, 360–368.e362.

Sensoy Bahar O, Byansi W, Kivumbi A, Namatovu P, Kiyangi J, Ssewamala FM, et al. , 2020. From “4Rs and 2Ss” to “Amaka Amasanyufu” (Happy families): adapting a U.S.-based evidence-based intervention to the Uganda context. *Fam. Process* 59, 1928–1945. [PubMed: 32027763]

Shonkoff JP, Garner AS, et al. , Child, C.o.P.A.o., Family Health, C.o.E.C., Adoption, Dependent Care, Developmental, S.o., 2012. The lifelong effects of early childhood adversity and toxic stress. *Pediatrics* 129, e232–e246. [PubMed: 22201156]

Skinner HA, Steinhauer PD, Santa-Barbara J, 2009. The family assessment measure. *Can. J. Community Ment. Health* 2, 91–103.

Smith M, 2010. Good parenting: making a difference. *Early Hum. Dev* 86, 689–693. [PubMed: 20846799]

Ssewamala FM, Han C-K, Neilands TB, 2009. Asset ownership and health and mental health functioning among AIDS-orphaned adolescents: findings from a randomized clinical trial in rural Uganda. *Soc. Sci. Med* 69, 191–198. [PubMed: 19520472]

Ssewamala FM, Sensoy Bahar O, McKay MM, Hoagwood K, Huang K-Y, Pringle B, 2018. Strengthening mental health and research training in Sub-Saharan Africa (SMART Africa): Uganda study protocol. *Trials* 19, 423. [PubMed: 30081967]

The Lancet Child & Adolescent Health, 2019. Tackling the multidimensionality of child poverty The Lancet Child & Adolescent Health 3, 199.

Waschbusch DA, Willoughby MT, 2007. Parent and teacher ratings on the Iowa Conners rating scale. *J. Psychopathol. Behav. Assess* 30, 180.

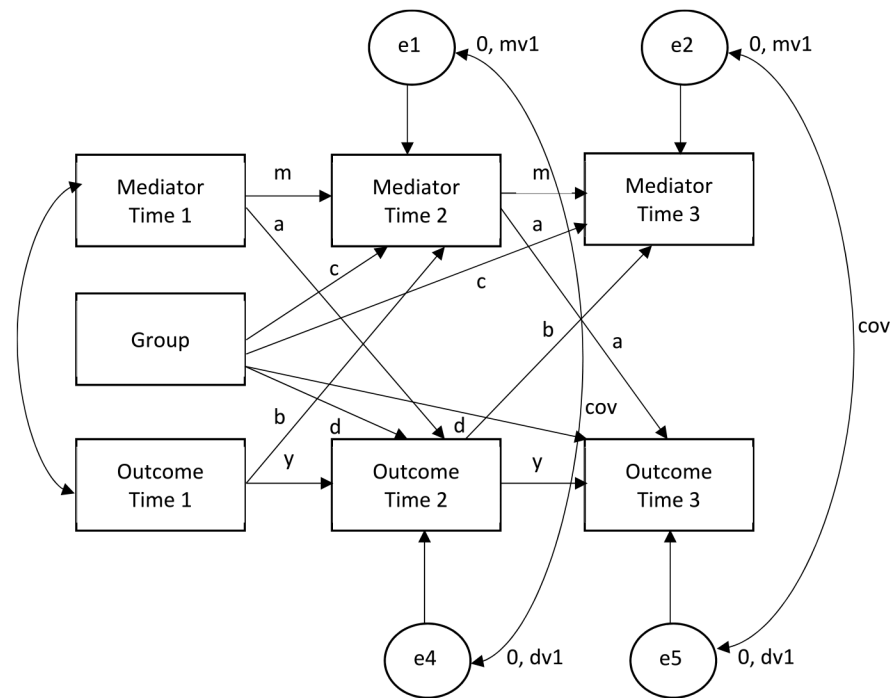


Fig. 1. Simplified diagram of the unadjusted mediation models showing the pathways that were fitted in the unadjusted model.

In this model, covariates adjusted for are not shown for simplicity. Each mediator was investigated one at a time. For each model, the group variable exerts both direct and indirect effects on the outcome. There is one key indirect effect, which is the product of path *a* from the group to the mediator at wave 2 and path *b* from the mediator at wave 2 to the outcome at wave 3. Of note, pathways with the same letter or name are constrained to have the same estimates. Thus the autoregressive effects of the mediator on itself at later waves is assumed to be constant across time via pathway *m* as is the outcome via pathway *y*. The direct effects of the group on the mediator at each wave (pathway *c*) and the direct effects of the group on the outcome (pathway *d*) are assumed to be the same over time. We also allow the residuals of the outcome and mediator to correlate within each wave (*cov*). Residual variances for the mediator (*mv1*) and outcome (*dv1*) are assumed to be equivalent across time. These various equality constraints would be relaxed to improve global model fit if the fit of the initial model that assumes these various equalities is poor.

Table 1

Characteristics of caregivers at baseline.

Characteristics	Total N = 636	Usual care N = 243	MFG intervention N = 393
Age (years), mean (SD)	42.4 (12.3)	41.5 (13.1)	42.9 (11.8)
Gender, n (%)			
Male	106 (16.7)	40 (16.5)	66 (16.8)
Female	203 (83.5)	203 (83.5)	330 (83.3)
Primary caregiver employment status, n (%)			
Formally employed	560 (88.1)	188 (77.4)	372 (94.7)
Not formally employed	76 (11.9)	55 (22.6)	21 (5.3)
Primary caregiver education level, n (%)			
None	48 (7.6)	23 (9.5)	25 (6.4)
Completed all or part of primary level education	389 (61.2)	149 (61.3)	240 (61.1)
Completed all or part of secondary level education	160 (25.2)	61 (25.1)	99 (25.2)
Completed certificate/diploma/vocational or tertiary level education	39 (6.1)	10 (4.1)	29 (7.4)
Asset ownership, mean (SD)	7.7 (3.3)	7.5 (3.0)	7.8 (3.5)

Table 2
Summary of mean (SD) scores for the outcome and mediators by study group and timepoint.

	Timepoint	Total			Usual care			MFG intervention		
		N	Mean (SD)	N	Mean (SD)	N	Mean (SD)			
Outcome: Parenting stress score	Baseline	633	100.39 (18.35)	242	104.24 (15.99)	391	98.01 (19.3)			
	8 weeks	611	95.84 (20.36)	234	102.42 (16.72)	377	91.74 (21.33)			
	16 weeks	591	91.46 (20.01)	234	98.50 (17.21)	357	86.85 (20.39)			
Mediator 1: Caregiver mental health	Baseline	633	78.66 (20.81)	242	81.56 (18.76)	391	76.86 (21.81)			
	8 weeks	611	76.28 (22.38)	234	82.88 (19.56)	377	72.19 (23.06)			
	16 weeks	591	73.86 (22.29)	234	77.68 (19.41)	357	71.36 (23.68)			
Mediator 2: Parenting practices	Baseline	636	22.13 (3.58)	243	22.23 (3.37)	393	22.07 (3.71)			
	8 weeks	614	21.46 (3.36)	235	21.92 (3.14)	379	21.17 (3.46)			
	16 weeks	593	21.80 (3.21)	235	22.37 (3.22)	358	21.43 (3.15)			
Mediator 3: Family cohesion	Baseline	633	31.78 (4.28)	242	31.40 (4.22)	391	32.00 (4.31)			
	8 weeks	611	31.98 (4.77)	234	30.41 (4.33)	377	32.96 (4.78)			
	16 weeks	591	31.72 (3.69)	234	30.85 (3.22)	357	32.30 (3.87)			

Table 3

Global model fit indexes of the three mediator models.

Global model fit indexes	Parenting Practices	Caregiver Mental Health	Family Cohesion
χ^2 (DF), <i>p</i>	22.07(19), 0.2808	45.52(19), 0.0006	52.58(19), 0.0001
CFI	1.00	0.98	0.95
RMSEA	0.02	0.05	0.05
SRMR	0.05	0.04	0.15

Notes: Global model fit tests were computed in Mplus 8.8 using full information maximum likelihood estimation with robust test statistics (Mplus estimator MLR).

Table 4

Unstandardized total, total indirect, specific indirect, and direct effects of the MFG intervention on parenting stress at 16 weeks, N = 636.

Mediator	Effect	B (95% CI)
Parenting practices	Total effect	-8.58 (-10.99, -5.93)
	Total indirect	-2.16 (-2.78, -1.53)
	Specific indirect: MFG intervention - > parenting practices at 8 weeks - > parenting stress at 16 weeks	-0.29 (-0.59, -0.11)
	Specific indirect: MFG intervention - > parenting stress at 8 weeks - > parenting stress at 16 weeks	-1.87 (-2.39, -1.32)
	Direct effect: MFG intervention - > parenting stress at 16 weeks	-6.42 (-8.29, -4.37)
Caregiver mental health	Total effect	-8.06 (-10.18, -6.01)
	Total indirect	-2.00 (-2.60, -1.52)
	Specific indirect: MFG intervention - > caregiver mental health at 8 weeks - > parenting stress at 16 weeks	-0.42 (-0.77, -0.21)
	Specific indirect: MFG intervention - > parenting stress at 8 weeks - > parenting stress at 16 weeks	-1.58 (-2.03, -1.19)
	Direct effect: MFG intervention - > parenting stress at 16 weeks	-6.07 (-7.73, -4.40)
Family cohesion	Total effect	-8.52 (-10.79, -6.34)
	Total indirect	-2.15 (-2.84, -1.54)
	Specific indirect: MFG intervention - > family cohesion at 8 weeks - > parenting stress at 16 weeks	-0.26 (-0.75, 0.124)
	Specific indirect: MFG intervention - > parenting stress at 8 weeks - > parenting stress at 16 weeks	-1.90 (-2.44, -1.44)
	Direct effect: MFG intervention - > parenting stress at 16 weeks	-6.37 (-8.12, -4.71)

Notes: Regression coefficients (B) were estimated via full-information maximum likelihood using Mplus 8.8; 95% confidence intervals were estimated via the bias-corrected bootstrap based on 5000 replicate samples.

Confidence intervals which do not include zero are bolded and are significant at $p < 0.05$.