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Preliminary Impact of Group-Based Interventions on Stigma and the Mental Health of Caregivers of Adolescents Living with HIV in Uganda

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Abstract

This study examined the preliminary impact of group-cognitive behavioral therapy (G-CBT) and a family-strengthening intervention delivered via multiple family groups (MFG-FS) on HIV stigma, parenting stress, and the mental health of caregivers of adolescents living with HIV. We analyzed data from the Suubi4Stigma study (2020–2022), a two-year pilot randomized clinical trial for adolescents and their caregivers ($N = 89$ dyads), recruited from nine health clinics in Uganda. Adolescent-caregiver dyads were randomized to three intervention conditions delivered over three months, with data collected at baseline, three and six-months follow-up. We fitted mixed-effects linear regression models to test the effect of the interventions on caregiver outcomes over time. At six months, caregivers randomized to the MFG-FS condition reported lower levels of stigma by association (mean difference = -1.45 , 95% CI = $-2.52 - -0.38$, $p = 0.008$), and stigma and discrimination attitudes (mean difference = -3.84 , 95% CI = $-4.63 - -3.05$, $p < 0.001$), compared to Usual care condition. In addition, caregivers of adolescents randomized to the G-CBT condition reported lower levels of stigma and discrimination attitudes at three months (mean difference = -5.18 , 95% CI = $-9.13 - -1.22$, $p = 0.010$), and at six months (mean difference = -6.70 , 95% CI = $-9.28 - -4.12$, $p < 0.001$). Caregiver mental health and parenting stress significantly reduced over time regardless of intervention condition. Findings point to the importance of incorporating stigma reduction components within psychosocial interventions targeting adolescents and families impacted by HIV.

Keywords

HIV stigma; Caregiving; Multiple family group; Group-cognitive behavioral therapy; Parenting stress; Caregiver mental health

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Full study protocol <https://pilotfeasibilitystudies.biomedcentral.com/articles/10.1186/s40814-022-01055-7>

Conflict interests The authors have no conflict of interest to disclose.

Introduction

Caring for individuals living with HIV is associated with significant caregiving burden, stress, and strain [1, 2]. Initial HIV diagnosis for children has been associated with disruptions in family cohesion, family structures – including spousal abandonment and family separation [3], status disclosure concerns, daily care burden, and increased financial constraints related to the cost of treatment and care [4, 5]. Moreover, HIV stigma experienced by people living with HIV remains high [6]. In Uganda, an estimated 1.4 million people were living with HIV in 2023; 80,000 were children < 15 years [7]. Of these, 27% reported experiences of stigma and discrimination in healthcare settings [6]. Within the general population, discriminatory tendencies still exist, with 25% of people reporting that they would avoid buying vegetables from a vendor living with HIV [8] – pointing to the lack of HIV basic knowledge that still exist. In addition, estimates from the 2019 Stigma Index Survey in Uganda indicate that 34% of people living with HIV reported experiences of external stigma, including exclusion from social gatherings, physical and verbal harassment, and gossip [9], pointing to the need for HIV stigma reduction interventions.

Similarly, caregivers also experience HIV-associated stigma and discrimination from other family members and the community [4]. Specifically, while caregivers may not be HIV positive, they experience the negative effects of stigma, by virtue of their association with a family member living with HIV – also known as stigma by association [10, 11]. Stigma toward family members is manifested through gossip, name-calling, rejection, isolation, and loss of social support [10]. Caregivers also experience fear, feelings of guilt, and suicidal thoughts [12]. As such, social support – both from family members and the community is critical in the care of children living with HIV and in supporting adherence to treatment protocols [13-15]. However, the lack of status disclosure and secrecy due to the fear of stigmatization and children being ostracized deters caregivers from accessing supportive systems and overcoming social and structural barriers, including financial constraints and making health-seeking decisions [16, 17].

The psychosocial impact of HIV-associated stigma on caregivers has been documented, including anxiety and depression [18-20]. Stigma by association has been associated with poor caregiver mental health and parenting stress [11]. However, even with these documented negative impacts, few studies have incorporated stigma reduction components for caregivers of adolescents living with HIV (ALHIV) [21, 22]. Yet, ALHIV depend on their caregivers for care, support, and adherence to treatment protocols [14, 15]. In turn, stigma and associated caregiver mental health directly impact the quality of care and overall well-being of children under their care [23, 24]. This study, therefore, examines the preliminary impact of group-based interventions to address HIV stigma among ALHIV and their caregivers in Uganda.

Potential of Group-Based Interventions

Group-based treatments have important therapeutic benefits for participating members [25]. Groups may foster feelings of belonging, being understood, and accepted by others; the ability to recognize and share similar feelings, thoughts, and problems; and gain personal insights through group member feedback [25]. For example, family strengthening

interventions delivered via multiple family groups (MFG-FS), have demonstrated a positive impact on a range of behavioral and psychological outcomes [26-28]. MFG-FS are rooted within the Family Systems theory that defines the family unit as a complex social system in which members interact to influence each other's behavior, and any change in one family member is likely to influence the entire family system and lead to change in other family members [29]. MFG-FS may include communication and parenting skills, psychoeducation, emotional support and problem-solving strategies, and other therapeutic components [30]. In non-HIV studies, MFG-FS interventions have demonstrated positive outcomes among children experiencing behavioral problems and psychological disorders [26, 27], lower levels of child behavioral disorders [31], hopelessness, depressive symptoms, and improvements in self-esteem among adolescent girls [32-34].

Studies have also documented the potential of MFG-FS interventions to build supportive systems for ALHIV and their families in sub-Saharan Africa (SSA) and elsewhere. For example, in Zambia, the Family Connection program developed to reduce social isolation, stigma, improve social support and HIV-related health outcomes documented positive trends in reducing internalized stigma among ALHIV (15–19 years) [35]. This study however did not report on the impact of the intervention on caregiver outcomes. In South Africa, the VUKA Family Program, a family-based psychosocial intervention to promote health and mental health among ALHIV (10–13 years) and their caregiver was found to improve adolescent mental health, youth behavior, HIV treatment knowledge, stigma, communication and adherence to medication. In addition, caregivers reported lower levels of HIV stigma and improvements in communication comfort with their children [21]. A psychosocial support group intervention for ALHIV (10–17 years) and their caregivers in central Haiti documented significant reduction in caregiver depressive symptoms, improved social support, and decreased HIV-related stigma [22].

Even with the documented positive impact of group-based family interventions above, none of them was designed specifically to address HIV stigma targeting caregivers. Yet, HIV stigma reduction interventions targeting ALHIV and their caregivers, especially in SSA, are very limited [36]. To address this gap, we pilot tested two evidence-based interventions: a group-based cognitive behavioral therapy (G-CBT), and a family strengthening intervention delivered via multiple family groups (MFG-FS) to address HIV stigma among ALHIV and their caregivers in Uganda. Guided by the Family Systems theory [29], we hypothesized that by bringing multiple families together, caregivers (and their children) would feel comfortable sharing their caregiving experiences –including those related to stigma and discrimination, supporting one another, helping to foster peer support, decrease social isolation, and enhance coping skills [30]. This article presents the preliminary impact of the interventions on caregiver stigma, parenting stress, and mental health.

Methods

Sample

The Suubi4Stigma study is a two-year study that pilot tested the feasibility, acceptability, and preliminary impact of two group-based interventions to address HIV stigma among adolescents (10–14 years) and their caregivers in Uganda [37]. The study recruited 89

adolescent-caregiver dyads ($N=178$), between November 2020 and May 2021. Adolescents were recruited into the study if they met the following inclusion criteria: (1) living with HIV and aware of their status; (2) between 10 and 14 years; (3) enrolled in ART in participating clinics; and (4) living within a family, including the extended family. Adults aged 18+ who identified as the primary caregiver of the child were recruited.

Setting and Participant Recruitment

Participants were recruited from nine comparable healthcare clinics across four political districts within the greater Masaka region of Uganda. This region has the highest HIV prevalence in Uganda (11.7%) compared to the national average of 5.4% [38]. Health clinics were comparable in terms of the number of adolescents served, facility level, and adolescent clinic days. A clinic staff presented the project idea to caregivers of eligible children during appointment day and obtained verbal consent to be contacted by a research staff. During a one-on-one meeting with the research staff member, caregivers were provided with detailed information about the study and went through the informed consent process. At the end of the meeting, interested caregivers provided voluntary written consent for themselves and their children to participate. Children provided assent separately from their caregivers to avoid coercion. A total of 147 adolescent-caregiver dyads were screened, and 89 dyads met the inclusion criteria and were recruited into the study.

Intervention Description

The study utilized a three-arm cluster randomized design, where children and caregivers were randomly assigned (at the clinic level) to one of three study conditions described below. Participants in the same clinic were assigned to the same intervention condition to minimize contamination. All adolescents received the Usual care in addition to their respective intervention components.

1. *Usual care condition* received the traditional clinic-based interventions focused on testing, medical and treatment services, and psychosocial support for ALHIV, and literature focused on children (11–13 years) living positively with HIV in Uganda [39].
2. *G-CBT condition* received 10 sessions of G-CBT delivered by two trained health paracounselors, with experience in psychosocial support and working with ALHIV. Caregivers did not participate in these sessions. Sessions utilized the core components of CBT, such as psychoeducation, cognitive restructuring, and skill-building, to increase adaptive coping [40]. Sessions were delivered biweekly, and each session lasted approximately one hour.
3. *MFG-FS condition* received 10 sessions of MFG-FS focused on the core components, also known as the 4Rs and 2 S (rules, responsibility, relationships, respectful communication, stress, and social support) [41]. Two sessions specifically focused on HIV stigma, discrimination, and associated risks, and HIV/AIDS knowledge and adherence to medication. Sessions were delivered biweekly by two trained parent peers and lasted approximately one hour. Both

adolescents and their caregivers attended the sessions to promote communication and support within and among families.

Intervention Adaptation

The adaptation process has been documented elsewhere [42]. In brief, both MFG-FS and G-CBT interventions are curriculum based. We engaged community stakeholders, including implementing partners, research partners, parent peers and community healthcare workers, mental health experts in the region, and paracounselors with experience working with adolescents. For G-CBT, we reviewed literature and adapted content from existing CBT manuals for children and adolescents, supplemented with content, activities and examples from the Ugandan context [43, 44]. Content from these existing manuals was tailored to focus on depression associated with living with HIV and stigma. We then engaged mental health experts and paracounselors to provide guidance, feedback and recommendations. For MFG-FS, we utilized existing content already adapted in the study region [41]. We also adapted and infused content to promote adherence and reduce stigma among ALHIV. Parent peers and community healthcare workers already trained in the delivery of MFG-FS sessions reviewed the new content and provided feedback. Once both manuals were finalized, we created the family handbooks, and translated all documents into Luganda- the widely spoken local language [42].

Ethical Considerations

Voluntary written consent and assent were obtained from caregivers and adolescents prior to participation. The research team received approvals from Washington University in St. Louis Institutional Review Board (IRB # 202,009,185), the Uganda Virus Research Institute (GC/127/20/10/792), and the Uganda National Council for Science and Technology (SS632ES).

Data Collection

Data were collected using a 90-minute interviewer-administered questionnaire, at baseline, 3 and 6-months follow-up. Study materials were translated into Luganda (the local language in the study region) and back translated into English to ensure consistency. Prior to engaging with participants, all data collectors received training in human subjects protection and completed Good Clinical Practice (GCP) training before engaging with study participants.

Study Measures

Parenting stress was measured using the Parenting Stress Index [45]. The 33-item scale assesses symptoms related to parental distress, difficult child, and caregiver-child dysfunctional relationships, with responses rated on a 4-point scale with 1 = strongly disagree and 4 = strongly agree. Sample items included “*You feel trapped by your responsibilities as a parent*” and “*Most times you feel that your child does not like you and does not want to be close to you.*” Summary scores were created with higher scores indicating higher levels of parenting stress (Cronbach’s alpha = 0.91).

Caregiver mental health was assessed using the Brief Symptom Inventory [46], a 34-item scale, measuring symptoms of depression, anxiety, and somatization. Responses were rated

on a five-point Likert scale, with 1 = Never true to 5 = Always true. Sample items include “*Trouble falling asleep*” and “*Feeling lonely even when you are with people.*” Summary scores were created with higher scores indicating higher levels of caregiver mental distress (Cronbach’s alpha = 0.93).

Stigma by association was assessed by the Brief Stigma-by-Association Scale [47], a 10-item scale measuring experiences and consequences of associated stigma on a 3-point scale (0 = *Not at all* and 2 = *All the time*). Sample items include: “*I avoid making new friends*” and “*I worry about rejection.*” Summary scores were created with higher scores indicating higher levels of stigma by association (Cronbach’s alpha = 0.93).

HIV/AIDS stigma and discrimination attitudes were assessed by the HIV/AIDS Stigma and Discrimination Scale [48]. The 22-item scale asks respondents about what they think about people living with HIV/AIDS. Responses were rated on a 4-point scale with 1 = strongly agree, and 4 = strongly disagree. Sample items include: “*People with AIDS should be isolated from other people*” and “*People living with HIV/AIDS should be ashamed.*” Summary scores were created with higher scores indicating higher levels of stigma and discrimination attitudes (Cronbach’s alpha = 0.87).

Data Analysis

Data analysis was performed using Stata version 17.0 and was based on an intention-to-treat approach. Continuous variables were summarized using means and standard deviations, while categorical variables were summarized with counts and percentages. In our analysis, we fitted four distinct mixed-effects linear regression models, corresponding to each outcome—parenting stress, caregiver mental health, stigma by association, and HIV/AIDS stigma and discrimination attitudes. Each model consisted of three hierarchical data levels. The first level was composed of the repeated measures of outcomes clustered under individual participants. The second and third levels incorporated the participants and the respective clinics at which they were treated. In every model, we included the specific outcome, the applied interventions (Usual care, MFG-FS, and G-CBT), time (baseline, 3 and 6 months), the interaction term between the intervention and time, and a random intercept for each participant and clinic. This structure allowed for examining the effects of the intervention, time, and their interaction on the four study outcomes.

We performed diagnostic checks for each model to ensure that the assumptions of normality and homoskedasticity (constant variance) of residuals across the predicted values were preserved. This involved creating histograms of standardized residuals to visually assess the normality of distribution and developing scatter plots of standardized residuals versus predicted values to evaluate the constant variance assumption. All models satisfied the assumption of normality of residuals. Intra-class correlation coefficients (ICC) were calculated to determine the proportion of the total variance in the outcomes attributable to the differences between clusters at each level. These computations utilized the variance estimates derived from the mixed-effects regression models. We explored pairwise comparisons of group means at the follow-up periods to further investigate the significance of the interaction term between the group and time variables. We applied Sidak’s correction method to adjust the p-values. Robust Huber-White cluster-adjusted confidence intervals

were reported to provide accurate and reliable estimates. A significance level of $p = 0.05$ was established as the threshold for statistical significance. Any p-value below this level was deemed to indicate a statistically significant difference or relationship.

Results

Baseline Characteristics

Table 1 summarizes the baseline attributes of the caregivers. On average, caregivers were 47.4 years old, with the majority of them being female (78%). On average, each household had seven individuals – both children and adults. In addition, caregivers reported moderate scores on all stigma and mental health-related outcomes.

Effects of the Intervention on Stigma by Association and HIV Stigma and Discrimination Attitudes

We observed significant main effects of the interventions on stigma by association ($\chi^2(2) = 16.76, p < 0.001$), and on the HIV/AIDS stigma and discrimination attitudes ($\chi^2(2) = 57.74, p < 0.001$) (Table 2). We also observed significant intervention-time interaction effects for both stigma by association ($\chi^2(4) = 179.73, p < 0.001$) and stigma and discrimination attitudes ($\chi^2(4) = 28.01, p < 0.001$). These findings indicate that the interventions influenced the two outcomes.

Pairwise comparisons (Table 3) revealed a significant decrease in the mean stigma and discrimination scores among caregivers of adolescents randomized to the G-CBT condition at three months compared to usual care (mean difference = -5.18 , 95% CI = $-9.13 - -1.22, p = 0.010$). Similarly, at six-month, both MFG-FS (mean difference = -3.84 , 95% CI = $-4.63 - -3.05, p < 0.001$) and G-CBT (mean difference = -6.70 , 95% CI = $-9.28 - -4.12, p < 0.001$) conditions exhibited significantly lower mean scores of stigma and discrimination attitudes compared to usual care. These findings indicate that both MFG-FS and G-CBT interventions reduced stigma and discrimination attitudes. In addition, caregivers randomized to the MFG-FS condition exhibited a significant reduction in stigma by association at six months (mean difference = -1.45 , 95% CI = $-2.52 - -0.38, p = 0.008$) when compared to the usual care condition (also see Fig. 1). These findings suggest that the preliminary impact of the intervention on stigma by association was primarily driven by MFG-FS, but not by G-CBT.

Effects of the Intervention and Time on Parenting Stress and Caregiver Mental Health

We observed significant main effects for time on parenting stress and caregiver mental health (Table 2), indicating that over time, the two outcomes reduced, irrespective of the study condition. We also observed significant interaction effects for parenting stress ($\chi^2(4) = 27.68, p < 0.001$) and caregiver mental health ($\chi^2(4) = 18.22, p = 0.001$). Pairwise comparisons were performed to further examine the significant intervention-time interaction effects, (Table 3). The pairwise comparisons did not reveal significant differences in the means for parenting stress and caregiver mental health across the groups at follow-up. These results show that the significant intervention-time interaction effects were not driven by the

intervention; hence, reaffirm the significant decline in parenting stress and caregiver mental health over time, irrespective of the study group.

Discussion

This study examined the preliminary impact of two group evidence-based interventions (G-CBT and MFG-FS) to address HIV stigma among caregivers of ALHIV in Uganda. In this paper we report the preliminary impact of the interventions on HIV stigma, parenting stress and caregiver mental health. We observed statistically significant differences between groups on stigma by association and HIV stigma and discrimination attitudes. Specifically, participating in the MFG-FS intervention was associated with lower levels of stigma by association at three months and lower HIV stigma and discrimination attitudes both at three- and six-months follow-up. This finding aligns with other studies in SSA that have incorporated stigma reduction components within psychosocial interventions targeting ALHIV and their caregivers [21, 22]. Consistent with our hypothesis, it is possible that by bringing multiple families together, caregivers (and their children) would feel comfortable sharing their caregiving experiences –including those related to stigma and discrimination, support one another and enhance coping skills [30]. This finding supports the importance of incorporating stigma reduction components within the care and support programs for families affected by HIV.

In addition, caregivers with children randomized to the G-CBT condition also reported a decrease in HIV stigma and discrimination attitudes at both three and six months when compared to Usual care. This finding is surprising given that caregivers did not participate in the G-CBT sessions. However, this finding aligns with the Family Systems theory – guiding group-based interventions, emphasizing the family unit as a social system in which members interact to influence each other's behaviors [29]. It could be that adolescents participating in G-CBT sessions shared what they learned, including strategies to identify negative thoughts related to stigma and discrimination, doing pleasant activities to deal with HIV-related challenges, as well as other coping strategies. In turn, caregivers may have benefited and learned from these strategies, resulting in a reduction in their stigma and discrimination attitudes. Further research should investigate the mechanisms through which the intervention components impacted caregiver outcomes.

Although caregiver parenting stress and mental distress reduced over time, we did not observe significant group differences. The lack of significant differences could be because the interventions were not designed to directly address caregiver mental health. Moreover, beyond stigma and mental health, caregivers face additional challenges, including financial constraints related to providing care and treatment for ALHIV and the entire family [5]. Indeed, studies have documented that poverty exacerbates the mental health wellbeing of caregivers of children affected by HIV [49]; and addressing family level poverty reduces parenting stress and improves caregiver mental health [50, 51]. Finally, it could be that the three-month intervention period was too short to produce positive impacts on caregivers' mental health – pointing to the need for a longer intervention period.

Limitations

We acknowledge the following limitations. First, we did not assess caregivers' HIV status. As such, we cannot ascertain whether the measured stigma is associated with the adolescent's or caregiver's positive HIV status. Second, we report results from a small pilot study, with a very short intervention period. Third, data collection was conducted during the COVID-19 lockdown. We do not know how this impacted caregivers' responses. Also, it is possible that the pandemic and related social distancing measures could have exacerbated caregiver mental health outcomes or limited the potential impact of the interventions.

Even with the above limitations, this study contributes to the limited literature focused on HIV stigma reduction interventions among ALHIV and their families in SSA. The study highlights an important and often overlooked aspect of HIV care by focusing on caregivers of ALHIV. These preliminary findings provide compelling evidence to test the efficacy of the interventions in a larger trial. The data collection during the COVID-19 pandemic is also a noteworthy aspect of the study, providing evidence for the studied interventions in a real-world context. Future research should continue to explore how crises and external stressors such as a pandemic can affect the effectiveness of interventions. Finally, future studies should consider assessing caregiver serostatus to help tease out individual versus stigma associated with the child.

Implications and Conclusion

Findings indicate that participating in group-based interventions (MFG-FS and G-CBT) is associated with reduced stigma by association and HIV stigma and discriminatory attitudes among caregivers of ALHIV. These findings highlight the importance of incorporating MFG-FS and/or G-CBT or similar group-based and evidence-based interventions into healthcare and support programs for ALHIV. Group-based interventions provide opportunities for caregivers and their families to normalize shared experiences including those related to HIV stigma and discrimination, and other HIV-related caregiving experiences, and help to foster social support and enhance coping skills.

Results also underscore the need for ongoing support and resources for caregivers of ALHIV to help them manage parenting stress, stigma and discrimination, as well as stigma by virtue of their association with family members living with HIV. On the other hand, healthcare programs and policies should consider the mental health needs of caregivers in their planning and program implementation. Tailored evidence-based interventions such as the ones discussed in this study can make a meaningful difference in addressing mental health burden experienced by caregivers of ALHIV.

Overall, findings point to the importance of addressing HIV stigma and the incorporation of stigma reduction components within psychosocial interventions targeting adolescents and families impacted by HIV. While this study was a pilot with a short intervention period, the observed reduction in caregiver parenting stress, HIV stigma and discrimination, and stigma by association following participation in the group-based interventions suggests the potential for longer-term positive impacts. Further research with larger sample sizes and extended

intervention periods could provide more robust evidence of the lasting effects of studied interventions or similar evidence-based interventions.

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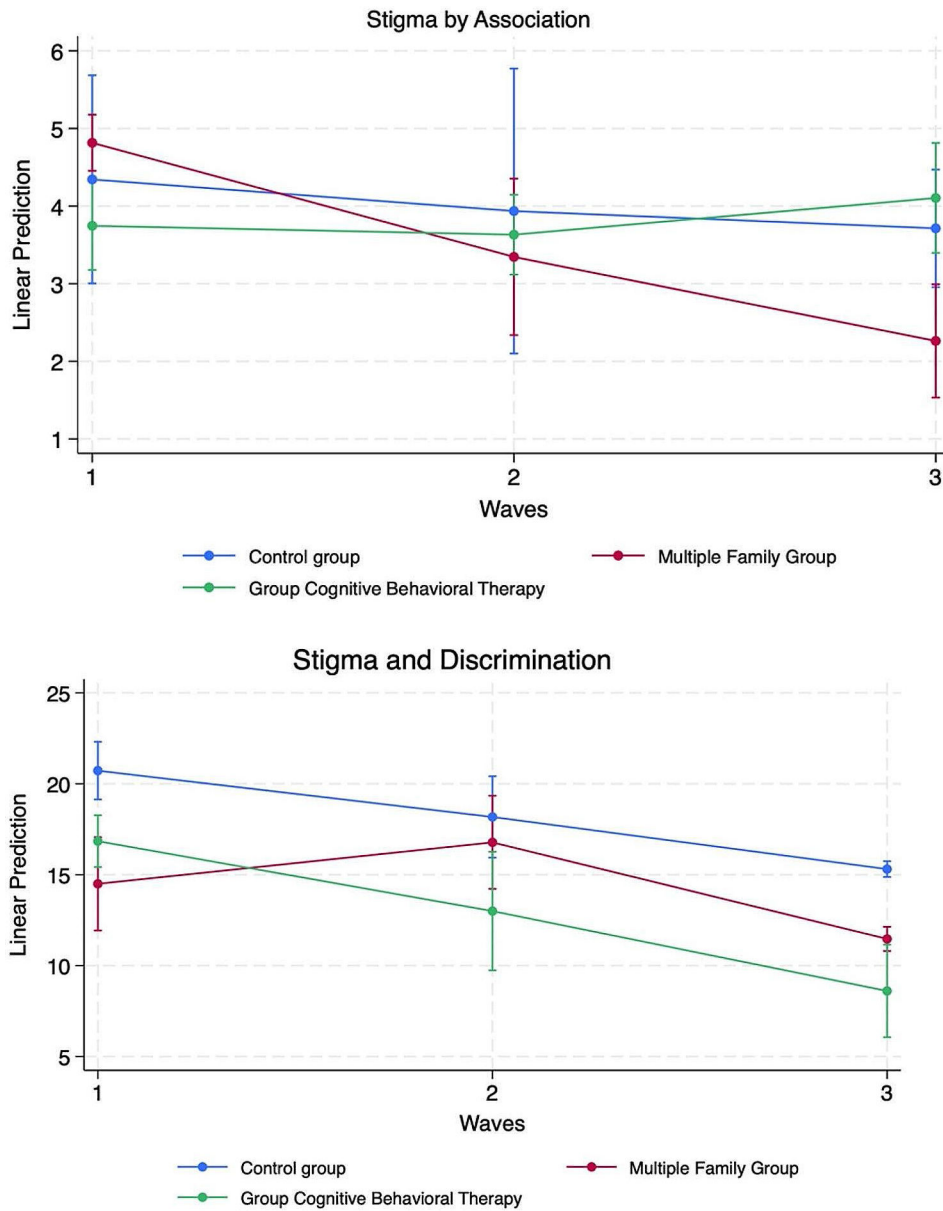


Fig. 1. Model-predicted means for stigma by association and HIV stigma and discrimination attitudes among caregivers of ALHIV. The predicted means were generated from post-estimations of mixed effects regression models

Table 1

Baseline characteristics of caregivers

Characteristics	Usual care <i>n</i> = 29 (%)	MFG-FS <i>n</i> = 34 (%)	G-CBT <i>n</i> = 26 (%)	Total sample <i>N</i> = 89 (%)
Gender				
Male	7 (24.14)	5 (14.71)	8 (30.77)	20 (24.47)
Female	22 (75.86)	29 (85.29)	18 (69.23)	69 (77.53)
Age in years (min/max: 22–90)	48.69 (13.40)	46.65 (16.77)	46.77 (11.22)	47.35 (14.12)
Household size (min/max: 2–14)	6.55 (2.40)	7.21 (3.01)	6.54 (2.94)	6.80 (2.79)
<i>Outcome measures</i>				
Parenting stress (min/max: 14–94)	39.79 (16.95)	40.68 (17.68)	45.12 (20.09)	41.69 (18.12)
Caregiver mental health (min/max: 0–91)	42.28 (24.36)	38.29 (20.00)	41.54 (23.76)	40.54 (22.42)
Stigma by association (min/max: 0–20)	4.90 (5.17)	5.00 (5.52)	4.23 (4.85)	4.74 (5.17)
HIV stigma and discrimination attitudes (min/max: 0–45)	20.72 (9.95)	14.50 (10.51)	16.85 (11.90)	17.21 (10.96)

Table 2

Mixed-effects model showing the effects of the interventions on caregiver outcomes

	Parenting Stress β (95% CI)	Caregiver Mental Health β (95% CI)	Stigma by Association β (95% CI)	HIV/AIDS Stigma and Discrimination Attitudes β (95% CI)
Group: $\chi^2(df)$, <i>p</i> -value	0.55 (2), <i>p</i> = 0.760	1.04 (2), <i>p</i> = 0.593	16.76(2), <i>p</i> < 0.001	57.74 (2), <i>p</i> < 0.001
Usual care	Ref	Ref	Ref	Ref
MFG-FS	0.22 (-6.45-6.89)	-5.11 (-13.97-3.75)	0.47 (-0.90-1.84)	-6.22 (-9.24 - -3.21)
G-CBT	5.30 (-3.49-14.08)	-0.85 (-12.19-10.48)	-0.60 (-2.04-0.84)	-3.88 (-6.01 - -1.75)
Time: $\chi^2(df)$, <i>p</i> -value	53.17 (2), <i>p</i> < 0.0001	26.78 (2), <i>p</i> < 0.0001	9.25 (2), <i>p</i> = 0.010	84.77 (2), <i>p</i> < 0.001
Baseline	Ref	Ref	Ref	Ref
Three months	-4.20 (-9.51-1.12)	-4.82 (-10.03-0.38)	-0.41 (-3.55-2.73)	-2.55 (-6.20-1.11)
Six months	-7.59 (-12.29 - -2.88)	-5.86 (-11.34 - -0.38)	-0.63 (-2.63-1.37)	-5.41 (-7.03 - -3.80)
Time x intervention: $\chi^2(df)$, <i>p</i> -value	27.68 (4), <i>p</i> < 0.0001	18.22 (4), <i>p</i> = 0.0001	179.73 (4), <i>p</i> < 0.0001	28.01 (4), <i>p</i> < 0.001
Usual care x baseline	Ref	Ref	Ref	Ref
MFG-FS x 3-months	-4.65 (-12.38-3.07)	-0.69 (-1.65-10.26)	-1.06 (-4.44-2.31)	4.83 (0.10-9.55)
MFG-FS x 6-months	-2.71 (-7.65-2.24)	-1.98 (-6.05-10.01)	-1.92 (-3.97-0.13)	2.38 (-0.48-5.25)
G-CBT x 3-months	-8.67 (-15.05 - -2.29)	-5.56 (-11.69-0.57)	0.29 (-2.96-3.55)	-1.30 (-5.60-3.00)
G-CBT x 6-months	-5.47 (-18.44-7.50)	-4.98 (-12.41-2.46)	0.99 (-1.07-3.05)	-2.82 (-5.47 - -0.17)
Constant	39.78 (35.27-44.29)	42.35 (36.62-48.08)	0.99 (-0.81-2.79)	20.72 (19.14-22.31)
Random effects				
Child-level variance	2.52 (1.10-5.78)	3.98 (1.60-9.89)	< 0.01 (< 0.01, < 0.01)	< 0.01 (< 0.01, < 0.01)
Clinic-level variance	4.80 (2.06-11.22)	14.41 (9.99-20.79)	1.29 (0.86-1.92)	5.35 (3.70-7.74)
Residua variance	15.45 (13.94-17.12)	16.26 (14.92-17.73)	3.94 (3.55-4.37)	8.81 (7.70-10.09)
Clinic ICC	0.024 (0.004-0.126)	0.032 (0.004-0.204)	< 0.01 (< 0.01, < 0.01)	< 0.01 (< 0.01, < 0.01)
Guardian ICC	0.110 (0.034-0.298)	0.458 (0.292-0.623)	0.097 (< 0.01, 0.979)	0.269 (0.024, 0.843)
Number of participants	89	89	89	89
Number of observations	259	259	259	259

CI = Confidence Interval; MFG-FS = Multiple Family Group; G-CBT = Group Cognitive Behavioral Therapy

Table 3

Pairwise comparisons of group mean for parenting stress, caregiver mental health, stigma by association, and stigma and discrimination attitudes at each time point

Pairwise comparisons	Parenting Stress		Caregiver Mental Health		Stigma by Association		HIV/AIDS Stigma and Discrimination Attitudes	
	MD (95% CI)	P value	MD (95% CI)	P value	MD (95% CI)	P value	MD (95% CI)	P value
<i>At baseline</i>								
MFG-FS vs. usual care	0.22 (-6.45, 6.89)	0.948	-5.11 (-13.97, 3.75)	0.259	0.47 (-0.90, 1.84)	0.501	-6.22 (-9.24, -3.21)	< 0.001
G-CBT vs. usual care	5.30 (-3.49, 14.08)	0.237	-0.85 (-12.19, 10.48)	0.883	-0.60 (-2.04, 0.84)	0.416	-3.88 (-6.01, -1.75)	< 0.001
<i>At 3 months</i>								
MFG-FS vs. usual care	-4.43 (-15.35, 6.48)	0.426	-5.80 (-23.89, 12.30)	0.530	-0.59 (-2.66, 1.48)	0.576	-1.40 (-4.79, 2.00)	0.420
G-CBT vs. usual care	-3.37 (-10.25, 3.51)	0.337	-6.41 (-19.37, 6.54)	0.332	-0.30 (-2.16, 1.55)	0.748	-5.18 (-9.13, -1.22)	0.010
<i>At 6 months</i>								
MFG-FS vs. usual care	-2.49 (-11.18, 6.20)	0.575	-3.13 (-12.45, 6.19)	0.511	-1.45 (-2.52, -0.38)	0.008	-3.84 (-4.63, -3.05)	< 0.001
G-CBT vs. usual care	-0.18 (-9.54, 9.19)	0.970	-5.83 (-16.51, 4.85)	0.285	0.39 (-0.69, 1.47)	0.477	-6.70 (-9.28, -4.12)	< 0.001

CI = Confidence Interval; MD = Mean Differences; MFG-FS = Multiple Family Group; G-CBT = Group Cognitive Behavioral Therapy; SD = standard deviation