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Acceptability, feasibility, and preliminary efficacy of a resilience-oriented family intervention to prevent adolescent HIV and depression: A pilot randomized controlled trial

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Abstract

Introduction—We tested the acceptability, feasibility, and preliminary efficacy of *Our Family Our Future*, a resilience-oriented intervention engaging families in prevention of adolescent HIV and depression.

Methods—South African adolescents, 13–15 years of age, with mild depressive symptoms, were randomized to intervention or wait-list using parallel assignment in a single-blind trial. HIV risk

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behavior and depression were evaluated at baseline, 1-, and 3-months. We examined intervention satisfaction, fidelity, trial retention, and preliminary efficacy.

Results—196 adolescent-parent dyads completed eligibility screening and baseline, and N=73 dyads were randomized. All families ranked intervention quality as ‘good’ or ‘excellent’. Over 90% were satisfied with content. Facilitators were adherent to intervention protocol. All families were retained in post-intervention assessments. Intervention recipients reported diminished depressive symptoms, inconsistent condom use, and sexual activity, as well as increased HIV testing.

Conclusions—*Our Family Our Future* is highly acceptable and feasible and should be tested in a future efficacy trial.

Keywords

depression; prevention; family interventions; resilience; South Africa

Adolescents and young people aged 15–24 years account for 40% of all new human immunodeficiency virus (HIV) infections each year, with the majority of these infections in South Africa and other sub-Saharan African countries (UNAIDS, 2014). A sub-population of adolescents with psychological distress are uniquely at risk for engaging in risk behaviors that put them at risk for HIV and other sexually transmitted infections (STIs). For example, adolescents with depressive symptoms may experience emotional dysregulation, linked to inability to control behaviors when emotionally distressed. Maladaptive emotion management responses (Weiss, Tull, Anestis, & Gratz, 2013) may increase sexual risk behavior by diminishing an individual’s awareness of their environment, decreasing sensitivity to cues regarding impending risk (Messman-Moore & Long, 2003), or interfering with the correction of inaccurate appraisals of safety (Ehlers & Clark, 2000). Individuals may use substances to avoid or numb intense emotions, further increasing potential for HIV and STI infection and transmission by skewing perceptions of risk, and by interfering with decision-making or implementation of protective behaviors (Donenberg & Pao, 2005). South African adolescents are uniquely at risk for depression in communities disproportionately affected by HIV due to poverty, structural disparities, orphanhood, and family HIV illness (Cluver, Gardner, & Operario, 2009; Cluver, Operario, & Gardner, 2009; Cluver, Orkin, Boyes, Gardner, & Nikelo, 2012; Cluver, Orkin, Boyes, & Sherr, 2015). As such, prevention for adolescent HIV and depression should take an integrated approach.

Adolescents are ideally suited for integrated HIV-depression prevention. This age marks a developmental transition corresponding to elevated HIV and STI risk. In a large longitudinal prospective cohort study of South African adolescents, 70% had engaged in sexual foreplay and oral sex by 13 years; the median age of penetrative sexual debut was 15 years (Richter, Mabaso, Ramjith, & Norris, 2015). Adolescence also corresponds to elevated risk for depression, with rates of depression onset increasing rapidly during early- and mid-adolescence (Angold, Costello, & Worthman, 1998; Ge, Conger, & Elder Jr, 2001; Lewinsohn, Clarke, Seeley, & Rohde, 1994). Yet, adolescence is a period of life transition that is ideal for prevention. Exposure towards protective behaviors during adolescence can build resilience through habituation of healthy behaviors with long-term prevention benefit.

Involving families in prevention is both age- and developmentally-appropriate for adolescents. Parents have a strong influence on adolescent motivations, decisions, and behaviors relating to health. Yet, there are few evidence-based family programs for integrated prevention of adolescent HIV and depression in South Africa. The *Vhutshilo* intervention targets adolescents from HIV affected families and provides psychological and behavioral HIV intervention for 14–17 year olds (Thurman, Kidman, Carton, & Chiroro, 2016). The *Vuka* intervention targets adolescents ages 10–13 years living with HIV and involves caregivers in mental health and HIV prevention (Bhana et al., 2014). The *South African STYLE* intervention is a family HIV prevention for adolescents in psychiatric care within hospital settings. *Our Family Our Future* will be the first intervention to our knowledge in South Africa to integrate prevention of HIV and STI risk behavior with depression in a community setting for adolescents regardless of HIV status or family experience of HIV. We wanted to test the feasibility and acceptability of *Our Family Our Future* prior to engaging in a full-scale efficacy trial. We set out to answer the following research questions: 1) Is the *Our Family Our Future* intervention acceptable to the target population?; (2) Is a future randomized controlled trial of *Our Family Our Future* feasible? and (3) Is there preliminary evidence that the intervention will reduce or maintain symptoms that fall below the clinically significant range for depression and reduce sexual risk behaviors related to HIV and STI infection or transmission? In this paper, we present results on the acceptability, feasibility, and preliminary efficacy of *Our Family Our Future*, a resilience-oriented intervention engaging families in prevention of adolescent HIV and depression. Reporting of results in this pilot trial adheres to the CONSORT guidelines for randomized pilot and feasibility trials (Thabane et al., 2016).

Methods

Participants

Data were derived from a pilot randomized controlled trial (RCT) of N=73 adolescents (and their parents) ([ClinicalTrials.gov #NCT02432352](https://clinicaltrials.gov/ct2/show/study/NCT02432352)). The study occurred in an urban community outside of Cape Town, South Africa from 2015–2017. The study protocol was approved by an institutional review board and human research ethics committee (Brown University Protocol #1207000666, University of Cape Town Protocol # 072/2013 and 796/2014).

To identify study participants, the study community was split into South African census enumeration areas. These areas were visited in a pre-determined random sequence, and in each area, every household was visited up to 3 times on random days and times for eligibility screening. Eligibility screening was conducted by the study team face-to-face with each adolescent and parent using a smartphone pre-programmed with eligibility criteria. Based on what individuals were inputting as responses into the smartphone, the smartphone would auto-calculate eligibility with a visual screen that detailed whether or not the individual was eligible or not. The following inclusion criteria were used to identify eligible adolescent participants: 1) 13–15 years of age; 2) concurred that the adult identified was their parent (we also included primary caregivers in the parental role); 3) when more than one child in the family fell within the eligible age range, one child was chosen at random;

and 4) lived in the household at least 4 days a week. The following inclusion criteria were used to identify eligible adults participants: 1) 18+ years, 2) parent or equivalent person responsible for the child; 3) when more than one parent who provided primary care existed in the household, one was chosen at random to ensure consistency in intervention activities; and 4) lived in the household at least 4 days a week. Both adolescents and parents needed to: 1) report sub threshold depressive symptoms (score 9–15 points) using the Centre for Epidemiologic Studies Depression scale. Adolescents and parents were excluded if they reported no or low symptoms (<8) or clinically significant thresholds of depression (16+). Scoring of the Centre for Epidemiologic Studies Depression scale, including cut-off points for inclusion and exclusion criteria, were auto-calculated, embedded into the programming for the smart-phone eligibility survey. Adolescents were eligible regardless of status of sexual debut or HIV status. Adolescents regardless of their sexual debut status and HIV status could benefit from prevention content that stops onward transmission or re-infection. Interested and eligible adolescents and parents provided written informed assent and consent prior to participating in the study.

Procedures

Assessments—There were three types of assessments. First, we captured data on intervention acceptability using paper satisfaction forms that were filled out by participants after each intervention session, and an overall program satisfaction form that was filled out by participants at the end of the entire intervention program. Adult and adolescent participants filled out separate assessment forms. Participants ranked intervention satisfaction using 4-point Likert scales on session and program quality, information, usefulness of the intervention, and other aspects of the program that might impact acceptability. An example question includes, “The topic of this session was relevant to my life. 1 – Strongly agree, 2 – Agree, 3 – Disagree, 4 – Strongly disagree.” There were also free-response questions such as, “What aspect of the session did you find the most useful? Why?” Fifty South African Rand was provided as a stipend for participation in the assessment filled out after the intervention sessions. This stipend (and all stipends in the study), were offered in the form of a voucher which was converted into cash at a local store. This format for a study stipend was determined after consultation with stakeholders who determined that this format would limit danger of theft from participants and study staff.

Second, we examined feasibility by tracking recruitment and retention data (see Figure 1) and evaluating how well facilitators adhered to a manualized protocol guiding fidelity of intervention delivery. A neutral observer observed fidelity by live-coding 20% of sessions on a paper form. The fidelity coding form mapped onto the core components of the intervention, as laid out in a manualized protocol that standardized delivery of the core behavioral change components of the intervention. A neutral observer coded adherence to as well as skills in the facilitators’ delivery using rankings ranging from 1 to 3. The ranking of “1” was equivalent to low demonstration of skills <25% of the time and “3” was equivalent to high demonstration of skills >75% including skills such as active engagement with participants; active listening; respectful, positive communication; guided discovery; warmth, concern, confidence, professionalism; empowerment of families; building participant

confidence; maintenance of appropriate pace of group discussion; and ending on a positive note.

Third, for preliminary efficacy data, participants completed surveys at baseline, 1-, and 3-months post-intervention using smartphones programmed with SurveyToGo software. All outcome measures were pre-specified. All measures were translated into isiXhosa. Interviews took place at the participant's home. Interviewers administered items to participants verbally except for a subset of sensitive questions. These sensitive behavior questions were self-reported using audio computer-assisted self-interviewing software to reduce reporting bias. Interviews lasted approximately 1 hour with 50 South African Rand provided as a stipend for participation at baseline, 60 at the 1-month follow-up timepoint, and 70 at the 3-month follow-up timepoint.

Measures for Preliminary Efficacy

HIV risk behaviors.: The primary outcome for HIV risk behaviors was based on self-report using audio computer-assisted self-interviewing software. HIV risk was evaluated through questions on lifetime sexual activity, HIV testing, condom use, HIV knowledge, HIV risk perception, and self-efficacy for condom use.

Centre for Epidemiologic Studies Depression Scale.: The primary outcome of depression was evaluated using the Centre for Epidemiologic Studies Depression scale (CES-D) (Radloff, 1977). This 20-item measure evaluates depressive symptoms. Questions are answered on a 4-point Likert scale. An example item includes, "I was bothered by things that don't usually bother me." Scores range from 0 to 60, with a score of 16 or more used to indicate symptoms corresponding to clinically significant levels of depression (Radloff, 1977). Internal reliability was ($\alpha=0.90$). The scale has been shown to be reliable and valid with Xhosa populations (Baron, Davies, & Lund, 2017; Myer et al., 2008).

Connor-Davidson Resilience Scale.: The secondary outcome of resilience was evaluated using the Connor-Davidson Resilience Scale (Connor & Davidson, 2003). This 10-item scale evaluates resilience. Questions are answered on a 5-point Likert scale. An example item includes: "I am able to adapt when changes occur." Internal reliability was $\alpha = 0.91$.

Intervention

Our Family Our Future is a behavioral intervention for adolescent prevention of HIV and depression. This intervention involves parent-child dyads who receive the intervention in a community setting, in a facilitated group format. The intervention is comprised of three-hour group sessions, held weekly for three consecutive weeks. In addition to these group sessions, an individual family meeting is held in the third week immediately after the group session. Thus the entire intervention program consists of four sessions (three group sessions with a fourth individualized family session). The intervention also includes take-home activities to deepen behavioral engagement with the week's received session and to "prime the pump" for the upcoming week's session.

Our Family Our Future was developed by integrating two empirically supported programs, *Keepin' It Real* and *Family Talk* (developed and tested in the USA). The two original interventions use similar techniques to improve mood and sexual safety so were seamlessly integrated for simultaneous delivery in *Our Family Our Future*. The two interventions were merged and adapted to South Africa through qualitative research described elsewhere (Kuo et al., 2016; Kuo et al., 2018). The final intervention covered the following topics in combined adolescent-parent modules using role play, group activities, discussion and debate, and facilitation: 1) family needs and values; 2) community strengths and challenges; 3) communication skills; 4) talking about sensitive topics – HIV, STIs, sex, puberty, mental health, and discipline; 5) HIV and STI transmission, prevention, and living with HIV; 6) healthy individual and family coping with mental distress, adolescent sexual health, and other challenges; and 7) family goals and strategies for healthy interactions and problem-solving. There are also separate adolescent and parent modules. For adolescents, topics included: 1) peer influences; 2) healthy relationships and gender roles and interpersonal violence; 3) sexual decision making and communication; 4) condom use and contraception; and 5) consequences of sexual decisions. For parents, these included: 1) adolescent development and reproductive health; 2) healthy relationships and gender roles; 3) psycho-education with a focus on depression and child perspectives on depression; 4) communicating about sexual and mental health; and 5) condom use and contraception.

Signature elements of the *Our Family Our Future* intervention include the following. First, the intervention is theory driven and developmentally-appropriate for adolescent HIV/STI prevention. *Our Family Our Future's* adolescent HIV/STI prevention components were taken from the original HIV intervention – *Keepin' It Real* – which had some of the largest effect sizes for condom use ($d=0.89-1.68$) in Johnson's global meta-analyses of 67 adolescent HIV prevention trials (DiIorio, McCarty, Resnicow, Lehr, & Denzmore, 2007; DiIorio et al., 2002; Johnson, Scott-Sheldon, Huedo-Medina, & Carey, 2011). *Keepin' It Real* was ranked a “best-evidence” HIV intervention by the Centers for Disease Control and Prevention (DiIorio et al., 2006). The theoretical premise of *Our Family Our Future* (and *Keepin' it Real*) is Information-Motivation-Behavioral (IMB) theory and it is informed by adolescent development theory on the salience of family involvement in prevention (J. Fisher & Fisher, 2000; W. Fisher & Fisher, 1992; W. Fisher, Williams, Fisher, & Malloy, 1999). The change strategy of the HIV/STI prevention and risk reduction components include: 1) increasing HIV/STI knowledge around protective behaviors (i.e., information); 2) encouraging adolescents to implement protective behaviors through for example, facilitating positive family involvement in addressing adolescent sexual and reproductive health challenges, linking protective HIV/STI behaviors to future goals, and formation of positive peer relationships that impact attitudes towards HIV risk (i.e., motivation); and 3) building self-efficacy for prevention behaviors including condom use, condom negotiation, and healthy sexual relationships (i.e., behavior) (J. Fisher & Fisher, 2000; W. Fisher & Fisher, 1992; W. Fisher et al., 1999).

Second, the intervention includes theory driven, best-evidence adolescent depression prevention: *Our Family Our Future's* adolescent depression prevention components are taken from the original depression intervention – *Family Talk* – which showed efficacy lowering depressive symptoms ($d=0.32$), has been adapted for diverse linguistic, cultural,

and socioeconomic populations, and was ranked high in strength of evidence by the Substance Abuse and Mental Health Services Administration (William Beardslee, Versage, Wright, & Salt, 1997; W. R. Beardslee, Gladstone, Wright, & Cooper, 2003; W. R. Beardslee et al., 1997; W. R. Beardslee, Wright, Rothberg, Salt, & et al., 1996; W. R. Beardslee, Wright, Gladstone, & Forbes, 2007; W. R. Beardslee, Wright, Salt, & Drezner, 1997; D'Angelo et al., 2009; Podorefsky, McDonald-Dowdell, & Beardslee, 2001). It has been adapted to different global contexts including Finland and Sweden with additional adaptations ongoing in Columbia (Pihkala, Sandlund, & Cederström, 2011; Solantaus, Reupert, & Maybery, 2015). This intervention is informed by cognitive behavioral theory and resilience theory (Rutter, 1987, 1999), emphasizing individual- and family strengths, and facilitating resilience-boosting factors such as education, coping, and healthy family interactions. In addition, the intervention is future-oriented to help families develop strategies to cope with forthcoming challenges (W Beardslee, Chien, & Bell, 2011). The change strategy of the depression prevention components include: 1) psychoeducation including specific education of family dynamics of depression; 2) empowering parents to communicate about mental health; 3) cognitive-behavioral strategies including development of recognizing and changing negative thoughts and behaviors and practicing positive coping strategies; 4) supporting healthy family interactions; and 5) creating family strategies and a common narrative around the family experience of mental health.

Third, the intervention addresses linkages between HIV/STI and depression. This includes for example, how negative affect can alter perceptions of risky situations and partners, and how maladaptive coping with emotional dysregulation such as substance use can negatively impact implementation of protective behaviors. This also includes for example how parental depressive symptoms can affect communication and healthy family interactions. The intervention builds self and family efficacy in behavioral strategies to address these interactive risks between HIV/STI risk and depression.

Finally, the intervention builds facilitating family environments for prevention. The starting point of the program is family strengths and resilience, and the program integrates context specific concepts and strategies to build resilience based on qualitative pilot work (Kuo et al., 2018). In addition, the intervention incorporates insights from adolescent development theory to create family environments that can be leveraged to enhance adolescent prevention outcomes (Elder & Shanahan, 2006). The intervention focuses on family elements critical for both prevention of adolescent depression and HIV/STIs including communication and functioning. The intervention empowers families by using a facilitated process to identify a family's unique strengths and to build on these for maximum prevention impact, by encouraging families to map their family's unique goals in their own tailored journey through the intervention, and to create family strategies to overcome their specific challenges.

Facilitators

Two facilitators with bachelor's and master's level training delivered the intervention in-person after-school and on weekends in a family-friendly space in a community organization, with standardized delivery guided by an intervention manual. This community

organization was situated in the same community where participants lived. The organization was within walking distance or short transport distance for families attending the intervention. Both facilitators had significant prior experience interacting with adolescents and families affected by HIV and poor mental health in research and clinical settings. Training occurred through an initial two-week interactive didactic seminar and completion of a mock course of intervention delivery. Weekly support was provided during the intervention delivery including specialized support by a South African clinical psychiatrist as needed.

Randomization

Urn randomization was used to assign dyads to the intervention group or the control group in a parallel design, with a 1:1 ratio of assignment. The randomization assignment was pre-programmed into a computer by the statistical team. This computer program was then used by the study team to assign participants in-person. The randomization process balanced allocation of adolescent-parent dyads based on adolescent age and gender. Because randomization occurred in a group setting, assignment was not concealed from participants or from the study staff who delivered the intervention or coded fidelity. However, assignment was concealed from study staff who were part of the assessment team (single-blind) so as not to affect assessment of hypothesized effects of the intervention. The control group was offered the intervention immediately following the last assessment point at 3 months (as a wait list control).

Sample Size and Statistical Analyses

The sample size was designed to examine feasibility and acceptability, and to examine whether there were promising directions for preventive behavior change but was not powered to examine efficacy in this pilot trial. Descriptive statistics were computed to assess sample characteristics and the distribution of study variables. We compared participants in the intervention arm to those in the control arm at baseline and 1- and 3-month follow-up visits using chi square tests and independent samples t tests. The effect of the intervention across follow-up was then estimated using generalized estimating equations (GEE) with an unstructured correlation matrix to account for repeated outcome measurements within subject-specific clusters. Lastly, to evaluate direction of effects in the intervention arm for key outcomes from baseline to 1- and 3-month follow-up visits, paired samples t tests were used.

Results

Participant Characteristics

In total N=73 adolescents (and parents) were randomized. Adolescents were an average age of 14 years, 100% Black African, 100% isiXhosa, and 56% female, 44% male. *Our Family Our Future* reached high-risk adolescents and families. During eligibility screening, 28% of adolescents met criteria for mild, but concerning depressive symptoms suggesting prevention was needed to arrest further decline. Adolescents in the target community were at elevated risk for depression given 44% of parents met criteria for mild, but concerning depressive symptoms. At baseline, 69% of adolescents had never tested for HIV and 92%

had never tested for other STIs despite living in a community with high rates of HIV and STIs. A significant number of adolescents had started their sexual lives: 25% reported vaginal or anal sex. Among adolescent who engaged in penetrative sex, 30% reported sexual partners of unknown HIV status, 36% had 5+ partners, 31% had recent unprotected sex, and 31% engaged in inconsistent condom use.

Acceptability of the Intervention

Our Family Our Future was highly feasible. Randomization achieved balance in arms with no significant differences between groups in regards to key variables. We also achieved 100% retention at both 1- and 3-month follow-up timepoints for all adolescents and parents in our pilot trial in spite of a challenging scientific environment including working in the community in house-to-house recruitment, tracking, and tracing with no street names, lack of home addresses, no postal service, few landline phones, and frequent seasonal migration. Both parents and children had to meet all eligibility criteria, resulting in only 28% of those screened being eligible. Both adolescents and their parents needed to report a sub-threshold level of depressive symptoms. Those with minimal or threshold level of symptoms were excluded. Among parents, 20.3% scored in the 0–8 range with no or very low symptoms of depression; 35.6% scored in the clinically significant range and, thus, 55.9% were excluded. For adolescents, 69.9% scored in the 0–8 range with no or very low symptoms of depression; 1.9% scored in the clinically significant range and, thus, 72.8% were excluded. There are no community-based data that we could find on depressive symptomology for adolescents in South Africa but the adult rates were on par with reports from other community-based samples (reports ranging from 25.2% to 34.7% prevalence among adults in similar urban South African settings) (Cooper et al., 1999; Gillis, Welman, Koch, & Joyi, 1991). Regarding the enrollment rate, we purposively separated the baseline assessment from the time of randomization, which occurred with participants who returned to be for the enrolled in the trial when they were randomized to the intervention or control arms. This design was selected for two reasons. First, we wanted to determine whether there were differences between the demographic characteristics of the baseline sample and the final sample in the trial (there were not). Second, we wanted to determine whether this design would result in reasonable retention rates and resulted in a trial sample that shared the same demographic characteristics as the enrolled sample. The design then could be used in a future efficacy trial where it would be very important to maximize retention (see Figure 1 for recruitment and retention details). Although sessions, on average, had good attendance (60% in the intervention arm attended more than 2 sessions), families identified ways to improve acceptability and attendance including the need to: 1) readjust timing of sessions that occur in the winter season (to address family concerns about sessions ending after dark, a safety concern for families); 2) increase travel reimbursement; 3) increase food when sessions coincide with lunch and dinner times; 4) provide flexibility in the group composition to provide greater flexibility for attendance days and times; 5) separate the individual family session into a fourth week so that the length of activities were not so lengthy in the third week (in this pilot the individual family session ran immediately after the third group session); and 6) consider shifting to a community site less affected by gang violence to increase safety and diminish fears of random violence while enroute to the site.

Our Family Our Future was appealing to high-risk adolescents and their families. Overall the program was ranked ‘good’ or ‘excellent’ in quality by 100% of adolescents and parents. 100% of adolescents and parents felt they received desired information. In regards to satisfaction with information, 90.6% of adolescents and 100% of parents felt ‘most’ and ‘all needs were met’. In terms of the intervention helping them to deal effectively with important issues, 100% of adolescents and 96.9% of parents felt it ‘helped’ and ‘helped a great deal’. In terms of intervention meeting overall needs, 100% of adolescents and 96.9% of parents felt they were ‘mostly’ and ‘very satisfied’. 96.9% of adolescents and 93.5% of parents felt ‘mostly’ and ‘very satisfied’ with the overall intervention. 96.7% of adolescents and 100% of parents as ‘mostly’ and ‘very satisfied’ with facilitators. 100% of participants would recommend the intervention to others and attend again.

Fidelity of the Intervention

Our Family Our Future was implemented with rigorous fidelity. Based on fidelity observation by a neutral observer, facilitators exhibited skilled delivery of the intervention, with an average ranking of “3” - the highest ranking on a 1 to 3 scale (equivalent to demonstrated skills >75% of the time) for active engagement with participants; active listening; respectful, positive communication; guided discovery; warmth, concern, confidence, professionalism; empowerment of families; building participant confidence; and maintenance of appropriate pace of group discussion; ending on a positive note. In addition, guided by a manualized protocol to standardize delivery for core behavioral change components, facilitators received high fidelity rankings with >90% fidelity to core components.

Preliminary Efficacy of the Intervention

The primary aim of this pilot study was to investigate acceptability and feasibility as described above. This trial was not powered for efficacy (and thus saw no significant differences in study outcomes between the trial arms. We did, however, observe promising direction of effects in the intervention arm. Mean changes in the study outcomes from baseline to 3-months post-intervention and estimated effect sizes (Cohen’s *d*) are shown in Table 1. Changes observed at 3-months were consistent with changes observed at 1-month post-intervention.

HIV testing, HIV risk behavior, HIV knowledge, risk perception, and condom use self-efficacy—Protective behavior change occurred. HIV testing increased, with 6 adolescents (22%) newly testing for HIV between baseline and the 3-month timepoint and a total of 13 adolescents (35%) reporting testing for HIV during the 3-month follow-up period, compared to only 10 (27%) who reported ever testing at baseline. Inconsistent condom use in the past 3 months decreased from 8.1% at baseline to 2.7% at 3-months post-intervention. Moreover, 7 adolescents (19%) reported lifetime sexual activity at baseline and, while we expected engagement in oral, anal, and vaginal sex to increase due to natural trajectories of sexual activity in this age group, only 3 additional participants (10%) reported sexual activity during the 3-month follow-up period, with a total of 5 (13.9%) adolescents reporting sexual activity during the follow-up period.

Adolescent HIV knowledge, risk perception, and self-efficacy for condom use increased. Adolescent knowledge on causes, modes of transmission, and treatment for HIV improved at 3-months compared to baseline ($p=.113$). Further, adolescents were less likely to perceive low HIV risk at 3-months post-intervention than baseline ($p=.024$). Lastly, self-efficacy for condom use was higher at follow-up compared to baseline ($p=.650$).

Depression, resilience, and family interactions—We recruited for a sample of adolescents who had mild depressive symptoms but at levels not yet reaching the threshold for a significant clinical depressive disorder. The intervention arm showed diminished depressive symptoms, with adolescent CES-D scores decreasing from 12 points at baseline to 7.5 points 3-months post-intervention ($p<.001$). Parent CES-D scores also decreased slightly from 12 points at baseline to 11 points 3-months post-intervention ($p=.432$). Both adolescent and parent resilience also improved, with adolescent resilience scores on the Connor-Davidson Resilience Scale increasing from 25 points at baseline to 26 points at 3-months post-intervention ($p=.572$) and parents scores increasing from 29 points at baseline to 31 points at 3-months post-intervention ($p=.233$). Lastly, family interactions changed positively. Adolescents scored higher on the Parent-Adolescent Communication Scale for both the openness in family communication subscale for positive family communication ($p=.586$) and the problems in family communication subscale for negative communication ($p=.012$) at 3-months post-intervention compared to baseline, with higher score representing better adolescent-parent communication (Barnes & Olson, 1985). Parents also scored higher on both subscales, demonstrating an improvement in both positive ($p=0.050$) and negative ($p<.001$) communication strategies.

Discussion

Adolescents are a high priority population for HIV prevention, especially those with elevated risk for HIV due to psychological distress. With only a handful of interventions under development in South Africa that synergistically address HIV risk behaviors with mental health, we need to advance intervention science urgently in this area. The *Our Family Our Future* intervention takes a strength-based approach, leveraging the resilience of families to help adolescents navigate an age- and developmentally-critical period where they faced increased risk for HIV, STIs, and depression.

Findings indicate that *Our Family Our Future* is a promising intervention. Families participating in the pilot study of the intervention found the program to be highly acceptable with high satisfaction reported for intervention quality, relevance of information, facilitators, and more. The intervention – both fidelity to a manualized intervention protocol and recruitment and retention – was also highly feasible. Although this pilot was not fully-powered to examine efficacy, we found promising directions for HIV prevention outcomes among those receiving the intervention, including increases in HIV testing, decreases in inconsistent condom use, and lower than expected rates of lifetime sexual activity. We also found increases in HIV knowledge, increased HIV risk perception, and increased confidence for correct and consistent condom use. We found promising directions for change around mental health, with decreased symptoms of depression. Finally, family resilience improved over time and family interactions changed positively in the area of communication which is

critical for adolescent HIV and depression prevention. Taken together, these findings suggest important directions for future research.

There are some limitations to this study. First, the study was underpowered to detect statistically significant effects, limiting our ability to determine if the observed changes in study outcomes in the intervention arm can be attributed to the intervention. Second, HIV and STIs were examined via behavioral reports rather than biomarker data in this small pilot study. Finally, behavior changes were examined over a 3-month period. The period of follow-up could be extended to examine the durability of behavior change. As such, future study of this promising intervention should expand sample size to examine statistically significant effects of the intervention on behavior, integrate biomarker data to verify the HIV and STI outcome, and extend the period of follow-up for outcome assessments.

Conclusions

Our Family Our Future is an acceptable and feasible intervention for reducing HIV risk, depressive symptoms, and increasing resilience. A future randomized controlled trial is needed to establish the efficacy of this promising intervention for reducing HIV risk and depressive symptoms, and increasing resilience. That larger trial could examine the mediators and moderators of behavior change so that more precision can be brought to the underlying mechanisms of change. South Africa is an ideal site to develop this intervention science. South African families and scientists should guide the development of how families need to be integrated into the process of supporting life-long healthy behaviors for adolescents as they make key transitions in sexual, reproductive, and mental health.

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Figure 1.
 Consort Diagram for Pilot Randomized Controlled Trial of *Our Family Our Future*

Table 1.

Direction of effects in intervention arm from baseline to 3-month follow-up visit

Outcome	Baseline	3-month follow-up	t-test (p-value)	Cohen's d^*
Adolescent	Mean (SD)	Mean (SD)		
HIV knowledge (n=37)	8.38 (2.97)	9.24 (2.51)	-1.623 (p=.113)	-0.267
Low HIV risk perception (n=33)	4.15 (1.87)	3.27 (2.02)	2.367 (p=.024)	0.412
Condom use self-efficacy (n=35)	20.83 (7.68)	21.47 (5.06)	-0.458 (p=.650)	-0.077
Depression (n=37)	12.11 (2.05)	7.51 (6.21)	4.384 (p<.001)	0.721
Resilience (n=34)	25.09 (9.36)	26.26 (8.65)	-0.570 (p=.572)	-0.098
Openness in family communication (n=33)	43.70 (6.05)	44.61 (7.10)	-0.550 (p=.586)	-0.096
Problems in family communication (n=34)	29.91 (7.51)	35.06 (7.87)	-2.648 (p=.012)	-0.454
Parent	Mean (SD)	Mean (SD)		
Depression (n=37)	12.27 (2.08)	11.22 (7.69)	0.794 (p=.432)	0.131
Resilience (n=37)	29.49 (6.92)	30.84 (5.94)	-1.213 (p=.233)	-0.199
Openness in family communication (n=37)	43.14 (6.25)	45.89 (5.79)	-2.027 (p=.050)	-0.333
Problems in family communication (n=37)	30.49 (7.81)	37.00 (7.10)	-3.961 (p<.001)	-0.651

* 0.2=small effect size; 0.5=medium effect size; 0.8=large effect size