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ScienceDirect

Behavior Therapy 51 (2020) 601–615

Behavior Therapy

www.elsevier.com/locate/bt

Group Intervention for Adolescent Anxiety and Depression: Outcomes of a Randomized Trial with Adolescents in Kenya

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Youth mental health interventions in low-resource communities may benefit from including empirically supported elements, using stigma-free content, and using trained lay-providers. We developed and evaluated such an intervention, targeting adolescent depression and anxiety in Kenya, where mental health care is limited by social stigma and a paucity of providers. Kenyan adolescents (N=51, ages 14–17, 60.78% female) from a school in an urban slum in Nairobi with self-reported moderate-to-severe symptoms of depression or anxiety were randomized to the 4-week "Shamiri" ("thrive") group intervention or a study skills control intervention of equal duration. The Shamiri intervention included growth mindset, gratitude, and value affirmation exercises. The content was delivered by recent high school graduates (ages 17–21, 60% male) trained as lay-providers. Participants met in school once-a-week in groups of 9–12 youths (average group size 10). Compared to the study-skills control, Shamiri produced greater reductions in adolescent depression symptoms (p=.038; d=.32) and anxiety symptoms (p=.039; d=.54) from baseline to 4-week follow-up, and greater improvements in academic performance (p=.034; d=.32) from the school-term before versus after the intervention. There were no effects on overall social support or perceived control, but the Shamiri group showed larger increases in perceived social support from friends (p=.028, d=.71). This appears to be the first report that a brief, lay-provider delivered, community-based intervention may reduce internalizing symptoms and improve academic outcomes in high-symptom adolescents in Sub-Saharan Africa. Larger replications with extended follow-ups will help gauge the strength and durability of these effects.

This research was supported by grants from the Center for African Studies at Harvard University, the Harvard College Research Program, and the Weatherhead Center for International Affairs at Harvard University. The authors are grateful to the principals and school administrators in Kibera, Kenya and to Gail O'Keefe, Doug Melton, Murori Muthehi, and the Eliot House community for their support. We also thank Prof. Carol Dweck for her guidance and advice in the study design and development process.

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Keywords: adolescents; Sub-Saharan Africa; depression; anxiety; global mental health

Developing scalable, nonstigmatizing, and cost-effective treatments for common mental health problems such as depression and anxiety is a critical priority within global mental health research (Collins et al., 2011). Identifying such interventions for youth mental disorders is particularly important as the onset of a majority of lifetime psychological disorders associated with lifetime educational, medical, and interpersonal challenges occurs during adolescence (Patel, Flisher, Hetrick, & McGorry, 2007; Vigo, Thornicroft, & Atun, 2016).

For adolescents suffering from depression or anxiety in low-income countries, such as those in Sub-Saharan Africa (SSA), treatment options are very limited for a variety of reasons. First, most of the existing evidence-based treatments are long, costly, and require delivery by trained experts (Schleider & Weisz, 2017a, 2017b). As a result, they are inaccessible to most youths in SSA, where incomes are low and there are few professional clinicians (Patel et al., 2007). Second, the stigma around depression and anxiety in Kenya discourages help-seeking (Ndetei, Mutiso, Maraj, Anderson, Musyimi, & McKenzie, 2016). Third, government investment in mental health in SSA countries is quite modest (Patel et al., 2007).

Given these obstacles to formal treatment of depression and anxiety in SSA, alternative approaches may be needed. One option might involve developing interventions that are low-cost and accessible, able to circumvent stigma, and scalable in the low-resource settings of SSA countries. Elements of this approach have been tried with a number of groups in SSA, including some for which the need has been considered most urgent (Yatham, Sivathasan, Yoon, da Silva, & Ravindran, 2018). One such effort involved a peer-group intervention for AIDS-orphaned youths in the Mbarara District of Uganda (N = 326, age 10–15). The intervention incorporated cognitive behavioral therapy (CBT) techniques (i.e. strengthening coping) and positive psychology (i.e., past–present–future hopes exercises) and was delivered by schoolteachers trained to be lay clinicians. Youths in the intervention group showed improved youth depression and anxiety when compared to a waitlist control group (Kumakech, Cantor-Graae, Maling, & Bajunirwe, 2009). A similar intervention trial focused on AIDS-orphaned youths in the Rakai District of Uganda (N = 261, ages 11–17), adding a comprehensive microfinance intervention, which included matched savings accounts and financial literacy sessions, to a traditional school counseling program. Youths in the intervention group reported reduced depression symptoms when compared to youths in the traditional school counseling program (Ssewamala, Neilands, Waldfogel, & Ismayilova, 2012). This suggests that alternative, nontraditional programs, such as poverty-alleviation interventions, may improve mental health outcomes.

Other efforts have shown more mixed results. During the recent conflict in Burundi, a school-based intervention trial with youths (N = 329, ages 8–17) included CBT techniques (psychoeducation, strengthening copying) and creative expressive elements (i.e., structured movement and cooperative games) and was delivered by high-school graduates trained as lay clinicians. However, this intervention did not reduce depression symptoms compared against a waitlist control (Tol et al., 2014). A similar attempt with Acholi youths living in internally displaced-persons camps during an armed conflict in Uganda (N = 314, ages 14–17) showed that an adaptation of interpersonal therapy for adolescents (IPT-A) reduced depression symptoms in girls but not in boys (Bolton et al., 2007).

As these examples illustrate, most research addressing youth mental health problems in SSA has used methods derived fully or partially from formal psychotherapy interventions for mental disorders, and these can sometimes be helpful. However, to the extent that the interventions require the use of formal therapy procedures, such as CBT or IPT-A, the expertise or training required for lay clinicians may be substantial; such intensive training requirements create high-cost barriers to dissemination. In addition, to the extent that the interventions explicitly reference depression, anxiety, or other mental health conditions or disorders, their effects might be limited by stigma in the participants' cultural context.

One approach to limiting skill requirements and risk of stigma may involve the use of brief, scalable interventions that invoke simple psychological principles rather than treatment of psychopathology. These are sometimes called "wise" interventions, and a growing body of evidence supports their potential to improve developmental, educational, and health outcomes (Schleider, Mullarkey, & Chacko, 2019; Walton & Wilson, 2018). Wise interventions (WIs) focus on a single component, often drawn from diverse psychological perspectives (e.g., social, developmental, health, and clinical psychology), and target specific psychological processes (e.g., core beliefs; Walton & Wilson,

2018). Compared to traditional therapeutic interventions, WIs are generally briefer (e.g., single session), more focused (e.g., targeting one single belief), and designed to reduce stigma (e.g., never mentioning the term "depression"; Schleider et al., 2019). While WIs are similar in some respects to core components of evidence-based treatments, they differ in their emphasis on broad relevance to human functioning rather than specific reference to treatment of mental health problems and disorders (Schleider et al., 2019). For example, growth mindset interventions have been classified as wise interventions. These interventions target the belief that traits are malleable rather than unchangeable, improving mental health and functioning without ever explicitly mentioning disorders (Schleider et al., 2019; Schleider & Weisz, 2016). Some of the characteristics of WIs may be desirable for interventions targeting youths in SSA. We sought to test this possibility.

The intervention trialed in the present study consisted of three modules drawn from previously tested WIs: a growth mindset module (Schleider & Weisz, 2016; Yeager et al., 2014) lasting two sessions, a gratitude module (Froh, Kashdan, Ozimkowski, & Miller, 2009) lasting one session, and a value affirmations module (Cohen, Garcia, Purdie-Vaughns, Apfel, & Brzustoski, 2009) lasting one session. Growth mindset interventions target implicit theories about the malleability of human characteristics; these interventions challenge the idea that characteristics such as personality traits and intelligence are unchangeable and attempt to strengthen individuals' beliefs in the malleability of such characteristics (Yeager et al., 2014). Gratitude interventions, derived from research on trait gratitude suggesting that grateful people exhibit positive states and outcomes, attempt to teach individuals to notice and appreciate good things that happen to them (Froh et al., 2009). Finally, in value affirmation interventions, people reflect on self-defining values, thereby reestablishing an awareness of personal worth and integrity, a process that affords them an opportunity to mobilize internal resources (Cohen et al., 2009).

We selected these modules because each has been shown in randomized trials to improve mental health, well-being, or academic functioning in adolescents. Growth mindset interventions have shown promising effects on youth mental health (Schleider & Weisz, 2016; Yeager et al., 2014), gratitude interventions have demonstrated beneficial effects on well-being and life satisfaction (Froh, Sefick, & Emmons, 2008), and value affirmation interventions have improved academic outcomes in marginalized populations (Cohen et al., 2009). While each stand-alone intervention (growth mindset, gratitude, value affirmation) has demonstrated beneficial emotional or academic effects on adolescents, to our knowledge, they have never been tested in combination.

In the present study we—a multicultural team of psychologists from American institutions (one a Kenyan citizen with firsthand experience of the Kenyan education system)—developed and evaluated an intervention for depression and anxiety in adolescents in Kenya. We built our intervention to address, and potentially circumvent, the numerous barriers that impede help-seeking in this population. As such, we aimed for the intervention to be low-cost, focused on positive concepts to circumvent stigma, and delivered in a naturalistic community setting by lay-providers. To achieve these goals, we developed an intervention built upon evidence-based components of WIs, combining three single-component WIs within one protocol, for delivery in a school setting by high school graduates. We named the intervention Shamiri, a Swahili-word for *thrive,* to convey a positive emphasis rather than a clinical image of psychopathology.

We predicted that students assigned to receive the Shamiri intervention would experience reductions in primary outcome measures (depressive and anxiety symptoms) and improvements in secondary outcome measures (social support, perceived control, and academic outcomes) when compared to youths assigned to a "study skills" control group. We opted for an active, study skills control group because (a) we wanted all participants to have an opportunity to benefit in some way from participation, and (b) meta-analyses of youth intervention research indicate that active control groups (as opposed to passive controls such as a waitlist) provide a more rigorous standard of comparison (Weisz et al., 2017).

Methods

Study setting

We tested Shamiri in a setting where the risk of adolescent depression and anxiety appeared to be especially high, and where there might be a particular need for a low-cost, scalable approach to intervention: Kibera, a slum located 4.1 miles from the city center of Nairobi, Kenya. Kibera is the most populous urban slum in Africa with about 250,000 living in a 0.96 square-mile area. Youths in Kibera face significant hardships: only 30% of those who attend high school graduate, youths are exposed to high rates of crime and violence, 15% of youths are reported to engage in drug use and abuse, and many youths live under severe financial

hardship (Onyango & Tostensen, 2015). Indeed, mental health care is limited in Kibera, and the clear need for accessible, youth-focused emotional support in Kibera made this a suitable location for an initial test of the Shamiri intervention.

The present study took place in a mixed-gender secondary school in Kibera. We selected a secondary school as the delivery setting for several reasons. First, secondary school enrollment rates in Kenya have risen in recent years, with 58.20% of secondary school–aged youths enrolled in 2014 compared to 41.90% in 2009 (Ministry of Education, Science and Technology, 2014). To strengthen this trend, the Kenyan government has recently passed legislation that will make nonboarding secondary schools all-expenses-free and aim to achieve a 100% primary to secondary school transition rate by the year 2022. Because most adolescents in Kenya are and will be in secondary schools, designing interventions for delivery in secondary school settings likely maximizes their accessibility. Second, adolescents in secondary schools face increased psychosocial stress, especially due to the stress-inducing mandatory national examinations at the end of secondary school that determine university and career prospects. Finally, English is the primary language of instruction at all levels of education in Kenya, and for students to gain admission into any secondary school, they have to demonstrate fluency in both written and oral English. As students in Kenyan secondary schools are fluent in English, the barrier to piloting and scaling an intervention is reduced because content need not be translated.

Participants: Recruitment and Resulting Sample

All procedures were approved by the university Institutional Review Board (IRB) prior to data collection. Upon consultation with local administrators, it was determined that the University IRB approval would suffice if we also received approval from school principals. Study recruitment took place in June 2018. Students between the ages of 12 and 19 were eligible for the study if they self-reported elevated depression or anxiety (for more information on cut-offs, see the measures section). No other exclusion criteria were applied. Students at this school completed a questionnaire battery in their classrooms to determine study eligibility. Consistent with the school policy and customs, the school principals represented parents in receiving information about the study and an opportunity to ask questions. They then provided consent on behalf of the parents of any minor interested in participating in the study. After this, all interested students provided informed assent before completing the baseline questionnaire. Of the 212 adolescents who completed the baseline questionnaire, 76 met the inclusion criteria and were invited to participate in the full intervention, and 51 accepted and participated. Thirty-three percent of those who met criteria for and were invited to the group intervention phase opted out. The most common reasons for opting out included: absence from school due to failure to pay school fees, scheduling conflicts, and lack of interest. See Figure 1 for the CONSORT flowchart diagram.

Measures

We administered seven measures of potential relevance to mental health and wellness of Kenyan youths. Because most of these measures had not been previously used with youths in SSA, we required evidence of adequate internal consistency within the Kenyan sample, defined as Cronbach's alpha value of 0.7, for inclusion in study analyses (see Osborn, Venturo-Conerly, Wasil, Schleider, & Weisz, 2019, for more information).

Patient Health Questionnaire-8

We used the 8-item version of the PHQ-9, the PHQ-8 to assess for depression symptoms. PHQ-8 scores are highly correlated with PHQ-9 scores, and the same cutoffs can be used to assess depression severity (Kroenke & Spitzer, 2002). Cronbach's alpha for the PHQ-8 in the present study was 0.73. We used cut-off norms from primary care studies on the PHQ-9 in United States youth samples—a score of 15 or higher on the PHQ-9 indicated moderately-severe-to-severe depression (Kroenke, Spitzer, & Williams, 2001). Participants were required to either endorse moderate-severe levels of anxiety *or* moderately-severe-to-severe levels of depression to qualify for study inclusion, and 37.25% of the sample reported moderately-severe-to-severe depressive symptoms.

Generalized Anxiety Disorder Screener-7

The GAD-7 is a measure used globally to screen for generalized anxiety disorder in adolescents and adults (Spitzer, Kroenke, Williams, & Löwe, 2006). Cronbach's alpha for the GAD-7 in the present study was 0.78. For the purposes of this study, we used norms established in primary care studies on the GAD-7 in youth in the United States (a score of 10-to-14 on the GAD-7 indicated moderate anxiety and a score of 15 or greater indicated severe anxiety) (Spitzer et al., 2006). Participants were required to either endorse moderate-severe levels of anxiety *or* moderately-severe-to-severe levels of depression to qualify for study inclusion, and

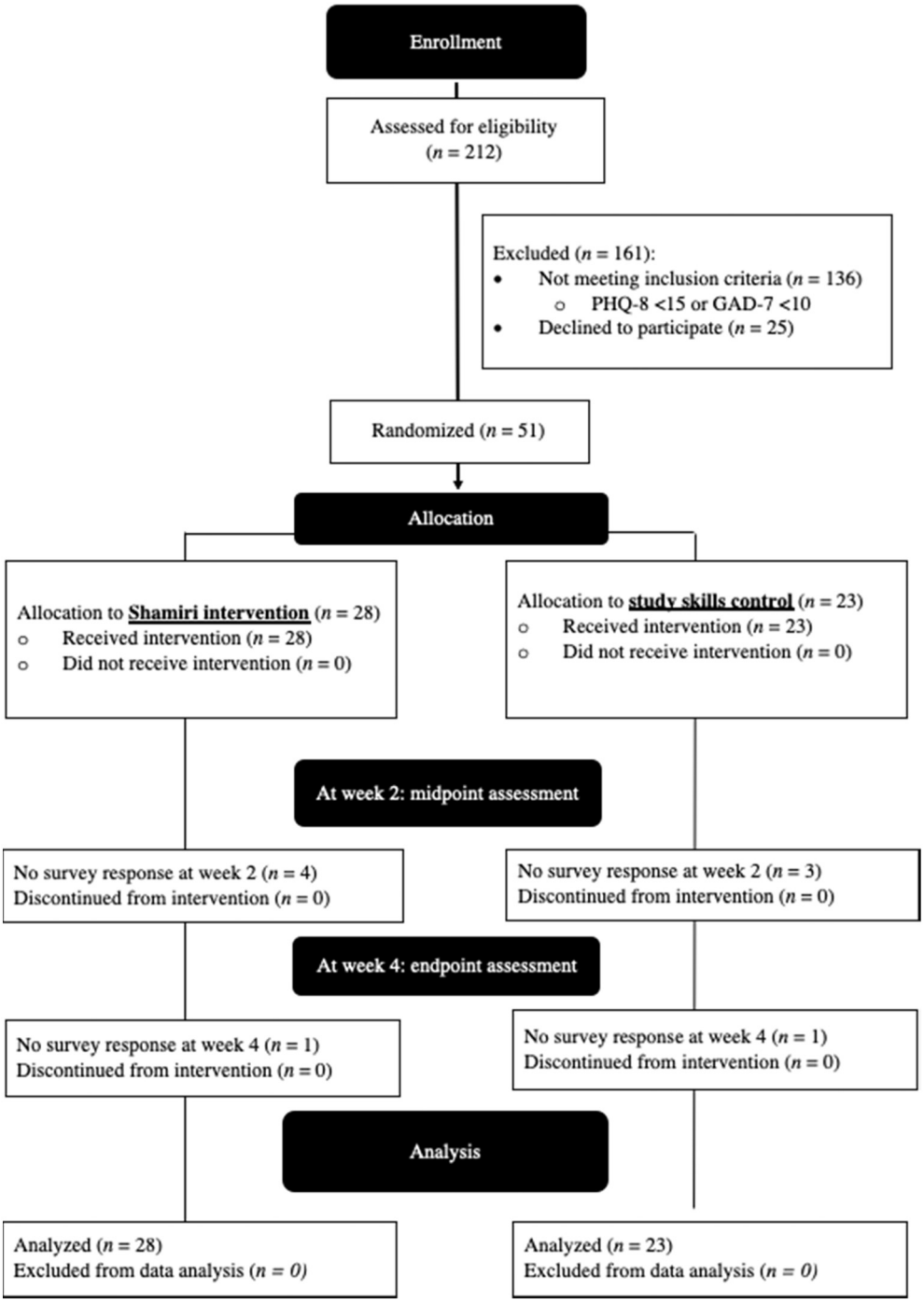

FIGURE 1 CONSORT diagram showing study flow.

92.16% of the sample reported moderate-to-severe anxiety symptoms at baseline.

Multidimensional Scale of Perceived Social Support
The MSPSS (Zimet, Dahlem, Zimet, & Farley, 1988) is designed to measure satisfaction with social support. It consists of three subscales: the "friends" subscale, which measures supporting from friends; the "family" subscale, which measures support from family; and the significant others subscale, which measures support from significant others. In the present study, Cronbach's alpha for the full 12-item Multidimensional Social Support Scale was 0.86; alpha was 0.79 for the 4-item Significant Other subscale, 0.80 for the 4-item Family subscale, and 0.86 for the 4-item Friends subscale.

Perceived Control Scale for Children

PCS (Weisz, Southam-Gerow, & McCarty, 2001) includes 24 items related to beliefs about personal control, specifically, the belief that one can obtain desired outcomes and avoid undesired outcomes through effort. Cronbach's alpha for the PCS in this study was 0.78.

Academic Performance

Academic grades of the participants were collected for the school-term before the intervention (January to April 2018) and the school-term after the intervention (September to November 2018). We used a student's average grade (mean grade across all enrolled subjects) to determine their academic performance per semester. We also examined the student's grade in math and science (mean grade across biology, physics and chemistry). The academic data provided by the school was unstandardized (e.g., if a student scored 45 on a test, the school provided us with the number 45). In order to compare scores between students in different grades and across different exams, we converted the academic grades to standard scores (M = 60, SD = 10, chosen arbitrarily and used in rescaling). For each student, we thus calculated a mean standard score across all exams, and a mean standard score across math and science exams only. Notably, the intervention (M = 61.07, SD = 10.88) and control (M = 58.61, SD = 8.51) groups did not differ significantly in their academic performance at baseline (t = –0.907, p = 0.369). Nonetheless, we elected to control for academic performance at baseline in our models of intervention effects. See Appendix B, supplementary materials for more information on academic grades.

Attendance

Intervention attendance was measured via students' completion of a weekly feedback questionnaire. The questionnaire was used internally by the study team and offered attendees an opportunity to give feedback on their group leaders and the intervention. In order to solicit honest feedback, identifying information was not collected on this sheet. As such, we only collected attendance in aggregate.

Feedback Survey

A feedback survey (Appendix D, supplementary materials) was designed to collect feasibility and acceptability information from participants at the end of the intervention.

Intervention Fidelity

Intervention fidelity—including group leader adherence to protocol manual and group leader competence in delivering the Shamiri and study skills interventions—was assessed using a grading rubric developed by the investigators (see Appendix C, supplementary materials). In this system, each session was broken down into components reflecting activities outlined in the protocol manual; these components were then graded by raters. For example, the Week 3 session on gratitude was divided into six components: a discussion of the previous week's homework, an introduction to gratitude, a group discussion on gratitude, a gratitude letter-writing activity, a discussion of the gratitude letter-writing activity, and an explanation of upcoming week's homework activity. Raters coded group leader adherence to protocol (i.e., whether the group leader followed precisely the intervention outline without deviating to change any content, and delivered content as defined in the protocol manual, classified as 0 = *no*, 1 = *yes*) and group leader competence (i.e., effectiveness in communicating concepts, skillfulness of delivery, etc., rated from 1 = *not competent* to 5 = *very competent*).

Raters (N = 2) were second-year students at a local university. The raters underwent training that consisted of three steps. First, the raters were didactically trained on the protocol manual of both Shamiri and study skills groups for each of the 4 weeks. Second, each week's grading rubrics were reviewed in detail, and each item in the rubric explained and connected to its component on the protocol manual. Finally, the raters and the first author listened to one randomly selected recording (approximately 60 minutes long) from the Shamiri and study skills groups in which they worked with the first author to grade all the components of the intervention as per the rubric. After this, the two raters independently graded a randomly selected 70% of the audio-recordings of the Shamiri and study skills sessions. The raters were blind to study purposes and did not know any of the group leaders. We used Cohen's (1960) kappa to determine adherence to protocol manuals. Mean adherence across all the sessions was in the "almost perfect" range (Cohen, 1960) for the Shamiri protocol (mean kappa = .82, SD = 0.21) and in the "substantial" range (Cohen, 1960) for the study skills protocol (mean kappa = .78, SD = 0.38). We used ICC to determine the reliability of the raters' score on group leader competence; ICC values above .75 are classified as "excellent" (Cicchetti & Sparrow, 1981). Coder agreement ranged from below to above this cutoff for the Shamiri protocol (mean ICC[2,2] = .71, range .61–.83) and the study skills protocol (mean ICC[2,2] = .81, range .66–.91).

Procedures

Eligible students who consented at baseline and were invited to the study were informed they had been selected to join the Shamiri Wellness Program,

which was intended to improve their academic functioning and wellness. They were informed that, should they wish to participate, they should meet their groups at the scheduled location and time. Fifty-one participants who accepted and participated in the study were randomly assigned to the Shamiri intervention or study skills control using a random number generator. Participants in each condition were assigned to groups of 9–12 youths (average group size was 10). They met in their groups every week for 1 hour for the month-long duration of the study. Each group met in the afternoons during activities period (4–5 P.M.) and was led by the same leader each week. Participants completed the anxiety and depression measures at baseline, midpoint (after 2 weeks), and endpoint (after 4 weeks). The other measures were only completed at baseline and endpoint. At the end of the study, participants provided feasibility and acceptability data by means of a feedback survey.

Group Leader Selection and Training

The Shamiri and study skills groups were led by five trained group leaders, recruited through local universities and high-school graduate forums. The average age of the group leaders was 19 (ages 17–21) and 60% were male. Eleven potential group leaders sent in written applications, and all were interviewed in person. Selection interviews were semistructured interviews with the study staff designed to assess past experiences, interest in the project, familiarity with mental health issues, and interpersonal facilitation skills. Taking funding constraints into consideration, five group leaders were selected. All group leaders were Kenyan high school graduates, and all were required to be able to read in English; however, none of these leaders was formally certified in counseling or related fields.

All group leaders received 20 hours of training, spanning 5 days, and covering the content of both the Shamiri and study skills groups. Training, led by the first three authors, began with general communication and group leadership skills such as active listening, noting connections between the group members, handling conflicts within the group, and referring students in need to appropriate school officials (training guides are in Appendix C, supplementary materials). Then, group leaders were trained didactically in the specific content of each week of the interventions. Finally, the group leaders were asked to role-play delivering the intervention content, and they received feedback from the trainers and fellow group leaders. All group leaders received detailed and structured outlines with the content of each intervention and control session. Upon completion of training, group leaders were randomly assigned to an intervention or control group and instructed to strictly follow the protocol manual and not use content from the other condition during their sessions. They were all trained in both conditions because the study team had originally intended to pilot the intervention in various schools and assign group leaders to different conditions at different schools with the intention of diluting group leader skills as a factor in intervention efficacy. Three group leaders were assigned to the Shamiri intervention group and two were assigned to the study skills control intervention group. All group leaders led their groups individually.

Shamiri Intervention

Intervention content was divided across four 1-hour sessions that were 1 week apart and included between-session homework exercises. All session materials were in English, but the group leaders were allowed the discretion of holding group discussions in either English or Kiswahili. During sessions one and two, students learned about growth mindsets. Exercises were modeled after existing interventions teaching growth mindset of personality (e.g., Miu & Yeager, 2015; Schleider & Weisz, 2016), but were simplified and otherwise adapted to suit the age and experiences of the intended participants. The intervention was adapted in an iterative process, using literature review, the expertise of the first author who was conversant with the local culture and customs in Kenyan high schools through firsthand experience, the expertise of the authors in intervention design, and the feedback of recent Kenyan high school graduates. Each session included reading activities, group discussions, and writing activities. Session one opened with a didactic introduction to personal growth and its benefits. Students read and discussed an article and video describing the concepts of neuroplasticity and growth mindset, read growth testimonials from well-known figures and their group leaders, wrote their own personal growth stories, and discussed their own experiences with growth. The intervention emphasized how they could apply growth mindset in multiple domains, such as personality, emotional well-being, and school performance. In the second session, students began by discussing their homework, which was to notice a challenge and write about how growth could apply to that challenge. Then, they brainstormed and discussed effective strategies they could use to apply the lessons on growth. Finally, they completed a "saying is believing activity" (Schleider & Weisz, 2016); following a vignette about a (hypothetical) student who was facing a

challenge, the students were asked to offer advice to the student based on the lessons on growth.

During session three, students learned about gratitude. The hour-long session opened with a didactic introduction to gratitude and its benefits, then included a group discussion about gratitude and the things for which participants were grateful. Then, participants wrote a "gratitude letter" (Toepfer, Cichy, & Peters, 2012) to someone who had changed their life for the better. For homework, students completed a daily "three good things" activity for 1 week (Emmons & McCullough, 2003), identifying, each day, three good things that happened and reflecting on those things.

During session four, students learned about values and completed a value affirmation exercise. In this 30-minute session, group leaders led a didactic introduction, first explaining what values are and then leading a group discussion about values. Students were then asked to select, from a list, several values that were important to them. Then, students were instructed to choose the value that felt most important to them, describe why this value was important, and describe a time when they had really lived up to that value, and describe ways they could live in better accord with that value in the future. The session was 30 minutes to allow the participants time to complete endpoint measures. There was no homework following this last session.

Study Skills Control Intervention

Control group content focused on study skills such as note-taking, effective reading strategies, and tips for time management (these exercises were developed for the present study). Each session consisted of didactics detailing study skill strategies and group discussions and activities to help students practice and better understand how to use the study skills they were taught. The structure of these sessions was meant to mirror the structure of intervention group sessions. That is, we controlled for the amount of didactic content, the number of writing activities, the number of group discussions, and in each session where the intervention group received homework, the control group received homework that would require similar effort. Control sessions ran concurrently with intervention sessions, on the same days and for the same duration (1 hour per session).

DATA ANALYSIS PLAN

We used an intent-to-treat approach, including all participants who had been randomized. We ran four linear mixed models comparing intervention and control groups on primary outcome measures (depressive and anxiety symptoms) and secondary outcome measures (social support, perceived control, and academic performance). Models were organized to reflect the hierarchical structure of the data. Different assessment points were nested within participants. All models included a random intercept that allowed for individual variation at baseline. Time, intervention condition, and their interaction were included in all models. Covariates were age in years and sex. Age was included because older adolescents are reported to face increased psychosocial stress, which may exacerbate depressive and anxiety symptoms (Osborn et al., 2019). Sex was included because gender differences in internalizing problems have been documented in Kenyan adolescents (Ndetei et al., 2008; Osborn et al., 2019). We initially included a random slope that allowed for individual variation in outcome change rates; however, this resulted in overfitting (i.e., random effects structure was too complex to be supported by the data). We thus decided to remove the random slopes to allow for a more parsimonious model. Significant ($p < .05$) Condition × Time interactions in predicted directions would indicate that the intervention condition produced more rapid improvements in outcomes across the study period, as compared to the control. Additionally, we calculated effect sizes (ESs) using differences in means; these ESs compared mean gain scores (Cohen's d) reflecting changes in each outcome from baseline to posttreatment for youths in the Shamiri intervention versus study skills control intervention. Statistically significant, positive Cohen's d values indicated greater improvements for intervention group youths versus control group youths.

At baseline there was no subject-level missing data and only one item-level missing data (i.e., one participant did not fill out the GAD-7). At the midpoint, the participant group attendance attrition rate was 14% while at the endpoint the participant group attendance attrition rate was 4%. Participants who missed a session were allowed to attend other sessions in the future. Missing item (measurement) and subject-level data were imputed five times using Fully Conditional Specification (FCS), implemented using the multivariate imputation by chained equations (mice) algorithm in R (van Buuren & Groothuis-Oudshoorn, 2011).

It is important to note that given the rather modest sample size, we conducted planned comparisons without correction for multiple tests. As this is, to the best of our knowledge, the first effort of its kind, we sought tests that would be sensitive enough to maximize their heuristic, hypothesis-generating potential. Given this approach, the

Table 1
Sample Characteristics at Baseline

Variable	Intervention (n = 28)	Control (n = 23)	Test Statistic*
Age (M, SD)	15.36 (0.95)	16.09 (1.04)	F (1,49) = 0.3, p = 0.867
Sex			
Female – n (%)	18 (64.29)	13 (56.52)	PHQ-8: t = 1.71, p = .09 GAD-7: t = 0.69, p = .492
Symptom levels			
PHQ – 8 (M, SD)	13.543 (4.14)	12.91 (3.52)	t = –0.48, p = .633
GAD – 7 (M, SD)	13.07 (4.05)	12.83 (2.33)	t = –0.27, p = .788
Academic Performance at Baseline (M, SD)	61.07 (10.88)	58.61 (8.51)	t = –0.91, p = .369
Form			
One	25	19	X^2 (1, 51) = 0.08, p = .779
Two	3	4	
Tribe[#]			
Luo	16	10	X^2 (10, 51) = 11.70, p = .306
Luhya	5	8	
Nubia	2	–	
Kisii	–	2	
Others	5	3	
Location of Parent's Home[&]			X^2 (3,51) = 4.150, p = .246
Rural Area	8	12	
Small Town	12	8	
Big Town	2	–	
City	6	3	

Note. *Test statistic used to test for significant group differences per variable. PHQ-8 stands for Patient Health Questionnaire, GAD-7 stands for the Generalized Anxiety Disorder – Screener. [#]More information on tribal demographics of the whole sample can be found in Osborn et al. (2019). [&]Students self-reported the location of their parent's primary home. As the above table shows, there was no statistically significant differences on any of the demographics at baseline indicating successful randomization.

findings should not be regarded as definitive, but rather as suggestive of trends to be examined in future research.

Results

Sample characteristics

Characteristics of the 51 adolescents who participated in the study, including tribe, form, and home location, are shown in Table 1. Twenty-eight adolescents were randomly assigned to the intervention group, *M* age (*SD*) = 15.36 (0.95), and 24 to the control group, *M* age (*SD*) = 16.09 (1.04). As study inclusion was based on elevated symptoms of either depression or anxiety, we assessed the percentage of youths above cutoffs on each of the measures. We used cut-off norms from primary care studies on the GAD-7 and PHQ-9 in United States youth samples (a score of 10–14 on the GAD-7 indicated moderate anxiety, a score of 15 or greater on the GAD-7 indicated severe anxiety, and a score 15 or higher on the PHQ-8 indicated moderately-severe-to-severe depression). At baseline, the mean PHQ-8 score in the intervention group was 13.54 (*SD* = 4.14), with 42.86% of the youths reporting moderately-severe-to-severe depressive symptoms. In the study skills condition, the mean PHQ-8 score was 12.91 (*SD* = 3.52), with 30.43 % of the youths reporting moderately-severe-to-severe depressive symptoms. Similarly, the mean GAD-7 score in the intervention group at baseline was 13.07 (*SD* = 4.05) with 89.28% of youths reporting moderate-to-severe anxiety symptoms; 57.14% of youths reported moderate anxiety and 32.14% reported severe anxiety symptoms. In the study skills condition, the mean GAD-7 score was 12.83 (*SD* = 2.33) with 95.65% of youth reporting moderate-to-severe anxiety; 65.22% of youths reported moderate anxiety symptoms and 30.43% reported severe anxiety symptoms.

As shown in Table 1, of the youths who met inclusion criteria, no significant group differences emerged on demographic characteristics, symptoms levels, or academic performance between the Shamiri intervention and study skills control groups, indicating successful randomization. Correlations among depressive symptoms, anxiety symptoms, perceived control and social support were in expected directions and are presented for the full sample in Appendix A (supplementary materials).

Fidelity ratings for the groups

The fidelity ratings for the Shamiri groups showed a mean adherence of 0.89 (out of 1.00, *SD* = 0.29) for the Shamiri group and a mean adherence of 0.92 (out of 1.00, *SD* = 0.26) for the study skills control group. Thus, it appeared that group meeting content adhered appropriately to the randomly assigned group conditions. Raters also graded group leaders on their competence on the protocol (i.e., efficacy of communicating concepts, skillfulness of delivery, etc., rated on a scale of 1 to 5). Group leaders who delivered the Shamiri protocol received a mean competence score of 4.02 (*SD* = 0.69). Group leaders who delivered the study skills protocol received a mean competence score of 3.78 (*SD* = 0.75).

Primary outcomes

Intervention Effects on Depressive Symptoms

The model predicting self-reported depressive symptoms revealed nonsignificant effects for time and condition, but significant effects for Time × Condition (Table 3). The interaction showed more rapid declines in depressive symptoms from baseline to Week 4 for youths in the intervention group than for control group youths (p = 0.038, d = .32 [–.34, .99]; Table 2 and Figure 2). The percentage of youths reporting moderately-severe-to-severe depressive symptoms decreased by 21.42% in the intervention group from 42.86% at baseline to 21.44 % at endpoint. In the study skills control group, the percentage of students reporting moderately-severe-to-severe depressive symptoms decreased by 4.35% from 30.43 % at baseline to 26.09% at endpoint. As such, at endpoint only 21.44% of the adolescents in the intervention would qualify for the intervention on the merit of depressive symptoms when compared to 26.09% in the in the study skills.

Intervention Effects on Anxiety Symptoms

The model predicting self-reported anxiety symptoms revealed nonsignificant effects for time and condition, but significant effects for Time × Condition (Table 3). Anxiety symptoms declined more rapidly from baseline to Week 4 for youths in the intervention than for control group youths (p = 0.039, d = .54 [–.20, 1.29]; Table 2 and Figure 2). The percentage of youths reporting moderate-to-severe anxiety symptoms decreased by 42.86% in the intervention group from 89.29% at baseline to 46.43% at endpoint. In the study skills control group, the percentage of students reporting moderate-to-severe anxiety symptoms decreased by 17.39% from 95.65% at baseline to 78.26% at endpoint. As such, at endpoint only 46.43% of youths in the intervention condition would qualify for the intervention on the merit of anxiety symptoms as 35.71% reported moderate anxiety symptoms and 10.71% reported severe anxiety symptoms. On the contrary, in the study skills group, 78.26% of youths at endpoint would qualify for the intervention on the merit of anxiety symptoms as 56.52% reported moderate anxiety symptoms and 21.74% reported severe anxiety symptoms.

Secondary outcomes

Intervention Effects on Social Support

The model predicting social support trajectories revealed nonsignificant overall effects for time, condition, and Time × Condition interactions, although the effect size favoring the intervention over the control group was medium-to-large (p = 0.082, d = .65 [–.07, 1.13]). A significant effect for the covariate age (p = 0.017, see supplementary materials, Appendix F) indicated that older adolescents reported more rapid improvements in social support from baseline to Week 4 when compared to younger adolescents. When we examined the separate subscales of the MSSPS, we found that the Friends subscale showed significant effects for intervention, Time × Condition, and the covariates age and sex. The significant Time × Condition interaction showed that self-reported social support from friends improved more rapidly from baseline to Week 4 for youths in the intervention than for control group youths (p = 0.028, d = .71 [.08, 1.34], see Table 3). Results from the other subscales of the MSSPS can also be seen in Appendix F, supplementary materials.

Intervention Effects on Perceived Control

The model predicting perceived control trajectories revealed nonsignificant effects for condition, time, and Time × Condition, although the effect size favoring the intervention over the control group was small-to-medium (p = 0.347, d = .30 [–.33, .94]). A significant effect for the covariate age (p = 0.011, see supplementary materials, Appendix E) indicated that older adolescents reported more rapid improvements in perceived control from baseline to Week 4 when compared to younger adolescents. Results from the other subscales of the PCS can be seen in supplementary materials, Appendix E.

Intervention Effects on Academic Performances

The model predicting average student grades revealed nonsignificant effects for time and condition, but significant effects for Time × Condition (see Table 3). The interaction showed more

Table 2
Mean and Effect Sizes Comparing Mean Gains (Cohen's *d*) Reflecting Symptom Reduction From Baseline to Week 4 for Youths Receiving Shamiri Intervention Versus Study Skills Control Intervention

Outcome variable	Shamiri Intervention Group			Study Skills Control Group			Cohen's *d*, based on mean gain score [95% CI] (Baseline to 4 weeks)
	M (SD) baseline	M (SD) 2 weeks	M (SD) 4 weeks	M (SD) baseline	M (SD) 2 weeks	M (SD) 4 weeks	
Primary outcomes:							
Youth depression	13.43 (4.14)	11.89 (3.80)	10.21 (4.39)	12.91 (3.52)	11.91 (3.65)	12.52 (4.23)	**.32** [–.34, .99]
Youth anxiety	13.07 (4.05)	11.93 (3.56)	9.29 (3.67)	12.83 (2.33)	10.17 (3.11)	11.65 (3.41)	**.54** [–.20, 1.29]
Secondary outcomes:							
Social support	4.63 (1.26)	–	5.05 (1.25)	5.49 (0.85)	–	5.06 (1.77)	.65 [–.07, 1.13]
Perceived control	55.82 (8.61)	–	60.46 (8.87)	56.74 (8.97)	–	58.83 (7.02)	.30 [–.33, .94]
Average academic grade	61.07* (10.88)	–	62.61* (10.70)	58.61* (8.51)	–	57.00* (8.01)	**.32** [.05, .60]

Note. For primary outcomes (symptom related variables), lower scores indicate better functioning, and for secondary outcomes, higher scores indicate better functioning. Where applicable, Cohen's *d* values were corrected (multiplied by –1.0) such that positive values indicate greater improvements for intervention group participants versus control group participants. Significant gains are highlighted in bold. *Academic grades were reported for the school-term before the intervention and the school-term after the intervention.

improvements in average student grades when we compared grades from the semester before the intervention to the semester after the intervention for youth in the intervention group that for control group youths (p = 0.034, d = .32 [.05, .60]; Table 3 and Figure 2). When we examined student grades in math and science, models predicting these trajectories revealed nonsignificant effects for condition, time, and Time × Condition (see supplementary materials, Appendix F).

Feasibility and Acceptability

Participants rated the overall usefulness of the group interventions on a scale of 1 to 5. An independent samples t-test revealed high mean ratings and no significant difference in perceived overall usefulness between the Shamiri (M = 5.00, SD = 0.00) and study skills (M = 4.75, SD = 1.00) groups; $t(15) = -1$, p = 0.333. More information on feasibility and acceptability, including themes in participant feedback and open-ended comments, is provided in Appendix D (supplementary materials).

Attendance

In Week 1, when 51 students attended, it was assumed that only those who attended the session wanted to take part in the study. In Week 2 the attendance was at 86.27% (85.71% Shamiri, 86.96% study skills). In Week 3 the attendance was at 92.16% (92.85% Shamiri, 91.30% study skills). In Week 4 the attendance was at 96.08% of all participants (96.42% Shamiri, 95.65% study skills).

Discussion

We tested the effects of Shamiri, a group intervention for adolescent anxiety and depression that consisted of three WIs, combined into one multicomponent protocol and delivered by lay clinicians in a school setting. Compared to adolescents in a study skills control intervention group, youths who received the Shamiri intervention experienced significantly greater improvements in self-reported depression (d = .32) and self-reported anxiety (d = .54) from the baseline to the end of the intervention (see Figure 2). Adolescents receiving Shamiri, compared to those in the control group, also experienced significantly greater improvements in academic grades (d = .32) from the school-term before the intervention to the school-term after the intervention (see Figure 2). Intervention effects were nonsignificant for the secondary outcomes: perceived control and social support, even though the pattern of group differences resembled those for anxiety and depression symptoms, and effect sizes were in the small-to-large range numerically. While the intervention effects were nonsignificant for overall social support, we found significant intervention effects for perceived social support from friends (d = .71).

In testing the Shamiri intervention, we also sought to create a control condition that would involve active skill-building, to offer potential benefit to participants and to provide a rigorous comparison group (rather than a passive control

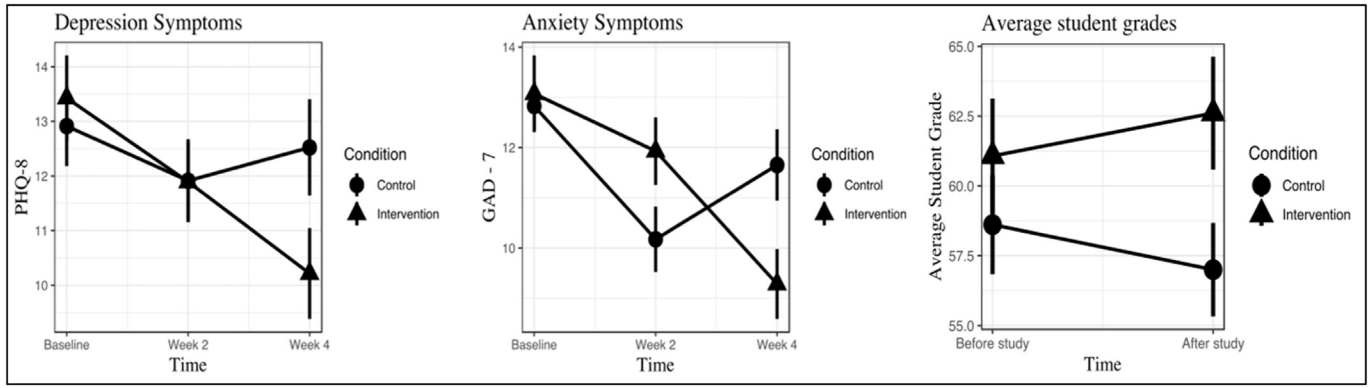

FIGURE 2 Fitted values showing trajectories of primary outcomes (youth depression and anxiety) and academic performance (average student grades). PHQ – 8 stands for Patient Health Questionnaire and GAD-7 stands for the Generalized Anxiety Disorder – Screener.

Table 3
Results of Mixed Linear Models Predicting Intervention Effects on Primary Outcome Measures (Depression and Anxiety Symptoms), Perceived Social Support Friends, and Academic Performance

	Depression symptoms (PHQ – 8)			Anxiety symptoms (GAD – 7)			Social support from friends (MSPSS – Friends)			Academic performance (Average Grade)		
Predictors	*B*	*SE*	*p*	*B*	*SE*	*p*	*B*	*SE*	*p*	*B*	*SE*	*p*
(Intercept)	7.61	7.51	0.316	3.51	6.15	0.571	−5.43	3.27	0.104	67.97	8.32	<0.001
Time	−0.20	0.50	0.695	−0.59	0.46	0.207	−0.22	0.19	0.249	−1.59	1.03	0.128
Condition (Intervention)	0.99	1.10	0.370	1.55	0.95	0.106	−0.92	0.46	0.050	2.45	2.76	0.378
Sex (Male)	−0.73	0.95	0.448	−0.48	0.78	0.540	−0.98	0.41	0.022	−1.07	1.16	0.357
Age	0.33	0.48	0.488	0.55	0.39	0.165	0.69	0.21	0.002	−0.57	0.52	0.282
Time * Condition (Intervention)	−1.41	0.67	0.038	−1.31	0.62	0.039	0.58	0.26	0.028	3.02	1.38	0.034
Observations	153			153			102			102		
Marginal R^2/Conditional R^2	0.068/0.339			0.119/0.291			0.201/0.450			0.055/0.881		

Note. The model predicting self-reported depressive symptoms revealed nonsignificant effects for time and condition, but significant effects for Time × Condition. The interaction showed more rapid declines in depressive symptoms from baseline to week 4 for youths in the intervention group than for control group youths. The model predicting self-reported anxiety symptoms revealed nonsignificant effects for time and condition, but significant effects for Time × Condition. Anxiety symptoms declined more rapidly from baseline to week 4 for youths in the intervention than for control group youths. PHQ – 8 = Patient Health Questionnaire, GAD-7 = the Generalized Anxiety Disorder – Screener. When we examined the separate subscales of the MSPSS (Multidimensional Scale of Perceived Social Support), we found that the Friends subscale showed significant effects for intervention, Time × Condition, and the covariates age and sex. The significant Time × Condition interaction showed that self-reported social support from friends improved more rapidly from baseline to week 4 for youths in the intervention than for control group youths. The model predicting average student grades revealed nonsignificant effects for time and condition, but significant effects for Time × Condition. The interaction showed more improvements in average student grades when we compared grades from the semester before the intervention to the semester after the intervention for youth in the intervention group that for control group youths.

such as a waitlist). Participants in the study skills control group rated the overall usefulness of the group 4.75 (out of 5.00), quite similar to the Shamiri intervention group rating (5.00). While it is possible that demand effects might explain the high usefulness scores, the insignificance in the score difference between the two groups provides further indication that the conditions being compared to each other were both enjoyable and active. While both active interventions were perceived as beneficial, they differ in their effects on the outcomes specifically targeted in the study, and thus demonstrate specificity of intervention effects. Importantly, we found specific effects of the Shamiri intervention on anxiety and depression symptoms, as well as effects on academic performance that were superior to the effects of an intervention which focused specifically on academic skill-building. Of course, given the modest sample size, the intervention's potential effects on these variables should be tested in future trials.

While some eligible participants opted out of participation, some faced involuntary barriers that hindered their participation. The first such barrier was a lack of school fees. Some students who would have had an opportunity to participate could not because they were absent from school as a result of fees. Unfortunately, this is the reality of life for many adolescents in low-income settings like Kibera. Future intervention research should look at ways of giving such adolescents an opportunity to participate. Another reason for opting out of participation was that the intervention was held at the same time as other school programs. As the intervention took place during the time slotted for activities in the school, students involved in competitive sports, clubs, and other co-curricular activities were faced with the choice of either participation in the study or in their activities, and some chose their activities. Given the tight nature of school schedules, future researchers are encouraged to adopt innovative ways of working with schools to find good timing for school-based interventions.

To our knowledge, these are the first findings suggesting that an intervention that combines empirically supported WI elements and is administered by trained youth lay-providers may reduce anxiety and depression symptoms among high-symptom youths in SSA. The findings may hold promise for adolescents in similar countries where stigma and a scarcity of providers and services compounds the burden of psychopathology, and particularly in highly impoverished areas like Kibera where prevalence rates are particularly high and where resources for support are even more limited (Osborn et al., 2019). The finding that Shamiri can improve academic outcomes suggests that the intervention may have functional utility

beyond clinical symptoms. These effects on academic performance may be especially relevant to contexts where stigma works against help-seeking, because beneficial effects on school performance will likely be valued by school personnel, students, and parents, regardless of societal attitudes toward mental health.

Shamiri's group-based format and use of lay-clinicians might be advantageous relative to traditional psychological interventions in this setting. First, the group format may increase the number of youths who have access to the intervention (Kumakech et al., 2009). Still, using lay-providers may help address the shortage of mental health specialists. In addition, the positive emphasis of the Shamiri intervention may serve to reduce social stigma around depression and anxiety. Youths do not directly talk about depression and anxiety in the groups and the intervention is not presented as a depression and anxiety treatment. Beyond this, feedback data suggest that many youths considered it beneficial to be part of the intervention. While we did not directly investigate reduction in stigma, youths self-reported utility in participation might hint that positive psychology interventions might circumvent stigma and boost buy-in from local stakeholders, making it possible for them to incorporate Shamiri as part of their programming and help-seeking options for adolescents without facing community resistance.

A limitation of the present study is the modest sample size. The small number suggests that the investigation might be viewed as a pilot study, requiring further tests of replicability and robustness. The substantial range of our effect-size confidence intervals makes it difficult to determine the true magnitude of the intervention's effects. Follow-up trials with larger samples and longer follow-ups are needed to address this limitation and to ascertain the strength and durability of the effects observed here. A second limitation is that some of the psychometric properties of the measures have yet to be validated with Kenyan youths. While we investigated and only used measures that met the psychometric standards for internal consistency, we were not able to fully assess the cultural appropriateness of the measures. As mental health problems are subjective perceptions that are influenced by cultural context, future research should adopt a sound criterion for assessing cultural suitability, and adopt measures that meet that criteria (Osborn et al., 2019; Wasil, Venturo-Conerly, Gillespie, Osborn, & Weisz, 2019). Finally, as in any effectiveness study, the natural, "real-world" setting of this trial creates potential internal validity threats, but these must be balanced against the benefits of enhanced ecological validity.

Our findings suggest that Shamiri, a low-cost intervention that draws on empirically supported WI elements and is delivered by youth group leaders trained to be lay clinicians in a group context in a school-setting, may reduce adolescent depression and anxiety symptoms in a particularly impoverished region of SSA. Further studies are required to investigate the effectiveness and robustness of this and similar interventions for adolescents who have significant mental health needs but few community resources to address those needs.

Conflict of Interest Statement

The authors declare that there are no conflicts of interest.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.beth.2019.09.005.

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Received: May 13, 2019
Accepted: September 16, 2019
Available online: 26 November 2019