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Effect of multi-level interventions on mental health outcomes among adolescents in sub-Saharan Africa: a systematic review

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ABSTRACT

Objective In sub-Saharan Africa (SSA), multiple factors contribute to the considerable burden of mental health disorders among adolescents, highlighting the need for interventions that address underlying risks at multiple levels. We reviewed evidence of the effectiveness of community or family-level interventions, with and without individual level interventions, on mental health disorders among adolescents in SSA.

Design Systematic review using the Grades of Recommendation, Assessment, Development and Evaluation approach.

Data sources A systematic search was conducted on Cochrane Library, MEDLINE, EMBASE, PSYCINFO and Web of Science up to 31 March 2021.

Eligibility criteria Studies were eligible for inclusion in the review if they were randomised controlled trials (RCTs) or controlled quasi-experimental studies conducted in sub-Saharan African countries and measured the effect of an intervention on common mental disorders in adolescents aged 10–24 years.

Data extraction and synthesis We included studies that assessed the effect of interventions on depression, anxiety, post-traumatic stress disorder and substance abuse. Substance abuse was only considered if it was measured alongside mental health disorders. The findings were summarised using synthesis without meta-analysis, where studies were grouped according to the type of intervention (multi-level, community-level) and participants.

Results Of 1197 studies that were identified, 30 studies (17 RCTs and 3 quasi-experimental studies) were included in the review of which 10 delivered multi-level interventions and 20 delivered community-level interventions. Synthesised findings suggest that multi-level interventions comprise economic empowerment, peer-support, cognitive behavioural therapy were effective in improving mental health among vulnerable adolescents. Majority of studies that delivered interventions to community groups reported significant positive changes in mental health outcomes.

Conclusions The evidence from this review suggests that multi-level interventions can reduce mental health disorders in adolescents. Further research is needed to understand the reliability and sustainability of these promising interventions in different African contexts.

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STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ Study selection was done by two independent reviewers to ensure all relevant studies were included.
⇒ As we only searched published studies, we may have missed important evidence from unpublished literature.
⇒ The diversity in the characteristics of included studies limited our ability to meta-analyse the findings.

INTRODUCTION

Mental health disorders account for 16% of the global burden of disease and injury in young people.[1] Common mental disorders such as depression and anxiety are among the leading causes of illness and disability in adolescents aged 10–24 years.[1 2] Globally, an estimated 10% of adolescents have a mental disorder and majority of these cases are not diagnosed or treated, leading to high risk of long-term physical and mental health problems in later life.[3] It is vital to intervene early, as half of mental disorders that are experienced during adulthood have their onset during adolescence.[4] Additionally, mental disorders are associated with poor academic and work performance and risky behaviours during adolescence.[5–7]

In sub-Saharan Africa (SSA), adolescents are disproportionately exposed to traumatic life experiences such as violence, armed conflicts and natural disasters, leading to high post-traumatic stress disorder (PTSD) prevalence rates.[8 9] They also face other multiple challenges, including HIV-AIDS, early pregnancy, substance abuse and poverty.[10–13] All these factors can directly or indirectly contribute to the risk of mental health disorders. For example, mental disorders are common in both people living with HIV and those at high risk of HIV acquisition,[14–16] and they can also increase the risk for HIV acquisition.[17 18]

Given the complexity of problems that adolescents face and dearth of resources for mental health in SSA, there is a critical need for combination interventions that will address the underlying risk factors at multiple socio-ecological levels to improve mental health.[19 20]

To date, there is limited evidence from SSA regarding interventions that promote mental health and prevent or treat mental disorders in adolescents.[21] Previous reviews from low/middle-income countries (LMICs) tended to focus on interventions that intervene only at interpersonal (family) or community-level to improve mental health outcomes in adolescents, or among specific groups (eg, HIV positive adolescents).[22 23] For example, Bhana and colleagues[23] previous study reviewing interventions targeted to adolescents living with or affected by HIV in LMICs found family-based and economic strengthening interventions to be effective in improving mental health. Similarly, Barry and colleagues demonstrated that mental health interventions can be implemented effectively in school and community-based settings.[22] Despite growing evidence on the effectiveness of combination interventions on health outcomes (eg, HIV and sexual health outcomes) among adolescents in SSA,[24] little is known about how these interventions could improve mental health in adolescents. The aim of this review was therefore to assess the effect of combining community or family-level interventions with individual level interventions on mental disorders in adolescents living in SSA. We used a socio-ecological model for combining interventions which suggests that people's behaviour is influenced by multiple factors operating at different levels of influence (eg, individual, interpersonal-level (family/community)).[25 26] This approach has been used by few studies to deliver mental health interventions to people living with HIV.[27] The objective of the review was:

1. To assess the effect of interventions that are delivered to either individuals, groups or both on mental disorders (depression, anxiety, PTSD and substance abuse) among adolescents in SSA.

METHODS

The conduct of this study was informed by the Cochrane Handbook for Systematic Reviews of Interventions and Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines.[28]

Search strategy and selection criteria

A systematic literature search was conducted on the following electronic databases: Cochrane Library, MEDLINE, EMBASE, PSYCINFO and Web of Science. The search was restricted to English language. A search strategy was developed and evaluated in MEDLINE and adapted for other databases. Cochrane and SIGN filters for RCT search were applied in Ovid databases.[29] The results were not filtered by publication date. A detailed search strategy is shown in online supplemental S1 appendix. Other articles were searched by manually reviewing the references of the selected studies. The last search was completed on 31 March 2021. All retrieved articles were sent to EndNote which was also used to remove duplicates. The screening of articles and full-text review were conducted by two independent reviewers (NM and AMR), and disagreements were resolved through discussion. Studies were included in the review if they met the following criteria:

1. Randomised controlled trials (RCTs) (individually or cluster randomised) and quasi-experimental studies (with control group) that were conducted in SSA.
2. Participants were adolescents aged between 10 and 24 years (age when the intervention was implemented). We used an expanded definition of adolescence based on the culturally and contextually influenced delays in the transition roles to adulthood in resource-limited settings.[30 31] Studies with adults above 24 years were only considered if data was disaggregated by age group so that outcomes in those aged 10–24 could be extracted. Studies were excluded if they did not specify age range of participants or did not mention that participants were adolescents.
3. Measured depression, anxiety, PTSD and substance abuse using a validated screening tool. Substance abuse (alcohol or drug abuse) was only included if it was measured alongside common mental disorders or PTSD.

Studies that met the criteria were classified according to the type of intervention which they delivered as: (a) individual-level only; (b) community-level only (including family-based); or (c) multi-level. Interventions were defined according to whether they were delivered directly to individuals or groups, irrespective of level of randomisation (cluster or individual). We defined individual-level interventions as those delivered directly to individuals (eg, one-on-one counselling, drug therapy) to develop copying strategies, change attitudes and behaviour. Community-level interventions were defined as interventions delivered to groups of people, including families and communities. Multi-level interventions were defined as a combination of individual and community-level interventions; interventions that were delivered to groups but also included one-on-one counselling sessions were categorised as multi-level interventions.

Data extraction and management

For each study, we extracted data on methods, participants, interventions and outcomes (see online supplemental S1 and S2 tables). For studies with multiple reports, we selected the most complete report, preferably including both baseline and last follow-up/postintervention data. For studies with pilot and main study reports, we preferred main study reports. Mean differences and SEs were used to generate forest plots. For studies that did not report SEs, the CIs, F statistic and p value were used to calculate SEs.[28] For studies that reported ORs or rate ratios, a natural logarithm of each estimate was calculated.

Assessment of risk of bias in the included studies

Studies were critically assessed for risk of bias using Cochrane Tools.[32 33] Random sequence generation or allocation concealment (or bias due to confounding for non-RCTs), blinding of outcome assessment and incomplete outcome data were considered critical for assessing the quality of studies in this review. No studies could blind participants due to the nature of interventions and we therefore did not include this criterion. Other biases which may rise due to use of inappropriate statistical analyses were also considered for cluster randomised trials, cross-over and non-randomised trials. None of the studies were excluded based on their risk of bias.

Assessment of heterogeneity

Clinical heterogeneity was assessed by considering the type of participants, duration of intervention and intervention components as these factors are likely to influence the effect of intervention.[34] Statistical heterogeneity was assessed using visual inspection of forest plots and subgroup analysis in RevMan V.5 software.[35] χ^2 tests for heterogeneity with 10% level of significance was used and the degree of heterogeneity was measured using I^2 statistic with values above 50% indicating substantial heterogeneity.[34] For outcomes with enough studies (minimum five studies per subgroup), subgroup analyses were conducted based on the type of participants and type of intervention.[34]

Data synthesis

As the interventions and participants in the included studies were too diverse to allow a quantitative synthesis of the study findings, synthesis without meta-analysis was used to summarise the results.[36] For all studies, we used outcomes measured at the last follow-up or postintervention regardless of whether the study had multiple follow-up times. The findings were synthesised separately for studies that delivered multi-level intervention and community-level interventions. Within each group, studies were subdivided according to type of participants who participated in the studies.

Assessment of the certainty of the evidence

The certainty of the body of evidence for each outcome was assessed using Grades of Recommendation, Assessment, Development and Evaluation approach within each of the four domains (risk of bias, inconsistency, imprecision and indirectness). The inconsistency in the findings was measured by looking at the direction of the effect among studies which measured the same outcome. The imprecision was measured by looking at the number of participants within each study and studies with less than 100 participants were judged as having serious imprecision. Indirectness was measured by looking at whether the included studies addressed the research question for this review. The quality of evidence was downgraded to a lower level (starting from high to very low) if one of the domains raised serious concerns.

Patient and public involvement

Since this is a systematic review, it was not possible to involve patients or public in the design or conduct or reporting of our research.

RESULTS

The search results are described in figure 1. A total of 1197 articles were identified through database search and hand searching. Of these, 122 articles were assessed for eligibility and 30 studies were included in the synthesis.[37–66] The remaining 92 articles were excluded due to various reasons described in online supplemental S3 table. Most studies were RCTs, except for three which used controlled quasi-experimental designs.[54 58 61] Fourteen studies were cluster-randomised trials including one cross-over trial.[66] Most studies had two groups except for four studies[37 44 51 58] which randomised participants into three groups (two intervention groups and one control). Study durations ranged from 1 week to 4 years and the length of the interventions ranged from 1 hour to 4 years.

Intervention

Interventions were heterogeneous across the included studies. The included studies were categorised according to the type of intervention (multi-level, community-based or individual). Of 30 included studies, 10 studies delivered multi-level interventions and the remaining studies delivered only community-based interventions. None of the included studies reported only individual-level interventions. For multi-level interventions, studies were divided into following categories: HIV affected; orphaned or bereaved; and war-affected adolescents. The studies that delivered community-level interventions were grouped in a similar way using the following categories: vulnerable adolescents comprised orphans, adolescents with trauma experiences and from poor households, students and general population.

Multi-level interventions

The multi-level interventions included a combination of community-level and individual- level interventions (table 1, online supplemental S4 table). Two studies delivered trauma-focused cognitive and behavioural therapy (CBT) for groups which also included trauma narratives modules that were delivered to individuals.[45 46] Three studies delivered economic empowerment interventions which were combined with antiretroviral therapy (ART) or counselling.[37–39] One study delivered HIV status disclosure to groups, and ART and counselling to individuals.[40] One study delivered CBT and interpersonal therapy (IPT) intervention for groups (families) which included trauma narratives sessions for individuals.[41] Participants in this study were all required to take ART. Two studies delivered a writing therapy or IPT in combination with counselling.[43 44] One study delivered a peer-support intervention to participants who also had access to monthly healthcare.[42] Most interventions targeted multiple mental

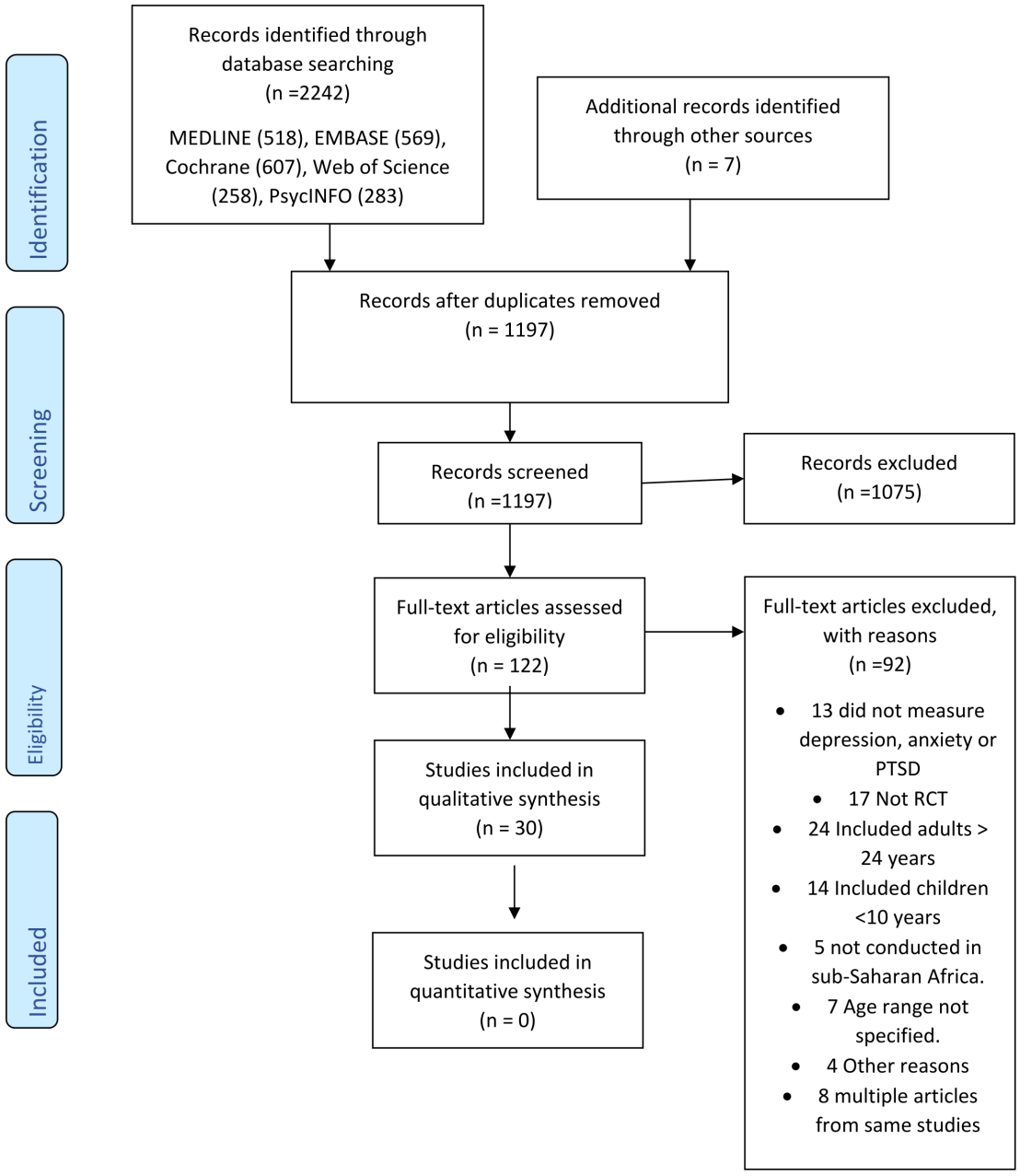

Figure 1 Preferred Reporting Items for Systematic Reviews and Meta-Analyses flow diagram. PTSD, post-traumatic stress disorder; RCT, randomised controlled trial.

health outcomes including those that are not common mental disorders (eg, self-concept, hopelessness, self-efficacy, grief, etc) and three studies targeted physical and sexual health in addition to mental health[37 40 41] (online supplemental S5 table).

Community-level interventions

Twenty studies delivered community-level interventions including CBT, IPT, writing for recovery, wise interventions (group and single digital session), psychoeducation (including parenting), prolonged exposure therapy, economic empowerment, cash transfers, parenting programme and sport for development (table 1). Five studies delivered economic empowerment interventions,[47 48 64–66] of which two delivered economic empowerment alongside family coaching or parenting programme.[48 66] Five studies delivered CBT including CBT-based interventions[50 54 56 58 63] such as prolonged exposure therapy,[50] rational emotive behaviour therapy[58] and The Living Well intervention.[55] Prolonged exposure therapy helps individuals to gradually confront their fears. Rational emotive behaviour therapy involves identifying and altering negative thoughts and beliefs that lead to unhealthy behaviour. The Living Well programme teaches about different behaviour change techniques such as problem solving, monitoring of emotional consequences and self-talk. Two studies delivered IPT[51 53] and one study delivered The Resourceful

Table 1 Characteristics of included studies that delivered multi-level and community-level interventions

Study (author) and setting	Target population	Study design, sample size	Study and intervention duration	Intervention components
Multi-level				
HIV/AIDS-affected adolescents				
Ssewamala *et al*, Uganda[37]	Adolescents, AIDS orphans in fifth or sixth grade (average age=12)	RCT (cluster) N=1383	48 months. The intervention was provided for the first 24 months. Twelve 1–2 hour workshops	Group: economic empowerment Individual: counselling
Cavazos-Rehg *et al*, Uganda[38]	Adolescents living with HIV, 10–16 years	RCT (cluster) N=702	48 months: The intervention was received for the first 24 months. 4 sessions and additional 12 sessions with a mentor for 24 months	Group (family): economic empowerment Individual: ART, weekly-monthly healthcare
Han *et al*, Uganda[39]	AIDS orphaned adolescents, 10–14 years	RCT (cluster) N=297	12 months, 1–2 hours training sessions and one mentorship meeting per month over 12-month period	Group: economic empowerment Individual: counselling
Vreeman *et al*, Kenya[40]	Adolescents HIV-infected and in active care, 10–14 years	RCT (cluster) N=285	24 months	Group: HIV status disclosure (counselling) Individual: ART, counselling
Dow *et al*, Tanzania[41]	Young people living with HIV, 12–24 years	Pilot RCT (individual) N=105	6 months. Ten group sessions, two one-on-one sessions. 90 min every Saturday for 3 months	Group: cognitive and behavioural therapy (CBT), interpersonal therapy (IPT), motivational interviewing (MI) Individual: trauma narratives, ART
Kumakech *et al*, Uganda[42]	Adolescents AIDS orphans, 10–15 years	RCT (cluster) N=326	16 exercises over 10 weeks. 1-hour play	Group: peer-group support Individual: monthly healthcare
Orphaned adolescents				
Thurman *et al*, South Africa[43]	Bereaved female adolescents, 13–17 years	RCT (individual) N=382	8 sessions. Weekly 90 min sessions (average three activities)	Group: theory-based support group (IPT), cultural adaptation Individual: counselling
Unterhitzenberger and Rosner, Rwanda[44]	Orphaned adolescents, 14–18 years	RCT (individual) N=69	3 weeks. 30 min writing periods each week on three consecutive Thursdays	Group: writing therapy Individual: counselling
War-affected adolescents				
O'Callaghan *et al*, Democratic Republic of Congo[45]	Sexually exploited, war-affected adolescent girls aged 12–17 years	RCT (individual) N=52	3 months. The intervention was offered for 2 hours per day, 3 days per week for 5 weeks	Group: CBT Individual: trauma narratives
McMullen *et al*, Democratic Republic of Congo[46]	Adolescent boys-former child soldiers aged 13–17 years	RCT (individual) N=50	3 months. 15 sessions. The intervention was delivered for approximately 5 weeks	Group: trauma Focused-CBT Individual: trauma narratives
Community_level				
Vulnerable adolescents				
Green *et al*, Kenya[47]	Orphaned adolescents (average age 14 years)	RCT (cluster) N=835	4 years. The intervention was provided annually from 2011 until 2015, or until the student dropped out of school	Cash transfers (school support)
Ismayilova *et al*, Burkina Faso[48]	Children aged 10–15 years from extremely poor households	RCT (cluster) N=360	24 months. Monthly one-on-one mentoring over 24 months. Family sessions conducted once monthly (35–45 min each)	Economic strengthening, family coaching
Cluver *et al*, South Africa[49]	Adolescents aged 10–18 years and their caregivers from families reporting conflict with their adolescents	Pragmatic RCT (cluster) N=552	9 months. 10 weekly child-caregiver sessions four separately	Parenting programme
Rossouw *et al* (2018), South Africa[50]	Adolescents who had experienced or witnessed an interpersonal trauma and had chronic PTSD (>3 months), 13–18 years	RCT (individual) N=63	6 months. 7–14 weekly, 60 min sessions	Prolonged exposure therapy, control group received supportive counselling

Continued

Table 1 Continued

Study (author) and setting	Target population	Study design, sample size	Study and intervention duration	Intervention components
Betancourt *et al*, Uganda[51]	Adolescent war-survivors, 14–17 years	RCT (individual) N=314	1 year. 16 weekly group meetings, lasting 1.5–2 hours each	Group interpersonal psychotherapy (IPT) and creative play
Getanda and Vostanis, Kenya[52]	Adolescents aged 14–17 years and experienced traumatic events in the past year	RCT (individual) N=54	1 week. Six sessions of writing over three consecutive days	Writing for recovery-psycho-social-educational group intervention
Thurman *et al*, South Africa[53]	Orphaned and vulnerable adolescents, 14–17 years	RCT (cluster) N=489	2 years. 16 weekly 90 min group sessions	Interpersonal psychotherapy for groups (IPTG)
School/college-based adolescents				
McMullen and McMullen, Uganda[54]	Adolescent students, 13–18 years	Quasi-controlled (cluster) N=620	1 year. 24 sessions, 45–60 min each	The Living Well manualised intervention (based on CBT)
Rivet-Duval *et al*, Mauritius[55]	Adolescents from single-sex secondary schools, 12–16 years	RCT (individual). N=160	6 months. 11 1 hour weekly sessions	The Resourceful Adolescent Programme based on CBT and IPT
Ede *et al*, Nigeria[56]	College adolescents, 16–21 years	RCT (individual) N=162	12 sessions (one session per week) lasted for 1 hour each.	Group cognitive behavioural therapy
Richards *et al*, Uganda[57]	Adolescent primary school pupils aged 11–14 years	RCT (individual) N=1462	11 weeks. At least one 1.5-hour training session per week over 9 weeks. 40 min game each weekend	The sport-for-development intervention
Eifediyi *et al*, Nigeria[58]	Secondary school students, 14–19 years	Quasi-experimental controlled N=160	7 weeks. 45 min each of six sessions lasted for 7 weeks	Rational emotive behaviour therapy
Osborn *et al*, Kenya[59]	Adolescent students, 14–17 years	RCT (individual) N=51	4 weeks. Four 1-hour sessions that were 1 week apart included homework exercises	Wise intervention
Berger *et al*, Tanzania[60]	Primary school students, aged 11–14 years in grades 6–8	RCT (cluster) N=183	16 sessions=two weekly 45 min sessions	Stress-Prosocial programme (ESPS)
Jordans *et al*, Burundi[61]	School-going children aged 10–14 years with elevated psychological distress	Quasi-experimental with controls N=161	Two sessions of an average 2.5 and 3.0 hours, respectively	Brief parenting psychoeducation
Osborn *et al*, Kenya[62]	Adolescent high school students aged 14–17 years	RCT (individual) N=103	The intervention took 1 hour	Digital wise intervention
Bella-Awusah *et al*, Nigeria[63]	Adolescents with depressive symptoms and aged 14–17 years	RCT (cluster) N=40	Five structured sessions offered weekly, each lasting 45–60 min	Brief school-based, group cognitive behavioural therapy
General population				
Kilburn *et al*, Kenya[64]	Adolescents, 15–24 years	RCT (cluster) N=1960	4 years	Large-scale unconditional cash transfer
Angeles *et al*, Malawi[65]	Adolescents, 13–19 years	RCT (cluster) N=2099	2 years. Monthly cash transfers for 2 years	Social Cash Transfer Programme
Puffer *et al*, Kenya[66]	Adolescents (and caregivers) aged 10–16 years	RCT (cluster) stepped wedge (four churches, n=237)	3 months. Nine sessions (2-hour each)	Parenting programme, HIV prevention, CBT, economic empowerment

ART, antiretroviral therapy; N, sample size; RCT, randomised controlled trial.

Adolescent Programme which used both CBT and IPT techniques.[54] Two studies delivered group and digital wise interventions that focus on how people make sense of themselves, the people or situations they are in.[59 62] Ten studies delivered community-level interventions that targeted multiple outcomes and two of these studies did not target mental health as primary outcomes.[49 66]

Implementation of interventions

The follow-up periods of the studies varied by type of intervention (online supplemental S4 table). Studies that delivered economic empowerment or HIV disclosure interventions had longer follow-up time ranging between 12 and 48 months. The retention rates at follow-up were high (above 80%) for both multi-level and community-level interventions, except two studies that reported

attrition rates of 23% and 37%[53 65] and one study that did not report retention rate.[38] Interventions in most studies were delivered by non-specialists (lay community health workers, teachers) who were trained and supervised by mental health specialists (see online supplemental S5 table).

Participants

The participants in the included studies varied across studies. Among studies that delivered multi-level interventions, six studies included participants who were living with HIV or affected by HIV,[37–41] two studies included war-affected adolescents[43 44] and two included orphans and bereaved female adolescents.[45 46]

Of 20 studies that delivered community-based interventions, 10 included school-going or college adolescents,[54–63] seven studies included vulnerable populations such as orphans, war survivors, adolescents who have experienced trauma and vulnerable orphans (from poor households)[47–53] and three studies included general population.[64–66]

Risk of bias in the included studies

All included studies were assessed for risk of bias. Ten studies were rated as having an overall high risk of bias due to not blinding the outcome assessors, incomplete outcome data and use of inappropriate statistical methods (eg, not accounting for clustering),[40 42 44 54 55 58 61 63 64 66] while 11 studies were judged as having an overall low risk of bias.[41 43 46–51 53 56] The remaining nine studies were judged as having unclear risk of bias. The summary of risk of bias is shown in online supplemental S6 table.

Effect of multi-level interventions on mental health

Depression

Eight studies measured depression (figure 2).[37–44] Three studies found a significant decrease in depressive symptoms among participants in the intervention group compared with control group.[39 42 43] Of these studies, two delivered peer or theory-based support to AIDS orphans[42] or bereaved females,[43] and one study delivered economic empowerment intervention.[39] In four studies, multi-level intervention was not significantly associated with decrease in depressive symptoms. However, one study that delivered a family economic empowerment intervention found a significant decrease in depressive symptoms at 24-month follow-up (end of intervention) but no significant effect observed thereafter at 36 and 48 months.[37] One study by Unterhitzenberger and Rosner evaluated the effect of emotional writing on depression and found that emotional writing was associated with increased

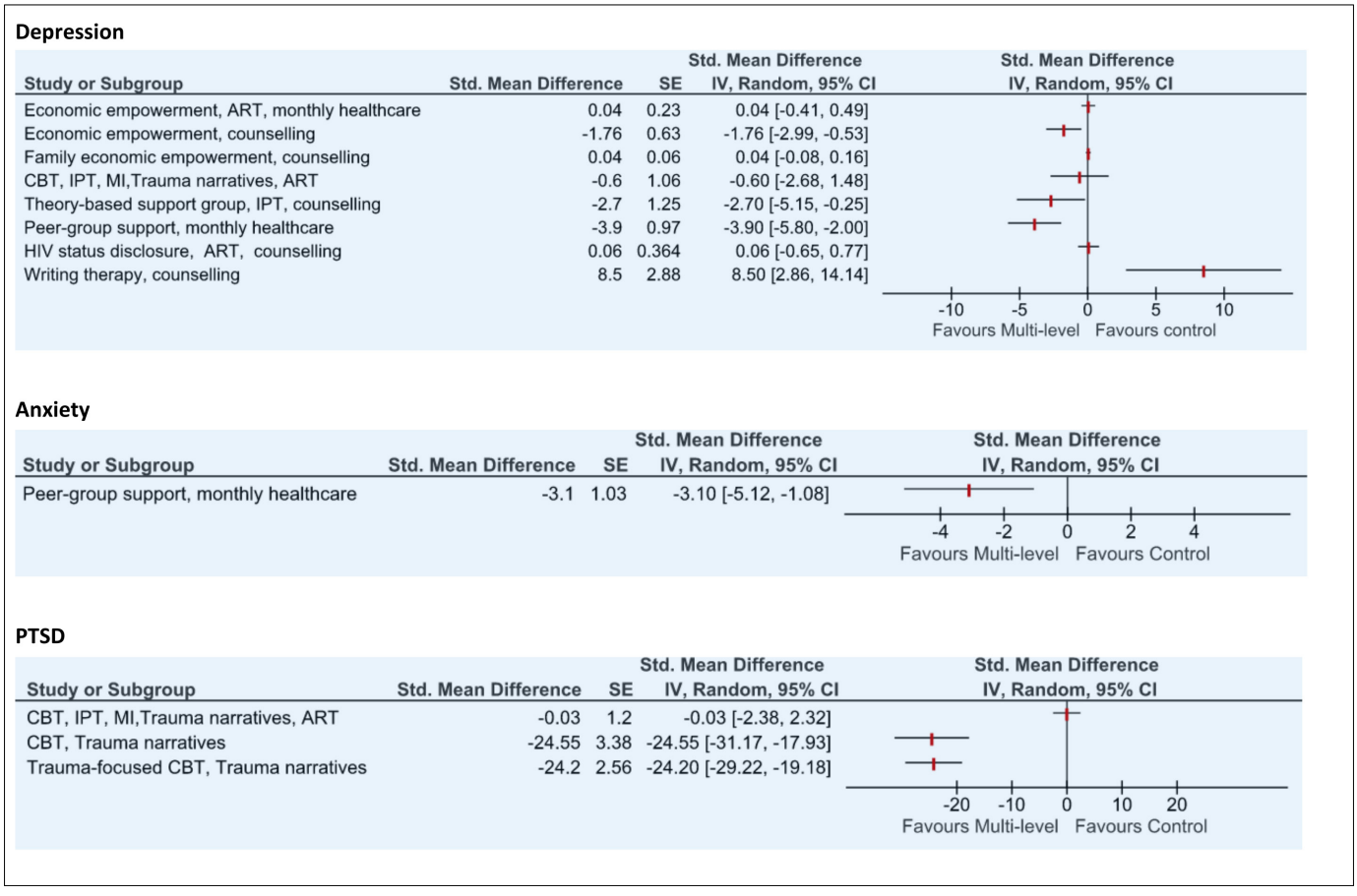

Figure 2 Effect of multi-level interventions on depression, anxiety and PTSD. ART, antiretroviral therapy; CBT, cognitive and behavioural therapy; IPT, interpersonal therapy; MI, motivational interviewing; PTSD, post-traumatic stress disorder; RCT, randomised controlled trial.

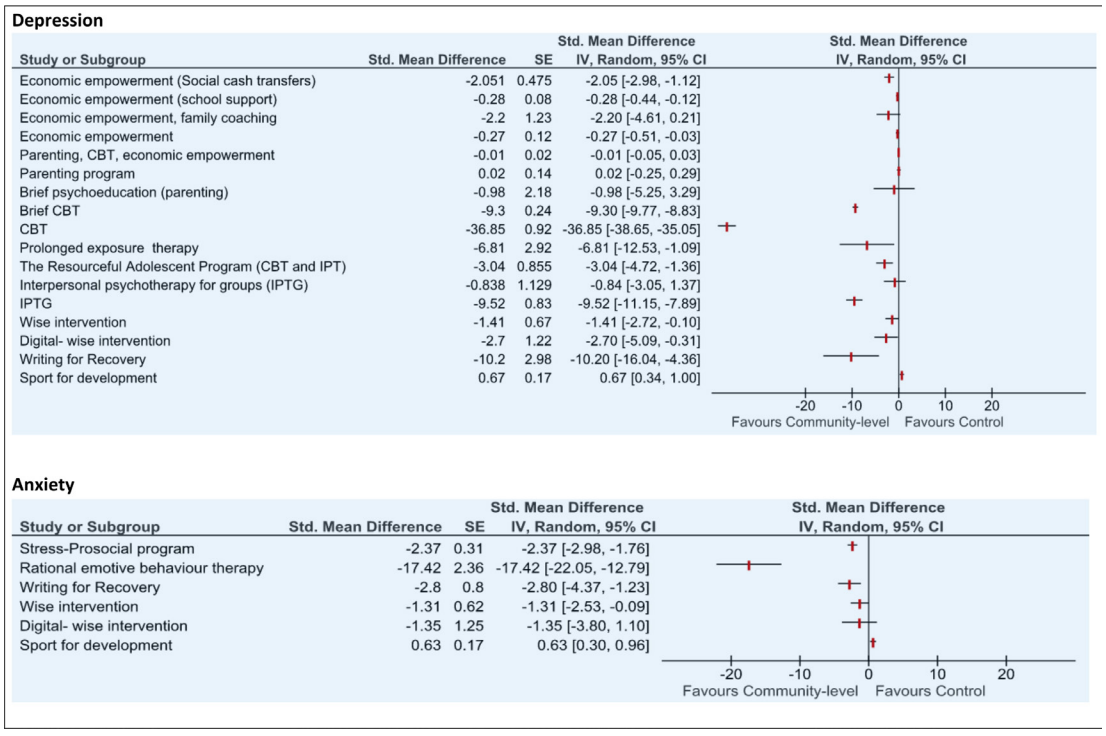

Figure 3 Effect of community-level interventions on depression and anxiety. CBT, cognitive and behavioural therapy; IPT, interpersonal therapy.

depression symptoms compared with positive writing and no writing.[44]

Anxiety

There was only one study that measured anxiety. Kumakech and colleagues found a significant decrease in anxiety among adolescents who received a peer support and monthly care compared with those who in the control group.[42]

Post-traumatic stress disorders

Three studies measured PTSD.[41 45 46] Of these studies, two showed a significant decrease in PTSD symptoms among participants in the intervention group compared with participants in the control group.[45 46] Both studies delivered CBT to war-affected adolescents.

Depression and anxiety-like symptoms

There were two studies[45 46] that looked at depression and anxiety-like symptoms (see online supplemental S1 figure). Both studies delivered CBT and found a significant decrease in depression and anxiety-like symptoms among participants in the intervention group compared with control group.

Effect of community-level interventions on mental health

Depression

Seventeen studies measured depression (figure 3). As there were enough studies that measured depression, subgroup analyses (by intervention and participants) were conducted to assess heterogeneity among studies (see online supplemental S2 and S3 figures). There was substantial unexplained heterogeneity (I^2>90%) between all studies and within each of the subgroups. Therefore, the intervention effect estimate was not calculated.

Eleven studies showed a significant decrease in depressive symptoms among participants in the intervention group in comparison with the control group. Of the 11 studies, five delivered theory-based interventions (CBT, IPT and wise interventions) to school or college students[55–57 62 63] and two delivered economic empowerment intervention to general adolescents.[64 65] The remaining four studies delivered interventions to vulnerable adolescents: three delivered theory-based interventions to adolescents who had trauma experiences,[50–52] and one delivered economic empowerment (cash transfers) to orphans.[47]

Four studies did not show any significant effect of intervention on depressive symptoms.[48 49 54 61] One study that used sport to promote physical fitness and mental well-being showed a significant increase in depressive symptoms among adolescent boys who participated in the sport-for-development interventions compared with control group.[57]

Anxiety

There were six studies that looked at anxiety (figure 3). Four studies found a significant decrease in anxiety symptoms among participants in the intervention group compared with control group and all these studies were conducted in schools.[52 57–60] Richards and colleagues[57] evaluated the effect of sport-for-development intervention and found an increase in anxiety symptoms among participants in the intervention group compared with participants in the control group.

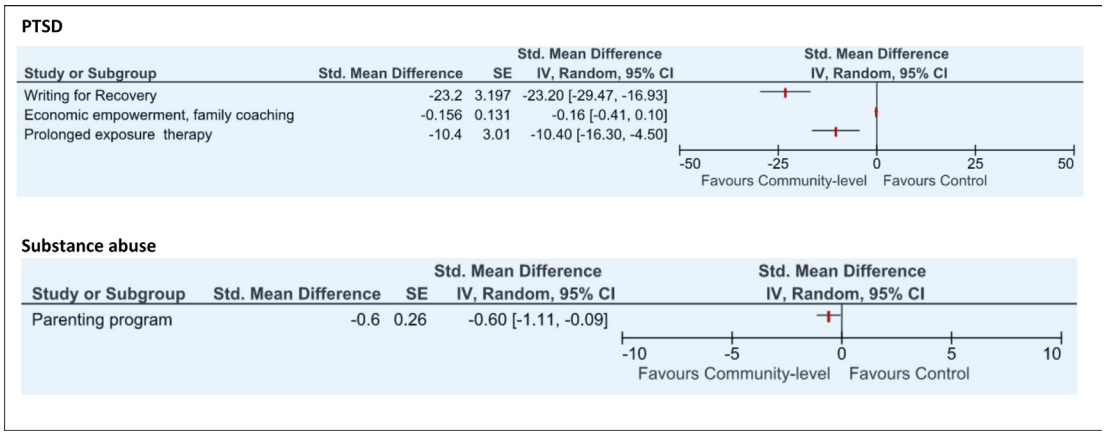

Figure 4 Effect of community-level interventions on post-traumatic stress disorder (PTSD) and substance abuse.

Post-traumatic stress disorder

Three studies measured PTSD (figure 4). Two studies that delivered prolonged exposure therapy and writing for recovery to adolescents with trauma experiences found a significant decrease in PTSD symptoms among participants in the intervention group.[50 52] One study by Ismayilova and colleagues delivered economic strengthening intervention but found no significant effect of the intervention on PTSD.[48]

Substance abuse

One study that looked at substance abuse alongside mental disorders found a significant decrease in substance abuse among participants in the intervention group compared with control group.[49] The study delivered a parenting programme (figure 4).

Depression and anxiety-like symptoms

There was only one study that assessed depression and anxiety-like symptoms[54] (see online supplemental S4 figure). This study found a significant decrease in depression and anxiety-like symptoms among participants in the intervention group compared with participants in the control group.

Certainty of evidence

The main strength of this review is that it is the first to assess the effect of multi-level interventions on mental health in adolescents in SSA. However, it is important to note the quality of evidence when interpreting these findings. Full details on quality appraisal are provided in online supplemental S7 table.

Multi-level interventions

The quality of evidence for studies that delivered multi-level interventions ranged from low to moderate. The results for effect of multi-level interventions on depression were not consistent across eight studies. Anxiety was measured by only one study which had a high attrition rate in the control group and did not adjust for clustering of participants in the analysis.[42] Among three studies that measured PTSD, two studies had small sample sizes below 100.[45 46]

Community-level interventions

The quality of evidence for studies that delivered community-level interventions ranged from low to high. For depression, most studies showed a positive intervention effect, however, the studies that delivered economic empowerment or parenting intervention seemed to have no or smaller effect than studies that delivered CBT or IPT interventions. The quality of evidence was not downgraded as the direction of effect was consistent for most studies. For anxiety, the quality of evidence was rated as high. For PTSD, the evidence was downgraded to moderate because two of the three studies that measured PTSD had sample sizes smaller than 100. For depression and anxiety-like symptoms (combined outcome), only one study was included. This study had a high risk of bias due to high attrition rate (only 27% completed both pre-questionnaire and post-questionnaire).[54] Thus, the quality of evidence was downgraded to low. For substance abuse, only one study was included. The study included enough participants and had a low risk of bias. Thus, the quality of evidence was rated as high.

DISCUSSION

The findings from this systematic review suggest that multi-level interventions that include economic empowerment, peer-support or CBT can improve mental health in adolescents. Similar patterns indicating the positive effect of these interventions were also observed for studies that delivered only community-level interventions. However, due to high variability in intervention components and study participants between studies identified in this review, further research on these interventions is needed to help us understand their effect when scaled up in different contexts and to demonstrate if they can be reliable and sustainable. The variability in intervention components found in this review is consistent with previous reviews that looked at mental health interventions for adolescents in LMICs.[22 23 67]

Among five studies that found multi-level interventions to be effective in reducing mental health problems, the intervention components included group-based

economic empowerment, peer support, CBT and IPT. These group-based interventions were offered alongside counselling or healthcare or included one-on-one trauma narrative sessions. One study that delivered an economic empowerment intervention did not show significant intervention effect after the intervention had been stopped,[37] and other two studies with longer duration (12 months or more) did not have an impact on depression.[38 40] This suggests that some interventions may be effective but fail to show positive long-term impact on mental health. This also highlights the importance of investing in sustainable interventions that have a longer positive health impact.

Multi-level interventions were generally delivered to highly vulnerable populations such as adolescents infected with or affected by HIV, orphans and war-affected adolescents, with individual-level components offered based on individual's need. While vulnerabilities may vary within youth populations, it is important to consider their individual needs when designing interventions. Engaging young people in the development of interventions may help identify their needs and ensure that interventions are relevant to their individual needs. Youth engagement have been found to be effective in improving mental health in youth,[68] however it is still limited in SSA.[69]

Community-level interventions varied substantially. Sixteen of the twenty studies reviewed significantly reduced mental health problems including substance abuse. Of these studies, four delivered economic empowerment interventions and family coaching or parenting interventions. Economic empowerment interventions like cash transfers have been shown to have a positive impact on mental health outcomes in SSA.[70] Parenting and family-focused interventions have been shown to have a significant positive effect on child and youth mental health in LMICs.[23 71] Another eleven effective studies delivered theory-based interventions such as CBT and IPT, of which ten were conducted in schools. This suggests that schools provide a good opportunity for implementation of interventions that are relevant to adolescents and youth; a previous review has demonstrated that school-based mental health interventions can be effective in improving mental health and could be integrated into education programmes.[22] Nevertheless, care must be taken not to exclude out-of-school youth by targeting effort too much on school settings. Peer-led community-based and digital mental health interventions including internet-based CBT may be able to reach many young people irrespective of whether they are enrolled in school.[72 73]

While there is overlap between mental health problems and substance abuse, in this review we identified only one study that measured both mental health and substance abuse. Cluver and colleagues found a significant positive effect of parenting programme on substance use among adolescents' families reporting conflicts, but no observed effect on mental health.[49] This finding highlights the importance of comprehensive interventions that involve parents, to prevent and reduce substance abuse in adolescents. In SSA, where substance abuse among adolescents is a major public health problem,[12] there is need for further research to identify effective interventions that will simultaneously reduce substance abuse and mental health problems.

Most studies in this review were targeting adolescents who were already having symptoms of common mental disorders. This highlights the gap in the evidence of preventive interventions on mental health in SSA and suggests the need for universal mental health interventions (whole school or community) that can reduce the risks of poor mental health. In settings like SSA where it may not be affordable to treat mental health conditions, preventive interventions such as economic empowerment and family strengthening interventions that are already known to be effective may be vital to reducing social determinants of poor mental health in adolescents. Future research should identify strategies to implement preventive interventions and consider task-shifting delivery model to achieve sustainable long-term mental health gains.

This review has a number of limitations. First, we only searched published studies and included only RCTs or quasi-experimental (controlled) studies, therefore some evidence from unpublished and qualitative studies may have been excluded. Second, we were unable to report summary effect measures due to variability in intervention components, participants and study duration in the included studies. Third, majority of studies measured the outcomes using a continuous scale without a cut-off or further confirmation of diagnosis by the specialist. Fourth, none of the included studies looked at individual-level interventions, so we could not compare multi-level interventions with individual-level interventions. Finally, we restricted the search to studies that included adolescents aged 10–24 years, this might have excluded important information. Despite these limitations, this review adds new knowledge about mental health interventions for adolescents. Our findings highlight the need to combine individual-level and community or family-level interventions when addressing mental health problems in vulnerable youth population. For example, social support or social protection interventions such as cash transfers, parenting programmes and school-based interventions (including feeding scheme) may be delivered in combination with individual-level interventions tailored to young people's needs.

CONCLUSION

There is evidence that multi-level interventions can improve mental health in young people in SSA. Economic empowerment, peer-support or CBT found to be effective when delivered alone or in combination with individual-level interventions tailored to individual needs. However, due to limited number of studies and substantial heterogeneity in intervention components, study participants and duration among studies that delivered multi-level interventions, it is difficult to identify intervention components that are most effective. Future research should involve replicating these promising interventions

in different settings to understand their long-term effect and reliability under different circumstances.

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Contributors NM, MS, GH and AC conceptualised and designed the study. NM and AMR undertook the literature searches, independently screened, filtered and selected the articles. NM and AMR completed the full text reviewing of articles and compared the database for discrepancies. NM analysed data and drafted the manuscript. All authors contributed to interpreting the data. All authors critically reviewed and approved the final version of the manuscript. The corresponding author affirms that all listed authors meet authorship criteria. NM is the guarantor.

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Patient and public involvement Patients and/or the public were not involved in the design, or conduct, or reporting, or dissemination plans of this research.

Patient consent for publication Not applicable.

Ethics approval Not applicable.

Provenance and peer review Not commissioned; externally peer reviewed.

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Supplementary material

Mthiyane N, *et al. BMJ Open* 2023; 13:e066586. doi: 10.1136/bmjopen-2022-066586

S1 Appendix: Search strategy

Medline

1 (adolesc* or child* or young or youth or teen* or pediatric* or paediatric*).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]

2 (depress* or anxiety or mental health or mental disorder or post-traumatic stress disorder or psychiatric disorder).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]

3 (randomized controlled trial or randomised controlled trial or randomised trial or randomized trial).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]

4 1 and 2 and 3

5 (Angola or Benin or Botswana or Burkina Faso or Burundi or Cameroon or Cape Verde or Central African Republic or Chad or Comoros or Congo or Cote dIvoire or Djibouti or Equatorial Guinea or Eritrea or Ethiopia or Gabon or Gambia or Ghana or Guinea or Kenya or Lesotho or Liberia or Madagascar or Malawi or Mali or Mauritania or Mauritius or Mozambique or Namibia or Niger or Nigeria or Reunion or Rwanda or Sao Tome or Senegal or Seychelles or Sierra Leone or Somalia or South Africa or Sudan or Swaziland or Tanzania or Togo or Uganda or Western Sahara or Zambia or Zimbabwe).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]

6 4 and 5

7 adolescent/ or child/

8 Pediatrics/

9 1 or 7 or 8

10 2 and 3 and 5 and 9

11 exp "Africa South of the Sahara"/

12 (subsahara* or sub-sahara* or sahara* or south sahara*).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]

13 5 or 11 or 12

14 2 and 3 and 9 and 13

15 mental disorders/ or exp anxiety disorders/ or exp depressive disorder/

16 exp Stress Disorders, Post-Traumatic/

17 exp Mental Health/

18 exp Depression/

19 exp Anxiety/

20 2 or 15 or 16 or 17 or 18 or 19

21 3 and 9 and 13 and 20

22 randomized controlled trial.pt.

23 (random$ or placebo$ or single blind$ or double blind$ or triple blind$).ti,ab.

24 (retraction of publication or retracted publication).pt.

25 or/22-24

26 (animals not humans).sh.

27 ((comment or editorial or meta-analysis or practice-guideline or review or letter) not randomized controlled trial).pt.

28 (random sampl$ or random digit$ or random effect$ or random survey or random regression).ti,ab. not randomized controlled trial.pt.

29 25 not (26 or 27 or 28)

30 3 or 29

31 9 and 13 and 20 and 30

EMBASE

1 (adolesc* or child* or young or youth or teen* or pediatric* or paediatric*).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]

2 (depress* or anxiety or mental health or mental disorder or post-traumatic stress disorder or psychiatric disorder).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]

3 (randomized controlled trial or randomised controlled trial or randomised trial or randomized trial).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]

4 1 and 2 and 3

5 (Angola or Benin or Botswana or Burkina Faso or Burundi or Cameroon or Cape Verde or Central African Republic or Chad or Comoros or Congo or Cote dIvoire or Djibouti or Equatorial Guinea or Eritrea or Ethiopia or Gabon or Gambia or Ghana or Guinea or Kenya or Lesotho or Liberia or Madagascar or Malawi or Mali or Mauritania or Mauritius or Mozambique or Namibia or Niger or Nigeria or Reunion or Rwanda or Sao Tome or Senegal or Seychelles or Sierra Leone or Somalia or South Africa or Sudan or Swaziland or Tanzania or Togo or Uganda or Western Sahara or Zambia or Zimbabwe).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]

6	4 and 5
7	exp juvenile/
8	exp "Africa south of the Sahara"/
9	1 or 7
10	5 or 8
11	Clinical Trial/
12	Randomized Controlled Trial/
13	controlled clinical trial/
14	multicenter study/
15	Phase 3 clinical trial/
16	Phase 4 clinical trial/
17	exp RANDOMIZATION/
18	Single Blind Procedure/
19	Double Blind Procedure/
20	Crossover Procedure/
21	PLACEBO/
22	randomi?ed controlled trial$.tw.
23	rct.tw.
24	(random$ adj2 allocat$).tw.
25	single blind$.tw.
26	double blind$.tw.
27	((treble or triple) adj blind$).tw.
28	placebo$.tw.
29	Prospective Study/
30	or/11-29
31	Case Study/
32	case report.tw.
33	abstract report/ or letter/
34	Conference proceeding.pt.
35	Conference abstract.pt.
36	Editorial.pt.
37	Letter.pt.

38 Note.pt.

39 or/31-38

40 30 not 39

41 3 or 40

42 2 and 9 and 10 and 41

PsycINFO

1 (adolesc* or child* or young or youth or teen* or pediatric* or paediatric*).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]

2 (depress* or anxiety or mental health or mental disorder or post-traumatic stress disorder or psychiatric disorder).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]

3 (randomized controlled trial or randomised controlled trial or randomised trial or randomized trial).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]

4 1 and 2 and 3

5 (Angola or Benin or Botswana or Burkina Faso or Burundi or Cameroon or Cape Verde or Central African Republic or Chad or Comoros or Congo or Cote dIvoire or Djibouti or Equatorial Guinea or Eritrea or Ethiopia or Gabon or Gambia or Ghana or Guinea or Kenya or Lesotho or Liberia or Madagascar or Malawi or Mali or Mauritania or Mauritius or Mozambique or Namibia or Niger or Nigeria or Reunion or Rwanda or Sao Tome or Senegal or Seychelles or Sierra Leone or Somalia or South Africa or Sudan or Swaziland or Tanzania or Togo or Uganda or Western Sahara or Zambia or Zimbabwe).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]

6 4 and 5

7 mental disorders/ or exp affective disorders/ or exp anxiety disorders/

8 2 or 7

9 1 and 3 and 5 and 8

Web of Science

1. TS=(("adolesc*" OR "child*" OR "young" OR "youth" OR "teen*") AND ("depress*" OR "anxiety "OR "mental health" OR "mental disorder" OR "post-traumatic stress disorder" OR "psychiatric disorder") AND ("randomized controlled trial" OR "randomised controlled trial" OR "randomised trial" OR "randomized trial"))

2. TS=(("Angola" OR "Benin" OR "Botswana" OR "Burkina Faso" OR "Burundi" OR "Cameroon" OR "Cape Verde" OR "Central African Republic" OR "Chad" OR "Comoros" OR "Congo" OR "Cote dIvoire" OR "Djibouti" OR "Equatorial Guinea" OR "Eritrea" OR "Ethiopia" OR "Gabon" OR "Gambia" OR "Ghana" OR "Guinea" OR "Kenya" OR "Lesotho" OR "Liberia" OR "Madagascar"
OR "Malawi" OR "Mali" OR "Mauritania" OR "Mauritius" OR "Mozambique" OR "Namibia" OR "Niger" OR "Nigeria" OR "Reunion" OR "Rwanda" OR "Sao Tome" OR "Senegal" OR "Seychelles" OR "Sierra Leone" OR "Somalia" OR "South Africa" OR "Sudan" OR "Swaziland" OR "Tanzania" OR "Togo" OR "Uganda" OR "Western Sahara" OR "Zambia" OR "Zimbabwe") OR "subsahara*" OR "sub saharan africa")
3. #2 AND #1

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#1 MeSH descriptor: [Africa South of the Sahara] this term only

#2 adolesc* OR child* OR youth OR teen*

#3 depress* OR anxiety OR "mental health" OR "mental disorders" OR "post traumatic stress disorder" OR "psychiatric disorders"

#4 Angola OR Benin OR Botswana OR Burkina Faso OR Burundi OR Cameroon OR “Cape Verde” OR “Central African Republic” OR Chad OR Comoros OR Congo OR “Cote dIvoire” OR Djibouti OR “Equatorial Guinea” OR Eritrea OR Ethiopia OR Gabon OR Gambia OR Ghana OR Guinea OR Kenya OR Lesotho OR Liberia OR Madagascar OR Malawi OR Mali OR Mauritania OR Mauritius OR Mozambique OR Namibia OR Niger OR Nigeria OR Reunion OR Rwanda OR Sao Tome OR Senegal OR Seychelles OR Sierra Leone OR Somalia OR “South Africa” OR Eswatini OR Sudan OR Swaziland OR Tanzania OR Togo OR Uganda OR “Western Sahara “ OR Zambia OR Zimbabwe OR subsahara* OR “sub saharan Africa”

#5 #1 OR #4

#6 MeSH descriptor: [Young Adult] explode all trees

#7 #2 OR #6

#8 #3 AND #5 AND #7

S1 Table. Extracted data included in the synthesis for studies that delivered multi-level interventions.

Study (Author, year)	Intervention		Intervention		Control		Statistic	p-value	Statistical method	Estimated effect
O'Callaghan, et al. (2013) (45)	M (SD)	N			M (SD)	N	F			
PTSD	18.38 (10.53)	24			42.93 (13.67)	28	52.708	<0.001	ANCOVA	
Depression/anxiety	13.96 (10.30)	24			40.04 (15.18)	28	52.371	<0.001		
McMullen, et al. (2013) (46)	M (SD)	N			M (SD)	N	F			
PTSD	10.6 (4.5)	24			34.8 (11.6)	24	89.27	<0.001	ANCOVA	
Depression/anxiety	7.0 (5.8)	24			29.3 (13.6)	24	52.82	<0.002		
Vreeman, et al. (2019) (40)	n (%)	N			n (%)	N				OR (95% CI)
Depression	No: 52 (42.6) Minimal: 53 (43.4) Moderate/severe:17 (13.9)	122			80 (61.1) 40 (30.5) 11 (8.4)	131			mixed effects ordinal logistic regression	1.06 (0.52–2.17)
Unterhitzenberger, et al. (2014) (44)	M (SD)	N	M (SD)	N	M (SD)	N	t(44)			
depression	20.6 (11.4)	23	13.0 (10.0)	23	12.1 (10.3)	23	2.948	0.01		
Thurman, et al. (2017) (43)	M (range, SD)	N			M (range, SD)	N				B (SE)
	12·4 (0–41; 10·2)	193			14·0 (0–45; 10·4)	189		0·01	GEE models	–2·70 (1·025)
Dow, et al. (2020) (41)	M (SD)	N			M (SD)	N				B (95% CI)
depression	4.1 (3.4)	55			5.1 (3.9)	38			Mixed effect models	−0.60 (− 2.67, 1.47)
PTSD	8.6 (7.5)	55			8.9 (6.3)	38				−0.03 (− 2.38, 2.32)
Kumakech, et al. (2009) (42)	M (SD)	N			M (SD)	N	F			
depression	13.2 (9.4)	157			17.1 (7.9)	141	16.12	<0.001	ANCOVA	
anxiety	18.0 (10.0)	157			21.1 (8.4)	141	9.09	0.003	ANCOVA	
Cavazos-Rehg, et al. (2020) (38)										B (95% CI)
depression									Mixed effect models	0.04 (0.00 - 0.09)
Han, et al. (2013) (39)	M (SD)	N			M (SD)	N	F			B(SE)
depression	8.42 (4.96)	179			10.58 (5.60)	118	4.37	<0.001	ANCOVA	-1.76 (0.63)
Ssewamala, et al. (2021) (37)										B (95% CI)
depression									Mixed effect models	B: 0.02 (–0.13, 0.18) B plus: 0.01 (–0.14, 0.15)

M-means, SD – standard deviation, OR – odds ratio, CI – confidence interval, B – coefficient, SE – standard error

S2 Table. Extracted data included in the synthesis for studies that delivered community-level interventions.

Study (Author, year)	Intervention		Control		Statistic	p-value	Statistical method	Estimated effect
Getanda, et al. (2020) (52)	M (SD)	N	M (SD)	N	F (2, 47)			
depression	8.6 (8.8)	25	18.8 (4.0)	25	11.74	<0.001	Repeated measure ANOVA	
anxiety	49.1 (11.7)	23	51.9 (7.7)	25	12.31	<0.002		
PTSD	12.0 (6.4)	25	35.2 (9.7)	25	52.67	<0.003		
Rivet-Duval, et al. (2011) (55)	M (SD)	N	M (SD)	N	F			
depression	47.45 (7.95)	80	50.49 (10.94)	80	12.65		ANCOVA	
Eifediyi, et al. (2018) (58)	M (SD)	N	M (SD)	N	F			
Examination anxiety	37.23 (12.29)	69	54.65 (5.02)	86	54.656	<0.001	ANCOVA	
Ede, et al. (2020) (56)	M (SD)	N	M (SD)	N	F (1,161)			
depression	12.45 (6.61)	82	49.3 (4.99)	80	1596.886	<0.001	Repeated measure ANOVA	
Bella-Awusah, et al. (2016) (63)					F (1,34)			
depression	11.8 (9.5)	20	21.1 (7.9)	20	15	<0.001	ANCOVA	
Thurman, et al. (2017) (53)	M (95% CI)	N	M (95% CI)	N				B(SE)
depression	17.03 [14.91, 19.14]	241	16.60 (16.27, 17.94)	223		0.46	Mixed effect models	-0.838 (1.129)
Rossouw, et al. (2018) (50)	M (95% CI)	N	M (95% CI)	N				MD
depression	6.15 (3.23–9.08)	31	14.42 (9.42–19.41)	32		0.02	unadjusted linear mixed models	6.81
PTSD	4.15 (1.77–6.54)	31	14.64 (8.98–20.30)	32		<0.001		10.4
Berger, et al. (2018) (60)	M (SD)	N	M (SD)	N	F			
Anxiety	13.68 (2.52)	95	16.05 (3.12)	88	56.92	<0.001	Repeated measure ANOVA	
Betancourt, et al. (2012) (51)								B (for IPT G)
depression						<0.001		-9.52
McMullen, et al. (2018) (54)	M(SD)	N	M(SD)	N	F (1,167)			
depression/anxiety-like symptoms	11.99(8.38)	92	14.17(8.14)	78	10.58	0.001	ANCOVA	
Osborn, et al. (2020) (59)	M (SD)	N	M (SD)	N				B(SE)
depression	10.21(4.39)	28	12.52 (4.23)	23		0.04	Mixed effect models	-1.41 (0.67)
anxiety	9.29 (3.67)	28	11.65 (3.41)	23		0.04		-1.31 (0.62)

S2 Table. (continued)

Study (Author, year)	Intervention		Control		Statistic	p-value	Statistical method	Estimated effect
Ismayilova, et al. (2018) (48)								aMD/IRR
depression						0.03[a]	Mixed effect models	−3.58 [-6.71, -0.45]]
						0.54[b]		−1.04 [-4.32, 2.24]
PTSD						0.09[a]		0.69 [0.45, 1.05]
						0.85[b]		0.97 [0.70, 1.34]
Jordans, et al. (2013) (61)	MD (SD)		MD (SD)		t			
depression	1.02 (4.45)		0.61 (5.28)		-0.449	0.65		
Kilburn, et al. (2016) (64)								aOR
depression						<0.05	Logistic regression models (clustered standard errors)	0.76 [0.60,0.96]
Green, et al. (2019) (47)								B(95% CI)
depression							Mixed effect models	-0.28 (-0.45, -0.12)
Angeles, et al. (2019) (65)								B(SE)
depression						<0.001	ANCOVA	−2.051 (0.475)
Cluver, et al. (2018) (49)	M (SD)		M (SD)					IRR
depression	1.98 (2.88)	270	1.84 (2.44)	278		0.91`	Poisson regression models	1.02 (0.77, 1.35)
substance abuse	0.14 (0.44)		0.27 (0.71)			0.03		0.55 (0.33, 0.93)
Osborn, et al. (2020) Digital (62)	M (SD)	N	M (SD)	N				B(SE)
depression	8.35 (4.69)	50	10.00 (4.65)	52		0.03	Mixed effect models	-2.70 (1.22)
anxiety	7.92 (4.48)		9.00 (4.45)			0.28		-1.35 (1.25)
Richards, 2014 (57)	M (SD)	N	M (SD)	N			ANCOVA	B(SE)
depression-like symptoms	24.35 (13.92)	74	18.63 (10.32)	71				0.67 (0.33, 1.00)
anxiety-like symptoms	8.73 (4.90)	74	7.31 (3.71)	71				0.63 (0.30, 0.96)
Puffer, et al. (2016) (66)								B(SE)
depression							Fixed effect OLS models	−0.01 (0.02)

M-means, SD – standard deviation, MD- mean difference, OR – odds ratio, IRR – incidence rate ratio, CI – confidence interval, B – coefficient, SE – standard error, a – Trickle Up group, b – Trickle Up- plus group

S3 Table. Characteristics of excluded studies

	Study (Author, year)	**Reasons**
1.	Zuilkowski, 2016	Not RCT
2.	Yeomans, 2010	Wrong population (includes adults)
3.	Yamaguchi, 2020	Wrong setting (not conducted in SSA)
4.	Wogrin, 2021	not RCT
5.	Willis, 2019	Did not measure outcome of interest
6.	Widmann, 2017	Wrong population (includes adults and did not measure the outcome of interest)
7.	Visagie, 2021	Wrong population (includes children younger than 10)
8.	Ugwuanyi, 2020	Age range for participants is not specified
9.	Tol, 2010	Wrong setting (not conducted in SSA)
10.	Tol, 2014	Wrong population (includes young children – age not disaggregated)
11.	Tol, 2020	Age range for participants is not specified
12.	Teivaanmaki, 2018	Not RCT
13.	Stockton, 2020	Wrong population (includes adults only)
14.	Ssewamala, 2009	Did not measure Outcome of interest
15.	Sikkema, 2018	Age range for participants is not specified
16.	Sensoy Bahar, 2020	not RCT
17.	Scholte, 2011	Wrong population (adult population)
18.	Schaal, 2009	Wrong population (includes adults)
19.	Rotheram-Borus, 2012	Did not measure the outcome of interest
20.	Robjant, 2019	Wrong population (intervention group includes adults)
21.	Rethorst, 2010	Wrong setting (not conducted in SSA)
22.	Rasmussen, 2019	not RCT
23.	Ramdhonee-Dowlot, 2021	Wrong population (not conducted in SSA)
24.	Radcliffe, 2020	Other (Study only included participants who received the intervention)
25.	Petersen, 2014	Wrong population (includes only adults)
26.	Pengpid, 2013	Wrong population (includes adults)
27.	Oshodi, 2020	Not RCT
28.	Olowokere, 2014	Wrong population (includes children below 10 years)
29.	Ofoegbu, 2020	Wrong population (adults only)
30.	Oduguwa, 2017	Did not measure the outcome of interest
31.	O'Donnell, 2014	Wrong population (children only)
32.	O'Callaghan, 2014	Wrong population (includes children below 10 years)
33.	Neuner, 2008	Wrong population (adults above 40 years)
34.	Nduna, 2010	Did not measure the outcome of interest
35.	Schaal 2009	Wrong population (includes adults)
36.	Mutamba, 2018	Age range for participants is not specified
37.	Murray, 2015	Wrong population (includes young children)

38.	Murray, 2013	Not RCT
39.	Mueller, 2011	Wrong population (includes young children)
40.	Mon, 2016	Wrong setting (not conducted in SSA)
41.	Mfidi, 2018	Not RCT
42.	Meinck, 2019	Not RCT
43.	Mavhu, 2013	Not RCT
44.	Levy, 2021	Did not measure the outcome of interest
45.	Kobach, 2017	Wrong population (includes adults)
46.	Kariuki, 2020	Wrong population (includes adults)
47.	Kapiga, 2017	Did not measure the outcome of interest
48.	Kane, 2016	Wrong population (includes young children)
49.	Jewkes, 2010	Wrong population (includes adults) and outcomes only measured at baseline
50.	Jani, 2016	Not RCT
51.	Jacob, 2014	Wrong population (adults only)
52.	Isa, 2018	Not RCT
53.	Ireri, 2019	Wrong population (includes young children)
54.	Harding, 2019	Did not measure the outcome of interest
55.	Gupta, 2008	Did not measure the outcome of interest
56.	Green, 2016	Wrong population (includes adults)
57.	Goin, 2020	Did not measure the outcome of interest
58.	Glass, 2014	Wrong population (includes adults)
59.	Glass, 2017	Wrong population (includes adults)
60.	Gandi, 2010	Wrong population (includes adults) and did not measure Outcome of interest
61.	Ezeudu, 2020	Age range for participants is not specified
62.	Ezegbe, 2019	Age range for participants is not specified
63.	Ertl, 2011	Wrong population (includes adults >25 years)
64.	Dow, 2018	Did not measure the outcome of interest
65.	Dorsey, 2020	Wrong population (includes young children)
66.	Cluver, 2020	Other (CMD was measured among caregivers only)
67.	Cluver, 2016	Not RCT
68.	Chibanda, 2016	Wrong population (includes adults)
69.	Chibanda, 2011	Not RCT
70.	Chaudhury, 2016	Wrong population (includes young children)
71.	Bliznashka, 2020	Wrong population (includes adults)
72.	Bhana, 2014	Did not measure the outcome of interest
73.	Betancourt, 2012	Not RCT
74.	Betancourt, 2017	Wrong population (includes young children)
75.	Betancourt, 2013	Not RCT
76.	Betancourt, 2014	Did not measure the outcome of interest
77.	Betancourt, 2020	Wrong setting (not conducted in SSA)

78.	Amone-P'Olak, 2013	Not RCT
79.	Alangea, (2020)	Wrong population (includes adults)
80.	Akol, (2018)	Wrong population (participants are service providers)
81.	Agboeze, (2020)	Wrong population (includes young children)
82.	Ssewamala, (2012)	Age range for participants is not specified
83.	Oladeji, (2019)	Other (The study compares adults and adolescents within study groups)
84.	Kuo, (2020)	Other (Comparison between intervention and control group not done)
85.	Vreeman (2018)	Same study as Vreeman (2019)
86.	Ssewamala, (2018)	Same study as Ssewamala, (2021)
87.	Rossouw, (2016)	Same study as Rossouw, (2018)
88.	Kivumbi, (2019)	Same study as Ssewamala, (2021)
89.	Karimli, (2019)	Same study as Ssewamala, (2021)
90.	Chang-Keun, (2013)	Same study as Han, (2013)
91.	Bolton, (2007)	Same study as Betancourt, et al. (2012)
92.	Cavazos-Rehg, (2020)	Same study as other Cavazos-Rehg, 2020 but different analysis (used baseline data)

S4 Table. Characteristics of included studies that delivered multi-level and community-level interventions

Study (Author, year) and setting	Participants	Study design, unit of randomisation (individual or cluster) and sample size	Study and intervention duration	Intervention and control descriptions	Multi-level intervention components	Outcome (instrument), Assessments
MULTI-LEVEL INTERVENTIONS						
A. HIV- affected adolescents						
Ssewamala, et al. (2021), Uganda (37)	Adolescents, AIDS orphans	RCT (Cluster). Control (16 schools, n =487), Bridges (16 schools, n=396), Bridges PLUS (16 schools, n=500)	48 months. The intervention was provided for the first 24 months.	The Bridges to the future- savings-led family economic empowerment intervention. The two treatment conditions (Bridges and Bridges PLUS) included standard of care as well as: (1) Twelve 1-2 hour workshops focused on asset building, financial literacy, and future planning; (2) peer mentors to reinforce learning and (3) matched financial savings account to be used for education for the participating adolescent or family microenterprise development. The only difference between Bridges and Bridges PLUS was the matching rate for financial savings: participants in the Bridges condition received a 1:1 savings match rate, whereas participants in the Bridges PLUS condition received a 2:1 savings matching rate. Usual care included counselling, food aid, and scholastic materials (textbooks, notebooks, and school uniforms). The control group only received usual care.	Group: Economic empowerment Individual: Counselling	Depressive symptoms (CDI) Baseline, 12, 24, 36 and 48 months

Cavazos-Rehg, et al. (2020), Uganda (38)	Adolescents living with HIV, 10-16 years	RCT (cluster). N=702, Intervention (19 health facilities, n=358), Control (20 health facilities, n=344)	48 months: The intervention was revised for the first 24 months.	The Suubi+Adherence intervention (treatment condition) included four sessions on financial management and training in income-generating activities and combined a matched savings account—opened in the child and caregiver names. The account was matched on 1:1 ratio. The intervention was intended to meet the needs associated with managing HIV as a chronic illness, including support for adherence to antiretroviral therapy (ART), microenterprises to generate family income, and/or to pay for schooling. Participants were also paired with a mentor and could attend 12 educational sessions, including, but not limited to, financial planning, business development, saving, setting short- and long-term goals, and avoiding risk-taking behaviours. Control group received standard of care only	Group (family): Economic empowerment Individual: ART, weekly-monthly healthcare	depressive symptoms (CDI) Baseline, 12, 24, 36 and 48 months
Han, et al. (2013), Uganda (39)	AIDS orphaned adolescents, 10-14 years	RCT (cluster). N=297, Intervention (5 schools, n=179), Control (5 schools, n=118)	12 months	Suubi- Innovative family economic empowerment intervention has three key components: (1) promoting monetary savings for educational opportunities.; (2) financial management workshops and family-level income generating projects to enhance economic stability and reduce poverty and (3) providing adult mentors to children. Intervention included usual care comprised counselling and mentorship, food aid and scholastic materials. Control group received usual care only	Group: Economic empowerment Individual: Counselling	Depressive symptoms (CDI) Baseline and 12 months

Vreeman, et al. (2019), Kenya (40)	Adolescents HIV-infected and in active care, 10-14 years	RCT (Cluster). N=285 Intervention (4 health facilities, n=143, Control (4 health facilities, n= 142)	24 months	The intervention components, referred to cumulatively as the HADITHI ('Helping AMPATH Disclose Information and Talk about HIV Infection') intervention, centre on participants' access to intensive counselling sessions (group and one-on-one) with trained counsellors and culturally tailored materials such as pamphlets and videos designed locally. Participants were offered ART. Participants in the control clinics received standard of care	Group: HIV status disclosure (counselling) Individual: ART, counselling	depression severity (PHQ-9) Baseline, 6, 12, 18 and 24 months
Dow, et al. (2020), Tanzania (41)	Young people living with HIV, 12–24 years	Pilot RCT (individual). N=105 (Intervention=58, Control=47)	6 months. The intervention was delivered for 10 weeks.	Sauti ya Vijana (SYV; The Voice of Youth) consisted of 10 group sessions and two individual sessions (trauma narratives). The first four group sessions (CBT) encouraged youth to identify their worries about living with HIV and to utilize relaxation methods such as deep breathing and mindfulness activities to cope with distress. Emphasis on nurturing strong familial and social relationships (IPT) was targeted for group sessions five through seven with a joint youth/caregiver meeting designed to prepare caregivers to listen and support their youth in trauma narratives. Group sessions eight through ten (MI) incorporated prior session teachings to cultivate a safe and healthy living environment through choices influenced by stigma, education about HIV, disclosure, and values. Participants received ART. Control group received standard of care	Group: Cognitive and behavioural therapy (CBT), interpersonal therapy (IPT), Motivational Interviewing (MI) Individual: Trauma narratives, ART	Depressive symptoms (PHQ-9), PTSD (UCLA - PTSD RI) Baseline and 6 months

Kumakech, et al. (2009), Uganda (42)	Adolescents AIDS orphans, 10-15 years	RCT (cluster). N=326, Intervention (10 schools, n=159), Control (10 schools, n=167)	10 weeks.	Peer-group support intervention comprised 16 semi-structured exercises designed in a form a game or play and presented in a problem-posing manner to stimulate thinking. In the first sessions, orphans introduced themselves and to share fears, worries and concerns about orphanhood. The subsequent meetings involved exercises such as name games, blindfolded walk, sharing of past–present–future hopes, all of which were aimed at building trust within the group. The last group of exercises was aimed at raising self-esteem and included sending messages to another orphan, sharing the aspects they like about themselves, physically bearing the weight of each other, and the ‘‘big hug’’ exercise where participants held, supported, and hugged each other. Intervention also included monthly healthcare. Each exercise lasted for 1 hour and two peer-group support exercises were held per week Orphans in the control group did not receive intervention.	Group: Peer-group support Individual: Monthly healthcare	Depressive symptoms (BYI), anxiety (BYI) Baseline and 10 weeks

B. **Orphaned adolescents**

Thurman, et al. (2017), South Africa (43)	Bereaved female adolescents, 13-17 years	RCT (individual). N=382 (intervention=193 , Controls=189)	Intervention delivered for three school terms (~9 months).	Theory-based support group called 'Abangane'. the intervention had 8 sessions which included an average of three structured activities focused on experiences of loss and grief, coping skills, and the links between feelings, thoughts and behaviour. All sessions included an opening and closing ritual and time for reflection. Weekly interactive 90 min sessions offered at three time periods, corresponding with the school year's first three terms. All participants had access to the standard of care consisting of a school-based counsellor available to serve students based on self-referral or referral by a teacher. Control group only received standard of care.	Group: Theory-based support group (IPT), cultural adaptation Individual: Counselling	Depressive symptoms (CES-DC) Baseline and 3 months post-intervention
Unterhitzenberger, et al. (2014), Rwanda (44)	Orphaned Adolescents, 14-18 years	RCT (individual). N=69 (Treatment=23, Trivial writing=23, control=23)	3 weeks.	The intervention included Emotional and positive writing therapy delivered in school. The EW participants wrote about their deepest emotions concerning their loss. In the PW condition, participants wrote about their favourite hobby, which is basically trivial but could also be experienced as positive topic and activating resources. 30-min writing periods started at 5 p.m. each week on three consecutive Thursdays. Adolescents had access to their guidance counsellor whenever they felt stressed, sad, or depressed. Control group received no intervention.	Group: Writing therapy Individual: Counselling	Depressive symptoms (MINI-KID A) Baseline and post-intervention

C. **War-affected adolescents**

O'Callaghan (2013) (45)	Sexually exploited, war-affected adolescent girls aged 12-17 years	RCT (individual). N=52 (Intervention=24, Controls=28)	3 months. The intervention was offered for 2 hours per day, 3 days per week for five weeks	The intervention group received a 15-session, manualized, culturally modified, trauma-focused cognitive behavioural therapy intervention. The manual was based on ‘‘A Web-based learning course for Trauma-Focused Cognitive Behavioural Therapy. It included the following modules: introduction (psychoeducation); stress management; feelings; cognitive coping, the relationship between thoughts, feelings, and behaviour; trauma narratives; and identifying and changing inaccurate or unhelpful cognitions. All modules were delivered in a group, except for module 5, for which three individual sessions were provided. Control group received no intervention during the study.	Group: CBT Individual: Trauma narratives	PTSD (UCLA-PTSD RI), depression and anxiety-like symptoms (AYPA) Baseline, post-intervention and 3 months
McMullen (2013) Democratic Republic of Congo (46)	Adolescent boys-former child soldiers aged 13-17 years	RCT (individual). N=50 Intervention (n = 25), Control(n=25)	3 months. The intervention was delivered for approximately 5 weeks	A 15-session, manualised, TF-CBT intervention included the following modules: (a) Psycho-education (b) Stress management/Relaxation techniques (c) Affect expression and modulation (d) Cognitive coping (e) Creating a trauma narrative, (f) Cognitive processing (g) Future Hopes. All of these were completed as a group except for sessions exploring the boys’ trauma narratives. These took place in 2–4 individual sessions to avoid the possibility of vicarious traumatisation within the group. TF-CBT intervention took place within an existing psychosocial programme which provided vocational training, food and shelter to both study groups. Control group received no intervention	Group: TF-CBT Individual: Trauma narratives	PTSD (UCLA-PTSD RI), depression and anxiety-like symptoms (AYPA) Pre-intervention, postintervention and 3-month follow-up
COMMUNITY-LEVEL INTERVENTIONS						
A. Vulnerable adolescents						

Green, et al. (2019), Kenya (47)	Orphaned adolescents	RCT (cluster). N=835 Intervention (133 schools, n=410), Control (13 schools, n=425)	4 years. The intervention was provided from 2011 until 2015, or until the student dropped out of school.	The intervention consisted of three components: (a) payment of school tuition fees for secondary school; (b) provision of a school uniform in primary school and the first year of secondary school; and (c) nurse visits. The average cost of secondary school fee payments per intervention participant was approximately $360 per year. The intervention paid all fees (tuition, exam, uniform) directly to schools as long as students remained enrolled, but students were free to attend any school that granted them admission based on their primary school exit examination scores. Schools in the control arm received cash incentives of $240 annually for their school development projects.	Depressive symptoms (CESD-R) Baseline, Year 2, 3 and 4
Ismayilova, et al. (2018), Burkina Faso (48)	Children aged 10-15 years from extremely poor households	RCT (cluster) Intervention 1 (Trickle Up plus): 4 villages, n=120 households Intervention 2 (Trickle Up): 4 villages, n=120 households Control: 4 villages, n=120	24 months.	Study had three arms: Wait-list condition (Control arm); economic strengthening intervention alone, (Trickle Up/TU arm); and a combination of economic strengthening and family coaching component (Trickle Up Plus/TU + arm). Economic strengthening intervention included Savings group formation and training, Livelihood training and planning, Seed capital grants and Monthly one-on-one mentoring. Family coaching for household members was designed to address normative beliefs related to protection of children from violence and exploitation. Monthly one-on-one caregiver mentoring took 24 months. Family coaching sessions were conducted once a month (each session lasted for 35–45 min). Control group received no intervention during the study.	Depressive symptoms (CES-DC), PTSD (CRIES-8) Baseline, 12 and 24 months

Cluver, et al. (2018), South Africa (49)	Adolescents aged 10-18 years and their caregivers from families reporting conflict with their adolescents	Pragmatic RCT (cluster). N=552 Intervention (20 villages, n=270), Control (20 villages, n=282)	9 months. The intervention was provided for 4 months	14-session parenting programme, 'Sinovuyo Teen'. Weekly sessions were conducted in local community halls, churches and outdoors under trees. Session content was based on social learning principles and included praise and relationship building, managing stress and anger, family problem-solving, planning together to protect adolescents from community violence, monthly family budgeting, saving and responding to crises. Control clusters received a hygiene and hand-washing promotion programme.	Depressive symptoms (MINI-Kid), substance abuse (WHO Alcohol Use Disorders Identification Test) Pre-test, 1 month and 5–9 months post-interventions
Rossouw, et al. (2018), South Africa (50)	Adolescents who had experienced or witnessed an interpersonal trauma and had chronic PTSD (>3 months), 13-18 years	RCT (individual). N=63 intervention (n=31), Control (n=32)	6 months.	Prolonged exposure therapy consisted of manualised 8 modules. It covered sessions on identifying the index trauma and conducting a breathing retraining exercise; conducting imaginal exposure which also focused on trauma worst moments. The imaginal exposure module was repeated for 4-7 sessions. The number of sessions required was determined on the basis on an adolescent achieving a reduction of at least 70% on the CPSS-SR. Treatment completers were defined as having completed at least seven sessions, which would have ensured that participants in PE-Treatment group received the main components of treatment across the sessions. Control group received supportive counselling	PTSD (CPSS-I) Pre-treatment, post-treatment, and at 3- and 6-month follow-up

Betancourt, et al. (2012), Uganda (51)	Adolescent war-survivors, 14-17 years	RCT (individual). N=314 Creative play(n=105), IPT(n=105), Control (n=104)	1 year. The intervention was provided for 16 weeks (~4 months)	Group interpersonal psychotherapy (IPT) and creative play. Both interventions comprised 16 weekly group sessions. The intervention was delivered to 12 IPT-G groups (each consisted of 6 or 8 adolescents) using locally adapted treatment manual specifying IPT-G strategies and techniques. CP was provided to 4 groups drawing from verbal and non-verbal expression of thoughts and feelings to interpret life lessons and personal difficulties. Control arm received no intervention during the study.	Depressive symptoms (APAI) Pre-intervention and post-intervention
Getanda, et al. (2020), Kenya (52)	Adolescents aged 14-17 years and experienced traumatic events in the past year	RCT (individual). N=54 (Intervention=27, Control=27)	1 week, Intervention lasted for 3 days	Writing for Recovery- psycho-social-educational group intervention. Writing gradually progressed from a general unstructured exploration of innermost feelings and thoughts related to experienced trauma, to more structured writing encouraging insight and shifting of perspective. Six sessions of writing over three consecutive days. Control group received no intervention during the study.	PTSD (CRIES-13), anxiety (RCMAS), depressive symptoms (DSRS) Pre-intervention, post-intervention and 1-week post-intervention
Thurman, et al. (2017), South Africa (53)	Orphaned and vulnerable adolescents, 14-17 years	RCT (cluster). N=489, 31 drop-in centers and 43 villages (Intervention=260, Control=229)	2 years. Intervention was delivered for 4 months	Interpersonal psychotherapy for groups (IPTG). The intervention consisted of 16 weekly 90-minutes group sessions (manualised). The program model focuses on four interpersonal areas that trigger depressive symptoms: grief, interpersonal disputes, role transitions, and relationship deficits. Control arm received standard of care comprised basic economic and educational support services	Depressive symptoms (CES-DC score ≥15) Pre-intervention, 3 months and 1-year post-intervention

B. School/college adolescents

McMullen, et al. (2018), Uganda (54)	Adolescent students, 13-18 years	Quasi- controlled (cluster). N=620 Intervention (3 schools, n=456), Control (one school, n=164)	1 year	The Living Well manualised intervention was designed to support the social, emotional, and behavioural development of east Africa youth through promoting mental health and resilience; developing communication skills; supporting good choices; and learning life skills to help in their present and their future. It included 6 lessons in each of four overarching themes: 1) Living Well with Ourselves and Others; 2) Living Well with Worry and Stress; 3) Living Well with Life's Issues; and 4) Living Well in the Future. Each session took 45–60 minutes. Control school did not receive the intervention during the study.	depression/anxiety-like symptoms (AYPA) Pre-intervention and post-intervention
Rivet-Duval, et al. (2011), Mauritius (55)	Adolescents from single-sex secondary schools, 12-16 years	RCT (individual). N=160 Intervention (n=80), Control (n=80)	6 months.	The Resourceful Adolescent Program (Adolescent version) based on cognitive-behavioural and interpersonal therapy. It involved 11 one-hour weekly manualised-sessions with 8 to 12 participants per group. It covers topics such as building self-esteem, keeping calm, self-talk, thinking resourcefully, problem solving, identifying and accessing support networks, considering the perspective of others and keeping the peace. Control group received no intervention	Depressive symptoms (RADS-2) Pre-intervention, post-intervention and 6-month follow-up

Ede, et al. (2020), Nigeria (56)	College adolescents, 16-21 years	RCT (individual). N=162 Intervention (n=82), Control (n=80)	Intervention was delivered for 3 months	Group Cognitive Behavioural Therapy comprised of 12 sessions delivered in 3 phases (one session per week, each session was 1 hour). The first four sessions addressed the contribution of thought pattern to human feelings. During phase 2, participants learned about ways enjoyable activities could decrease their depressive symptoms. They also narrated their experiences. Phase 3 focused on the impacts of social support and communication styles on participants' moods. Adolescents in the control group received no intervention.		Depressive symptoms (CES-DC) Pre-intervention, post-intervention, and follow-up
Richards, et al. (2014), Uganda (57)	Adolescent primary school pupils aged 11-14 years	RCT (individual). N=1462 (Intervention=227, Control=1235) (intervention: boys = 74, girls = 81; wait-list: boys = 72; comparison: boys = 472, girls = 763)	11 weeks. Intervention lasted for 9 weeks.	The sport-for-development intervention was a community-based programme called the Gum Marom Kids League (GMKL) and took place over an eleven-week period. The GMKL aimed to use sport as a vehicle to promote physical fitness and mental health as well as achieve peace-building objectives in the community. Team allocation took place one week after registration day. The registered adolescents were either assigned to a team for the first season of GMKL or informed that they had been wait-listed for the next season. One week after team allocation, the intervention group commenced a nine-week (40 minutes game every weekend) competitive football league. Control groups (waitlisted and unregistered) did not participate in GMKL activities		depression-like-syndrome (APAI) Baseline and 1-month follow-up

Eifediyi, et al. (2018), Nigeria (58)	Secondary school students, 14-19 years	Quasi-experimental controlled. N=160 Intervention (n=72), Controls (n=88)	7 weeks	Rational emotive behaviour therapy. The therapy was psycho –educational in nature. The six sessions included lecture on test anxiety, introduction to treatment package and how to stop irrational thoughts (Distraction techniques). Control group received placebo therapy on health issues.	examination anxiety (TAI – Nigerian vesrion) Pre-intervention and post intervention
Osborn, et al. (2020), Kenya (59)	Adolescent students, 14-17 years	RCT (individual). N=51 Intervention (n=28), Control (n=23)	4 weeks	Shamiri- wise interventions - delivered to groups in person. During sessions one and two, students learned about growth mindsets. During session three, students learned about gratitude. During session four, students learned about values and completed a value affirmation exercise. Each session included reading activities, group discussions, and writing activities. Control group received study skills	Depressive symptoms (PHQ-8), generalised anxiety disorder (GAD-7) Baseline, 2-weeks and weeks
Berger, et al. (2018), Tanzania (60)	Primary school students, aged 11-14 years in grades 6-8	RCT (cluster). N=183 Intervention (3 classes, n=95), Control (3 classes, n=88)	Intervention was delivered for 8 weeks.	ERSAE-Stress-Prosocial program (ESPS) is a universal school-based program composed of sixteen 90-minute sessions divided into two sets of strategies: stress-reduction interventions and prosocial interventions (i.e. perspective-taking, empathy training, mindfulness and compassion-cultivating practices), The control classes received 2-hour social studies classes weekly based on the Ministry of Education curriculum for primary schools.	Anxiety (SCAS) Pre-intervention, post-intervention and 8-month follow-up
Jordans, et al. (2013), Burundi (61)	School-going children aged 10-14 years with elevated psychological distress	Quasi-experimental with controls. N=161 Intervention (n=97), Control (n=64)	Th intervention took an average of 5.5 hours	Brief parenting psychoeducation intervention delivered to parents consisted of two sessions: The first session aimed at increasing dialogue and understanding of problems affecting children as well as of ways of communicating with children. The second session focused on advising parents how to manage their children's problems. The sessions 1 and 2 took average 2.5 and 3.0 hours, respectively. Control group received no intervention.	Depressive symptoms (DSRS) Pre-intervention and 3-weeks post-intervention

Osborn, et al. (2020) Digital, Kenya (62)	Adolescent high school students aged 14-17 years	RCT (individual). N=103 Intervention (n=50), Control (n=53)	The intervention took 1 hour.	Single session Shamiri-Digital intervention consists of three modules: growth mindset, gratitude, and value affirmation. In the growth-mindset module, participants learned about the brain's ability to grow in response to challenges in various domains (e.g., academic, interpersonal, and personality). Then, participants read a growth testimonial written by a Kenyan peer. Afterward, participants wrote their own growth stories about a challenge they faced and overcame. In the gratitude module, participants learned about the importance of practicing and expressing gratitude. In the value-affirmation module, participants learned about the importance of affirming personal value. Control group received study skills	Depressive symptoms (PHQ-8), anxiety (GAD-7) Baseline and 2-week follow-up
Bella-Awusah, et al. (2016), Nigeria (63)	Adolescents with depressive symptoms and aged 14-17 years	RCT (cluster). N=40, intervention (one school, n=20), Control (one school, n=20)	The intervention was offered for 5 weeks.	Brief school-based, group cognitive behavioural therapy consisted of 5 sessions which were delivered as interactive lectures and small group discussions. It included sessions on psychoeducation, monitoring of moods, avoidant activities and relaxation techniques. Control school did not receive intervention during the study.	depressive symptoms (BDI) Baseline, 1-week and 16-week post-intervention
C. General population					
Kilburn, et al. (2016), Kenya (64)	Adolescents, 15-24 years	RCT (cluster). N=1960 Intervention (14 locations, n=1408), Control (14 locations, n=598)	4 years	Large-scale unconditional cash transfer program. US$20 per month transfer irrespective of household size, directly to the caregiver. Payment is not conditional on any child or adult behaviours, although caregivers are instructed that receipt of the money is for the care and protection of orphans and vulnerable children. Control locations did not participate in the intervention.	Depressive symptoms (CES-D10) Post-intervention. Baseline data was not collected

Angeles, et al. (2019), Malawi (65)	Adolescents, 13-19 years	RCT (cluster). N=2099 Intervention (14 villages, n=1040 households), Control (15 villages, n=1059 households),	2 years	Malawi Social Cash Transfer Program. The objectives of the SCTP are to reduce poverty and hunger, and to increase school enrolment rates. Eligibility is determined based on households being: 1) ultra-poor (defined as being unable to meet basic and essential needs, including food), and 2) labour-constrained (defined as having no household members who are 'fit to work'—i.e., below 19 or above 64, or having a chronic disability or illness—, or if the ratio of unfit to fit exceeds three). Villages in the control arm received no intervention during the study	depressive symptoms (CES-D10) Baseline, midline and endline
Puffer, et al. (2016), Kenya (66)	Adolescents (and caregivers) aged 10-16 years	RCT (Cluster)-stepped wedge. (four churches, n=237)	3 months	Family-behavioural family communication skills training, skills-based HIV prevention interventions, behavioural parent training, and cognitive behavioural therapies.	Depressive symptoms (CDI) Baseline, 1-month and 6-month follow-up

Children's Depression Inventory (CDI), Patient Health Questionnaire (PHQ), The Beck Youth Inventories (BYI), Center for Disease Control Depression Index (CES-D), University of Califonia Los Angeles Post Traumatic Stress Disorder Reaction Index (UCLA - PTSD RI)), The African Youth Psychosocial Assessment Instrument (AYPA), Mini International Neuropsychiatric Interview-Kid (MINI-Kid), Center for Epidemiologic Studies Depression Scale Revised (CESD-R), Children's Revised Impact of Events Scale (CRIES), Acholi Psychosocial Assessment Instrument (APAI),

S5 Table. Intervention implementation and target outcomes

Study	Intervention and number of sessions (including length)	Providers	Attrition/retention rate	Target outcomes
Ssewamala, et al. (2021), Uganda (37)	**The Bridges to the future-savings-led family economic empowerment intervention** Twelve 1–2-hour workshops. Other intervention components (e.g., saving accounts) provided for 24 months	Counselling was provided by priests in the community. Provided of other intervention components not specified	Attrition rate was: 8.8% for Bridges, 10.6% for Bridges PLUS, and 8.6%. for control,	physical, mental (depressive symptoms), and sexual health
Cavazos-Rehg, et al. (2020), Uganda (38)	**The Suubi+Adherence intervention**. Four sessions and additional 12 sessions with a mentor for 24 months (unclear how many hours per session)	Adherence counselling delivered by trained lay workers.	Not specified	Three mental health measures (hopelessness, depression, and poor self-concept)
Han, et al. (2013), Uganda (39)	**Suubi- Innovative family economic empowerment intervention**. 1-2 hour training sessions and one mentorship meeting per month over 12-month period	Trained lay counselors and priest	Attrition rate was 9.1%	Mental health functioning (depression, hopelessness)
Vreeman, et al. (2019), Kenya (40)	**HADITHI ('Helping AMPATH Disclose Information and Talk about HIV Infection').** Number of sessions not specified.	Counselling was provided by trained counselors.	Attrition rate was 11.2%	To increase the proportion of children who know their HIV status, and support their clinical, mental (depression) and behavioural health through the disclosure process
Dow, et al. (2020), Tanzania (41)	**Sauti ya Vijana (SYV; The Voice of Youth).** 10 group sessions, two one-on-one sessions 90 minutes every Saturday for 3 months. Fidelity to the intervention was maintained	The sessions were facilitated by group leaders (young adults) with intensive two-week training, supervised weekly	Attendance at the six-month follow-up visit was 89% with 95% among those in the intervention arm and 81% among those receiving standard of care	mental health (depression, post-traumatic stress disorder), stigma, ART adherence, and HIV RNA

Kumakech, et al. (2009), Uganda (42)	**Peer-group support intervention.** 16 exercises over 10 weeks. 1 hour play	The intervention was delivered by selected teachers who were supervised weekly by the researcher and experienced counselor	Attrition was 8.6% (2 in the intervention group and 26 in the control group)	depression, anger, anxiety, and self-concept
Orphaned adolescents				
Thurman, et al. (2017), South Africa (43)	**Theory-based support group called 'Abangane'**. Eight sessions, Weekly 90 minutes sessions (average 3 activities)	Sessions were facilitated by social workers or social auxiliary workers facilitated. They received 4-day training and 3-day refresher training just before the study. Also attended weekly supervision meetings	Retention at follow-up was 96.5%. Intervention participation was 148 (77%) attended seven or more sessions, and 126 (65%) completed the full eight session programme.	Grief and depression
Unterhitzenberger, et al. (2014), Rwanda (42)	**Emotional and positive writing therapy**. 30-min writing periods each week on three consecutive Thursdays	Offered by the investigator	No attrition	Grief and depression
War-affected adolescents				
O'Callaghan (2013) Democratic Republic of Congo (45)	**Trauma-Focused Cognitive Behavioural Therapy**. The sessions ran for 2 hours per day, 3 days per week for five weeks	The intervention was delivered by social workers	The average attendance was 13.19 sessions (attendance range, 9–15). Four participants from the intervention group were moved to waitlist due to failing to attend.sessions	posttraumatic stress, depression, and anxiety and conduct problems and increasing prosocial behavior
McMullen, et al. (2013), Democratic Republic of Congo (46)	**Trauma-Focused Cognitive Behavioural Therapy**. 15 sessions (length not specified) Fidelity was maintained.	The intervention was delivered by study authors who hold a doctorate in educational, child and adolescent psychology and two experienced counselors. Daily training and evaluation sessions with facilitators	The mean number of sessions attended was 13.4 (range 10–15). One participant in the waitlist group dropped out	symptoms of posttraumatic stress, depression/anxiety-like symptoms, conduct problems and prosocial behaviour
COMMUNITY_LEVEL				

Vulnerable adolescents				
Green, et al. (2019), Kenya (47)	Three components (**school fess, uniform, nurse visits**) delivered annually for 4 years. High fidelity to the intervention maintained	A registered nurses tracked delivery of fees and health of student	Attrition rate was 9% among the intervention group and 11.6% among the control group.	depression
Ismayilova, et al. (2018), Burkina Faso (48)	**Economic strengthening and family coaching** Livelihood training for 6 days Monthly one-on-one mentoring over 24 months Family sessions conducted once monthly (35-45 min each)	Field agents received five monthly training sessions	Attrition rates at 24 month: 11.7%, 14.2%, 12.5% for waitlist, Trickle Up and Trickle Up plus	Depressive symptoms, self-esteem, trauma symptoms
Cluver, et al. (2018), South Africa (49)	**14-session parenting programme, 'Sinovuyo Teen'.** 10 weekly sessions attended by both child and a caregiver, four attended separately	The intervention was delivered by local social auxiliary workers trained for 1- week and supervised	Participation rates ranged between 96% - 98% for intervention and control group.	Primary outcomes. Abuse and parenting practices. Secondary outcomes: caregiver and adolescent mental health and substance use, adolescent behavioural problems, social support, exposure to community violence and family financial well-being at 5–9 months postintervention
Rossouw, et al. (2018), South Africa (50)	**Prolonged exposure therapy.** 7–14 weekly, 60 min sessions	The intervention was delivered by non-specialist health workers who were qualified psychosocial treatment naïve nurse – trained 1-year advanced diploma in psychiatric nursing	Participation rates: In the intervention group 25 out of 31 completed >7 sessions, Control: 27 out of 32 completed >7	post-traumatic stress disorder

Betancourt, et al. (2012), Uganda (51)	**Group interpersonal psychotherapy (IPT) and creative play**. Both interventions comprised 16 weekly group meetings, lasting 1.5 to 2 hours each	Facilitators received 2-weeks training and weekly supervision	Attrition rates were 6.8%, 11.1%, 13.7% for group IPT, creative play and waitlist respectively	depression
Getanda, et al. (2020), Kenya (52)	**Writing for Recovery-psycho-social-educational group intervention.** Six sessions of writing over three consecutive days. The duration of each session not specified.	The facilitator had social care background and worked closely with school counselor and teacher responsible for pastoral care	Completion rates (intervention group: 85%; control group: 92%)	Mental health (stressful life events; post-traumatic stress, depressive and anxiety symptoms; quality of life)
Thurman, et al. (2017), South Africa (53)	**Interpersonal psychotherapy for groups.** 16 weekly 90-min group sessions	The intervention was delivered by group facilitators who had completed at least 12th grade recruited from community received 2 weeks training from African psychologists	Attrition rate was 23%. IPTG assignees attended an average of nine sessions out of a possible total of 16 sessions	Depressive symptoms
School/college-based adolescents				
McMullen, et al. (2018), Uganda (54)	**The Living Well manualised intervention.** 24 sessions, 45–60 minutes each	The intervention was delivered by teachers who were trained for at least 3 days. Further training, supervision, and monitoring was also required.	Only 27% of the students completed both pre and post-intervention assessments	self-efficacy, internalising problems (depression and anxiety-like symptoms), promoting prosocial behaviour, and developing a sense of connectedness
Rivet-Duval, et al. (2011), Mauritius (55)	**The Resourceful Adolescent Program (Adolescent version) based on cognitive-behavioural and interpersonal therapy.** 11 one-hour weekly sessions with 8 to 12 participants per group	Facilitators were experienced teachers who attended a 2 day training and received ongoing support from a certified RAP trainer. Half-day booster training session was organized 6 months following initial training	Attrition rate: Only three students missed one session throughout the entire program	Depressive symptoms
Ede, et al. (2020), Nigeria (56)	**Group Cognitive Behavioural Therapy.** 12 sessions (one session per week) lasted for 1 hour each	Mental health therapists.	No attrition	Depressive symptoms

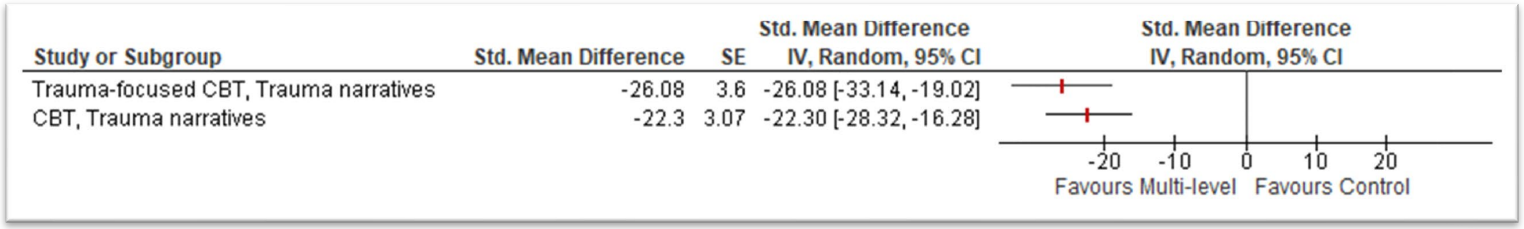
Richards, et al. (2014), Uganda (57)	**The sport-for-development intervention.** At least one 1.5-hour training session per week over 9 weeks. 40 minutes game each weekend	The intervention was delivered by six paid staff who selected and 32 volunteer adults who received 2-weeks training to become football and peace building coaches	Attrition rate: In the intervention group nine boys and eight girls In the control group , 10 boys dropped out	physical fitness and mental health (depression and anxiety-like symptoms)
Eifediyi, et al. (2018), Nigeria (58)	**Rational emotive behaviour therapy.** 45 minutes each of six sessions (therapy or placebo therapy) lasted for 7 weeks	Two professional counselors.	The participation rate was about 80–85% per week.	Examination anxiety
Osborn, et al. (2020), Kenya (59)	**Shamiri- wise interventions.** Four 1-hour sessions that were 1 week apart and included between-session homework exercises. Fidelity to the intervention was high	Facilitators were high school graduates completed 20 hours of training over 5 days. Training led by first 3 authors.	Participation rate ranged between 86.3% - 96.1% of all participants. Attrition rate for post-test was 3.1%	primary outcome measures (depressive and anxiety symptoms) and secondary outcome measures (social support, perceived control, and academic outcomes)
Berger, et al. (2018), Tanzania (60)	**ERSAE-Stress-Prosocial program (ESPS) is a universal school-based program.** Intervention group: 16 sessions in two weekly 45-minute sessions. Control received 2-hour social studies classes weekly. High fidelity was maintained	Homeroom teachers were trained 4-days by the first author in collaboration with mental health professionals who actively facilitated the activities	No Attrition	anxiety, hyperactivity, somatization, and social difficulties and increased prosocial behaviors and functioning
Jordans, et al. (2013), Burundi (61)	**Brief parenting psychoeducation.** Two sessions of on average 2.5 and 3.0 h, respectively	Lay community workers trained for 3 months	Attrition: Two children in the control group were lost to follow-up	Mental health (child-reported levels of aggression, depression symptoms and perceived family social support)
Osborn, et al. (2020) Digital, Kenya (62)	**Single session Shamiri-Digital intervention:** Session took 60 minutes	The intervention was iterative adapted from group-based intervention but It is not clear who facilitated the intervention session.	No attrition	depressive and anxiety symptoms and greater improvements in overall wellbeing

Bella-Awusah, et al. (2016), Nigeria (63)	**Brief school-based, group cognitive behavioural therapy**: Five structured sessions offered weekly, each lasting 45–60 min. Good adherence to the intervention manual.	First author consultant psychiatrist with training in CBT, supervised by other authors	Attrition: four participants in the intervention group were lost to follow-up	Depressive symptoms
General population				
Kilburn, et al. (2016), Kenya (64)	**Large-scale unconditional cash transfer program.** Low-income households and those with OVCs began receiving monthly cash transfers of $20 in 2007	not applicable	Attrition between 2009 and 2011 was only five percent across all study districts	The primary outcome was depressive symptoms. Secondary outcomes include Hope and physical health measures
Angeles, et al. (2019), Malawi (65)	**Malawi Social Cash Transfer Program.** Monthly cash transfers for 2 years	not applicable	Attrition was 37% (no difference between intervention and control group)	Depressive symptoms
Puffer, et al. (2016), Kenya (66)	**Family-focused communication intervention and cognitive behavioural therapy.** Nine sessions (2-hour each)	Local Community Advisory Committee (two from each church attended 5-day training)	Attrition was 9.3%	Primary outcomes included family communication, HIV risk knowledge, self-efficacy, and beliefs. Secondary outcomes included parenting, social support, mental health, and adolescent sexual behavior

S6 Table. Summary of risk of bias in the included studies (grouped by type intervention)

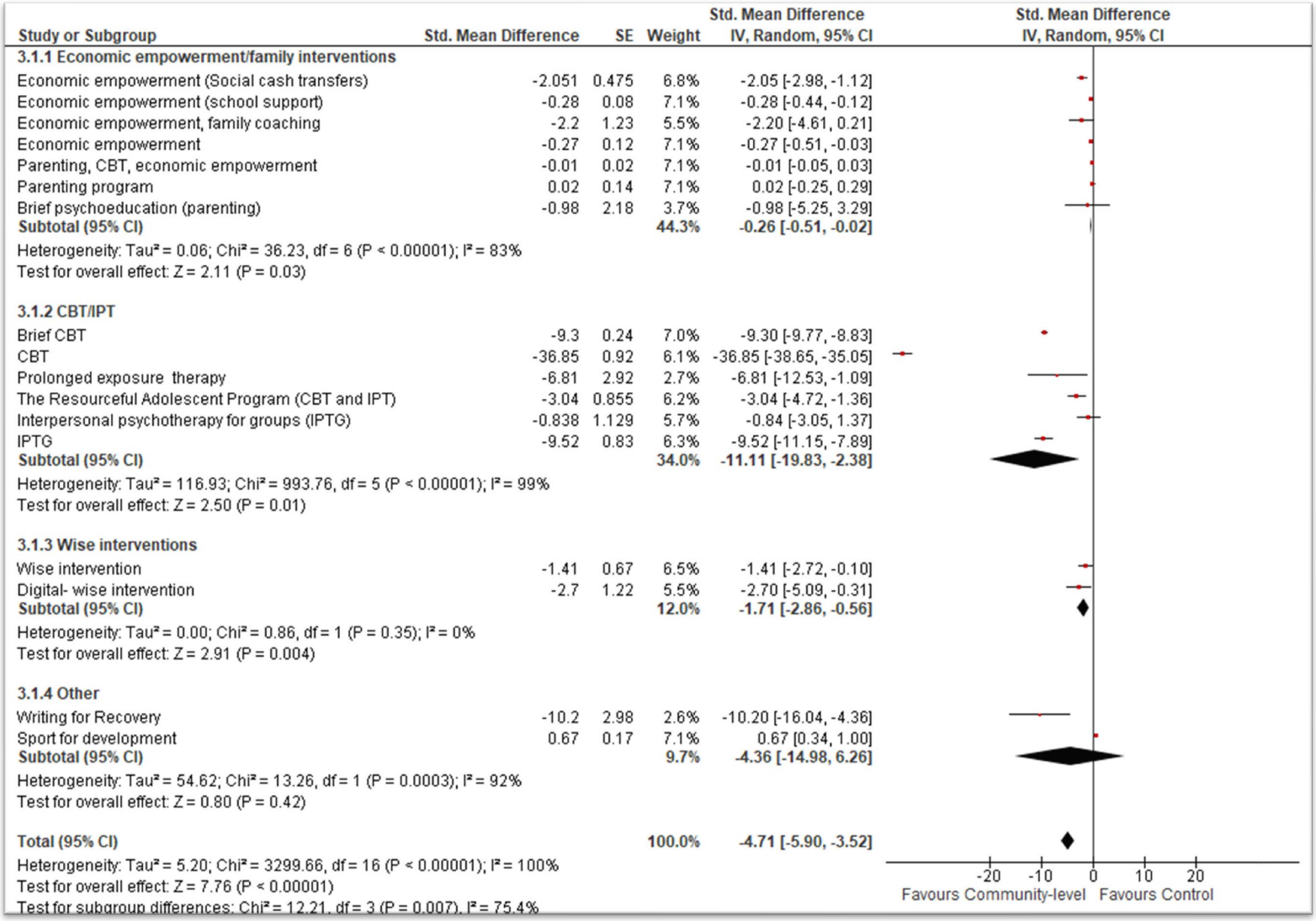
	Random sequence generation	Allocation concealment	Blinding of outcome assessment	Incomplete outcome data	Selective reporting	Baseline characteristics and outcome measurement	Other bias	Overall rating
Multilevel								
Ssewamala 2021	?	?	?	+	+	+	+	Unclear
Cavazos-Rehg 2020	+	?	?	?	+	+	+	Unclear
Han 2013	?	?	?	?	+	+	?	Unclear
Vreeman, 2019	?	?	-	+	?	+	+	High
Dow 2020	+	?	+	+	+	+		Low
Kumakech, 2009	+	?	+	-	?	+	-	High
Thurman 2017	+	?	+	+	+	+		Low
Unterhitzenberger, 2014	+	?	--	+	?	+		High
O'Callaghan 2013	+	+	+	+	+	+		Low
McMullen 2013	+	+	+	+	+	+		Low
Community-level								
Green 2019	+	?	+	+	+	+	+	Low
Ismayilova 2018	+	?	+	+	+	+	+	Low
Cluver 2018	+	?	+	+	+	?	+	Low
Rossouw, 2018	+	?	+	+	+	+		Low
Betancourt 2012	+	?	+	+	+	+		Low
Getanda, 2020	?	?	?	+	?	+		Unclear
Thurman 2017	+	?	+	+	+	+	+	Low
McMullen 2018			+	-	?	?	-	High
Rivet-Duval 2011	?	?	-	+	?	+		High
Ede 2020	+	?	+	+	+	+		Low
Richards 2014	?	+	+	+	+	+		Unclear
Eifediyi 2018			?	+	?	?	-	High
Osborn 2020	+	?	?	+	+	+		Unclear
Berger 2018	+	?	+	?	?	+	+	Unclear
Jordans 2013			?	-	?	+	+	High
Osborn 2020	?	?	+	+	+	+		Unclear
Bella-Awusah 2016	?	?	?	+	?	+	-	High
Kilburn 2016	?	+	-	+	?	?	+	High
Angeles 2019	?	?	?	+	?	?	+	Unclear
Puffer 2016	?	?	?	+	?	-	+	High

+	Low risk
-	High
?	Unclear
	Not applicable

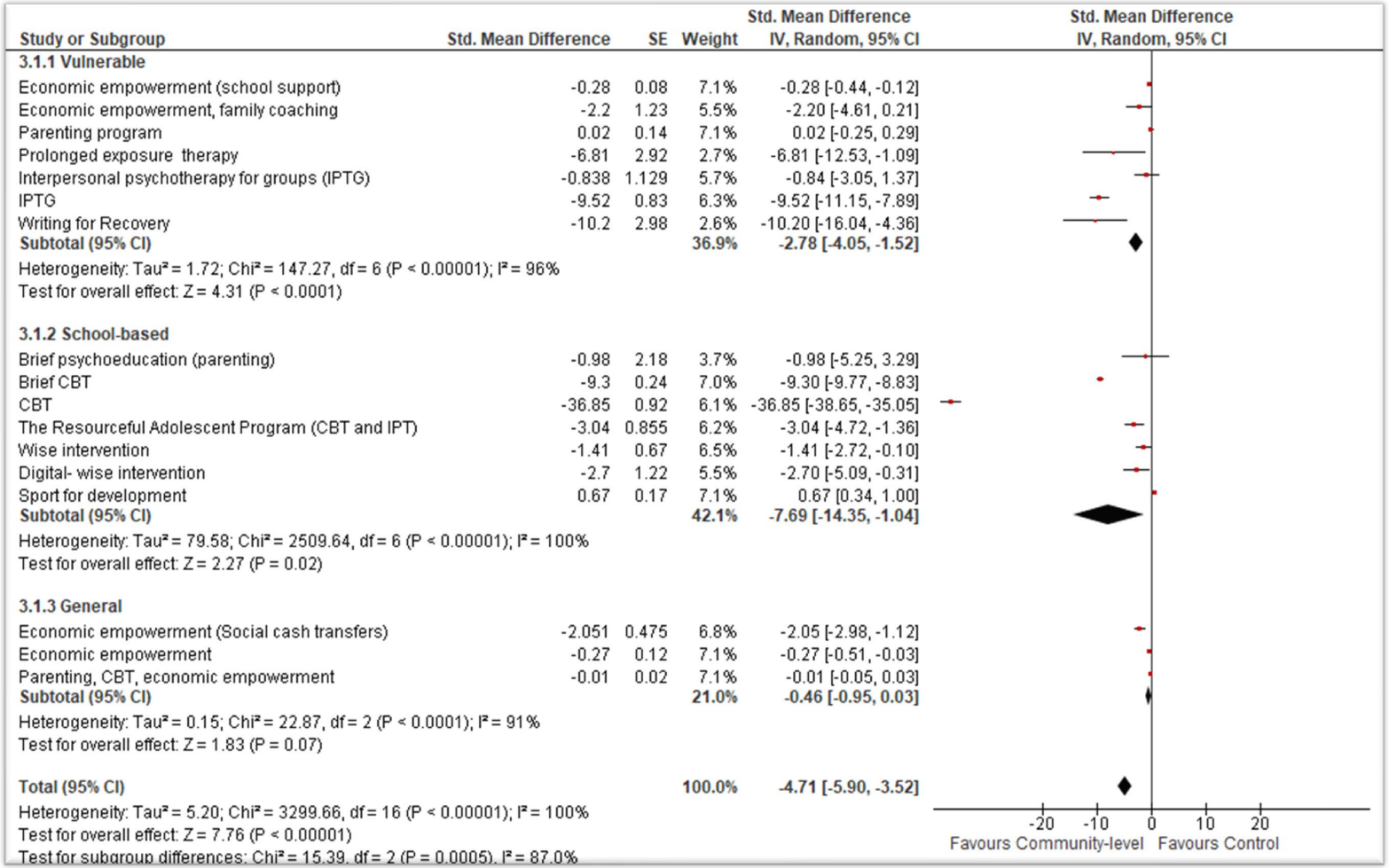


O'Callaghan 2013, McMullen 2013

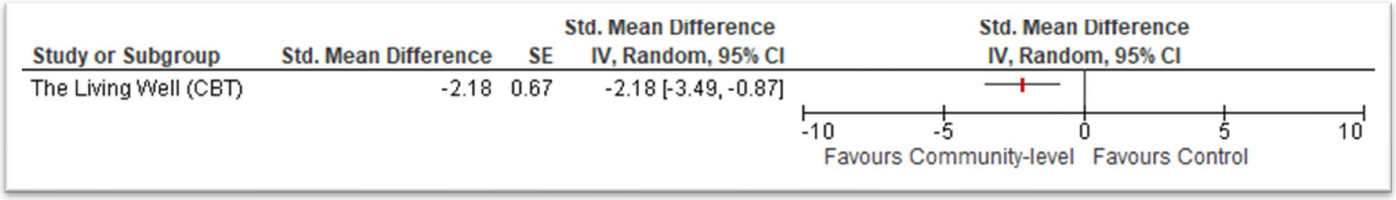
S1 Figure. Effect of multi-level interventions on depression and anxiety-like symptoms


Study or Subgroup
Std. Mean Difference
SE
Weight
Std. Mean Difference IV, Random, 95% CI
Std. Mean Difference IV, Random, 95% CI
3.1.1 Economic empowerment/family interventions
Economic empowerment (Social cash transfers) -2.051 0.475 6.8% -2.05 [-2.98, -1.12]
Economic empowerment (school support) -0.28 0.08 7.1% -0.28 [-0.44, -0.12]
Economic empowerment, family coaching -2.2 1.23 5.5% -2.20 [-4.61, 0.21]
Economic empowerment -0.27 0.12 7.1% -0.27 [-0.51, -0.03]
Parenting, CBT, economic empowerment -0.01 0.02 7.1% -0.01 [-0.05, 0.03]
Parenting program 0.02 0.14 7.1% 0.02 [-0.25, 0.29]
Brief psychoeducation (parenting) -0.98 2.18 3.7% -0.98 [-5.25, 3.29]
Subtotal (95% CI) 44.3% -0.26 [-0.51, -0.02]
Heterogeneity: Tau² = 0.06; Chi² = 36.23, df = 6 (P < 0.00001); I² = 83%
Test for overall effect: Z = 2.11 (P = 0.03)
3.1.2 CBT/IPT
Brief CBT -9.3 0.24 7.0% -9.30 [-9.77, -8.83]
CBT -36.85 0.92 6.1% -36.85 [-38.65, -35.05]
Prolonged exposure therapy -6.81 2.92 2.7% -6.81 [-12.53, -1.09]
The Resourceful Adolescent Program (CBT and IPT) -3.04 0.855 6.2% -3.04 [-4.72, -1.36]
Interpersonal psychotherapy for groups (IPTG) -0.838 1.129 5.7% -0.84 [-3.05, 1.37]
IPTG -9.52 0.83 6.3% -9.52 [-11.15, -7.89]
Subtotal (95% CI) 34.0% -11.11 [-19.83, -2.38]
Heterogeneity: Tau² = 116.93; Chi² = 993.76, df = 5 (P < 0.00001); I² = 99%
Test for overall effect: Z = 2.50 (P = 0.01)
3.1.3 Wise interventions
Wise intervention -1.41 0.67 6.5% -1.41 [-2.72, -0.10]
Digital- wise intervention -2.7 1.22 5.5% -2.70 [-5.09, -0.31]
Subtotal (95% CI) 12.0% -1.71 [-2.86, -0.56]
Heterogeneity: Tau² = 0.00; Chi² = 0.86, df = 1 (P = 0.35); I² = 0%
Test for overall effect: Z = 2.91 (P = 0.004)
3.1.4 Other
Writing for Recovery -10.2 2.98 2.6% -10.20 [-16.04, -4.36]
Sport for development 0.67 0.17 7.1% 0.67 [0.34, 1.00]
Subtotal (95% CI) 9.7% -4.36 [-14.98, 6.26]
Heterogeneity: Tau² = 54.62; Chi² = 13.26, df = 1 (P = 0.0003); I² = 92%
Test for overall effect: Z = 0.80 (P = 0.42)
Total (95% CI) 100.0% -4.71 [-5.90, -3.52]
Heterogeneity: Tau² = 5.20; Chi² = 3299.66, df = 16 (P < 0.00001); I² = 100%
Test for overall effect: Z = 7.76 (P < 0.00001)
Test for subgroup differences: Chi² = 12.21, df = 3 (P = 0.007), I² = 75.4%
-20
-10
0
10
20
Favours Community-level
Favours Control

S2 Figure. Effect of community-level interventions on depression, by type of intervention



S3 Figure. Effect of community-level interventions on depression, by type of participants



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S4 Figure. Effect of community-level interventions and depression and anxiety-like symptoms

S7 Table. Quality of Evidence

Outcome	Risk of bias	Imprecision	Inconsistency	Indirectness	Level of certainty	Justification
Multi-level interventions						
Depression	not serious	not serious	serious	not serious	moderate	Eight studies measured depression. Two studies did not blind outcome assessors. There was inconsistency in the direction of effect that could not be explained. Therefore, the quality of evidence was downgraded to moderate
Anxiety	serious	not serious	N/A	not serious	low	There is only one study that measured anxiety. The quality of evidence was downgraded to low due to high attrition rate in the control group and failure to account for clustering of participants in the analysis.
PTSD	not serious	serious	not serious	not serious	moderate	Three studies measured PTSD. Two studies observed reduction in PTSD symptoms, however, their sample sizes were below 100. Thus, the quality of evidence was downgraded to moderate
Depression and anxiety-like symptoms	not serious	serious	not serious	not serious	moderate	Two studies measured this outcome, and both have small sample sizes. Thus, the quality of evidence was downgraded to moderate
Community-level interventions						
Depression	not serious	not serious	not serious	not serious	high	Seventeen studies measured depression. The majority of studies showed positive intervention effect, however, the effect sizes for studies that delivered economic empowerment or parenting intervention had small effect sizes than studies that delivered CBT or IPT interventions. The quality of evidence was not downgraded.

S7 Table. (continued)

Outcome	Risk of bias	Imprecision	Inconsistency	Indirectness	Level of certainty	Justification
Anxiety	not serious	not serious	not serious	not serious	high	Six studies measured anxiety. Majority of studies (n=4) had adequate sample sizes and reported positive effect of intervention on anxiety. The quality of evidence was rated as high.
PTSD	not serious	serious	not serious	not serious	moderate	Three studies measured PTSD. Two of these studies have sample sizes smaller than 100. Although one study did not show significant effect on PSTD, the effect sizes were in the same direction and therefore the evidence rated as moderate and not downgraded due to inconsistency.
Depression and anxiety-like symptoms	serious	not serious	N/A	not serious	low	Only one study measured this outcome. The quality of evidence was downgraded to very low due to high risk of bias. The study had high attrition rate and did not show how confounding was dealt with since the study design was non-randomised study. The quality of evidence was downgraded to low.
Substance abuse	not serious	not serious	N/A	not serious	high	Only one study measured substance abuse. The study had adequate sample size and addressed our review objectives. Hence, the quality of evidence was not downgraded.