Statistical Analysis Plan (SAP)

Title	SYV: A Mental Health Intervention to Improve HIV Outcomes in Tanzanian Youth (NCT05374109)
CRU/Department/Division/Center	Duke Global Health Institute
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Investigators:	
Lead Investigator	Dorothy Dow
Site specific principal investigator	Getrud Mollel (Ifakara Health Institute) Lilian Komba (Baylor Center of Excellence, Mbeya) Blandina Mmbaga (Kilimanjaro Christian Medical Centre, Moshi) Eunice W. M. Ketang'enyi (Baylor Center of Excellence, Mwanza)
Co-authors (if known)	
Biostatistician(s)	John Gallis, David Arthur
Supervising Biostatistician	Liz Turner
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Investigator Agreement

☒ All statistical analyses included in an abstract or manuscript should reflect the work of the biostatistician(s) listed on this SAP. No changes or additional analyses should be made to the results or findings without discussing with the project biostatistician(s).

☒ All biostatisticians on this SAP should be given sufficient time to review the full presentation, abstract, manuscript, or grant and be included as co-authors on any abstract or manuscript resulting from the analyses.

☒I have reviewed the SAP and understand that any changes must be documented.

Acknowledged by: Dorothy Dow
Date: May 21, 2025

12/02/2022 – Minor updates

Activity Log	3/17/2023 – Adding language around sensitivity analysis for different cutoffs 8/11/2023 – Combining Dorothy's and John's edits 9/25/2023 – Minor updates 10/02/2023 – Updating mental health difficulties definition based on March 2023 meeting notes 01/04/2024 – Adding table shells; finalizing statistical plan 01/26/2024 – Adding information on dose response analysis 10/18/2024 – Updated and cleaned up the analysis section and the appendix table shells 12/13/2024 – Updating analysis based on discussion at team meeting 01/21/2025 – Further review 01/23/2025 – Final edits to send to Dorothy 04/15/2025 – Updates after Liz's comments and further discussion 04/18/2025 – Finalizing some minor edits; updated stats analysis based on discussion to adjust for predictors of missingness (rather than propensity score) and also adjust for chance imbalance as sensitivity analyses. 05/14/2025 – Additional updates and edits after meeting between Liz, John, and David. 05/21/2025 – Dorothy acknowledged final SAP

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1. Purpose and scope

This document provides the plan of analysis (statistical analysis plan) for an NIH-funded individually randomized group treatment (IRGT) trial in Tanzania to assess the impact of the SYV intervention to improve HIV Outcomes in Tanzanian Youth. This plan covers the primary analysis comparing intervention arms at the six-month primary time point. The funding runs through end of January 2026.

2. Background of the trial

Young people living with HIV (YPLWH, 10-24 years of age) are a growing population that experience unique mental health challenges that may compromise their HIV care. Despite the clear need, few evidence-based mental health interventions exist to address the difficulties faced by this important population. The goal of our research is to provide a developmentally appropriate, evidence-based mental health intervention that effectively helps YPLWH cope with life challenges, instill hope for the future, and find motivation to adhere to their antiretroviral therapy medication leading to improved HIV outcomes. Sauti ya Vijana (SYV, The Voice of Youth), is a novel and innovative group-based mental health and life skills intervention designed with and for Tanzanian YPLWH to address the mental health and life challenges they have described in our prior research.

The study is conducted at four sites in Tanzania (Moshi, Mbeya, Mwanza, Ifakara).

3. Description of the trial

3.1 Intervention

The SYV intervention is described in detail in the protocol.[1] In brief, Sauti ya Vijana (SYV, The Voice of Youth) is a mental health and life skills intervention specifically tailored to the needs of YPLWH in Tanzania. Over the course of approximately 12 weeks, SYV includes 10 group sessions lasting approximately 90 minutes and two individual sessions delivered by trained young adult group leaders who use a manualized protocol that is designed to scale in low resource settings. YPLWH randomized to the SYV arm will also be invited to a booster session after the 12-month study visit to evaluate if a booster session may enhance intervention effect over time.

3.2 Control

The enhanced standard of care (SOC) at all sites includes all sites offering an adolescent HIV clinic from which participants will be recruited. All sites offer antiretroviral therapy for free, have dolutegravir, a newer formulary medication available as of June 2019, and the ability to test viral load as standard of care and in a quality assured laboratory for research purposes.

Participants randomized to the enhanced standard of care (SOC) arm will continue routine care as usual, with the addition of study visits at outcome assessment timepoints (4-, 6-, 12-, and 18-month follow-up). This arm is considered “enhanced” SOC due to the potential benefit of being referred for additional mental health care based on the outcome assessment study visits. They will not meet in groups as part of the study, but will continue to meet in standard of care adolescent HIV clinic groups.

3.3 Sample

- **Inclusion criteria**: youth between the ages of 10 and 24 years of age, who are attending the enrolling adolescent HIV clinic and are receiving ART for a minimum of 6 months; if > 18 years, able to understand the project and provide written, informed consent; if < 18 years, a parent or guardian must provide written permission and participant must be able to assent; all adolescents must also commit to attending the 10 weekly SYV sessions (2 with invited caregivers) and 2 individual sessions.
- **Exclusion criteria**: active psychosis, developmental delay, or cognitive disability that precludes active participation in consent process, intervention, and assessment interviews.

3.4 Principal research objectives and hypotheses to be addressed

- Primary aim: Evaluate the effectiveness of SYV to support positive coping strategies that bolster mental health and lead to improved HIV outcomes among YPLWH.
- Primary hypothesis: The proportion of participants virologically suppressed (viral load < 400 copies/mL) at 6 months post-baseline will be higher in the SYV arm than in the enhanced SOC arm.
- Secondary hypotheses: Antiretroviral therapy (ART) adherence and mental health outcomes will be better in the SYV arm than in the enhanced SOC arm.

3.4.1 Primary and secondary outcomes

The primary and secondary outcomes are shown in **Tables 1a and 1b**. The primary HIV outcome is virologic suppression (VS; viral load < 400 copies/mL) at 6 months post-baseline. Secondary outcomes include log viral load, adherence to ART, and mental health measures including stigma, resilience, coping, and change in HIV knowledge. The assessment time points are T_0, T_1, T_2, T_3, and T_4 (baseline, 4-, 6-, 12-, 18-month follow-up). The primary outcome time point is 6 months.

3.4.2 Primary outcome

Table 1a: Primary outcome

Domain	Construct	Tool	Specifications	Administration				
				T_0	T_1	T_2	T_3	T_4
Behavioral Health Outcome	Virologic Suppression	Viral load (measured in HIV RNA copies/mL) < 400	Binary	✓	✓	✓	✓	

3.4.3 Secondary outcomes

Table 1b: Secondary outcomes

Domain	Construct	Tool	Specifications		Administration				
					T_0	T_1	T_2	T_3	T_4
Behavioral Health Outcomes	Log viral load	Natural logarithm of viral load (measured as copies of HIV RNA per mL)	Continuous		✓	✓	✓	✓	
	Adherence	Self-report, 3 questions[2]	Continuous		✓	✓	✓	✓	✓
		ART levels in hair[3]	Continuous		✓		✓		
	Behavior	Sexual activity and condom use	Binary		✓	✓	✓	✓	✓
		Disclosure to sexual partner	Binary		✓	✓	✓	✓	✓
		Substance use	Binary		✓	✓	✓	✓	✓
Self and social regulation	Mental Health	Patient Health Questionnaire (PHQ-9)[4,5]	Continuous and binary		✓	✓	✓	✓	✓
		Adverse Childhood Events-International Questionnaire and UCLA Trauma Reaction Index survey[6,7]	Continuous and binary		✓	✓	✓	✓	✓
		Generalized Anxiety Disorder-7 Questions (GAD-7)[8]	Continuous and binary		✓	✓	✓	✓	✓
		Mental Health Difficulties (PHQ-9 ≥ 10 or GAD-7 ≥ 10)**	Binary		✓	✓	✓	✓	✓
	Coping	Coping Self-Efficacy[9]	Continuous		✓	✓	✓	✓	✓
	Resilience	People Living with HIV Resilience Scale[10]	Continuous		✓	✓	✓	✓	✓
		Rosenberg Self-Esteem[11]	Continuous		✓	✓	✓	✓	✓
	Stigma	10 question stigma scale[12]	Continuous		✓	✓	✓	✓	✓
	Quality of Life	WHOQOL-HIV-BREF[13]	Continuous		✓	✓	✓	✓	✓
	Disclosure	Purposefully disclosed to someone new (if yes, who and why)	Binary		✓	✓	✓	✓	✓
	HIV knowledge	HIV knowledge[15]	Continuous		✓	✓	✓	✓	✓
	Retention in Care	Study visit status/chart information standard of care viral load	Binary		✓	✓	✓	✓	✓

*T_0: Baseline; T_1: 4 months; T_2: 6 months; T_3: 12 months; T_4: 18 months

**Include sensitivity analysis with Mental Health Difficulties defined as PHQ-9 ≥ 10 or GAD-7 ≥ 10 or UCLA ≥ 35

3.4.4 Exploratory outcomes

Exploratory outcomes include viral genotype testing (if HIV RNA ≥400 copies/mL) and biologic markers of inflammation, both measured using blood samples if future funding is secured.

3.4.5 Covariates of interest

The primary analysis will be adjusted for the randomization stratification variables (see section 3.5), and for other baseline variables as described in section 4.1. Additionally, effect modification will be explored by age, sex, site, and severity of mental health symptoms at baseline (i.e. PHQ-9 ≥ 10 or GAD-7 ≥ 10 or PHQ-9 9th question indicator of suicidality [a 2 or a 3 selected]).

3.5 Randomization

We will individually randomize up to 750 participants divided across the four sites to receive the SYV intervention or enhanced standard of care. Randomization will occur by computer-generated permuted blocks of size 4 generated using SAS software. Randomization will be performed separately at each site, and stratified by sex and enrollment HIV RNA (<400 copies/mL or ≥400 copies/mL) to ensure balance on these variables. For participants who do not have study lab values of HIV RNA at randomization (due to delays in lab processing or other reasons), we will use their most recent HIV RNA value from their medical records.

Note that the randomization is implicitly stratified by site, and that all groups are single-gender. Since the intervention will be implemented in four waves (see section 3.7), the randomization is also implicitly stratified by wave. Those randomized to receive the SYV intervention will be assembled into 33 groups of 10-11 participants per group, across 4 sites. Those randomized to enhanced SOC will continue routine care, which will be clearly defined by each site. The outcomes assessor and statisticians will be masked to participant study arm through the 6-month study visit (primary aim).

3.6 Sample size calculation

We will individually randomize up to 700-750 participants divided across the four sites to receive the SYV intervention or enhanced standard of care across four sites in Tanzania. This sample size calculation is based on a plausible proportion of 80% viral suppression (VS) in enhanced standard of care and 90% VS in SYV intervention at the primary time point (6-months post-baseline (T2)). In our pilot trial, the VS rate at follow-up was 65% in SOC and 75% in SYV. Because the roll-out of dolutegravir and other factors may lead to increased baseline VS rates, here we assume a reference rate of 80% VS in SOC at 6-months post-baseline. We also assume a conservative ICC estimate of 0.04 (noting that the ICC for viral suppression was ~0.04 in the pilot data), and assume because of dropout 8 participants per group in the SYV intervention would have data available for analysis at T2. With these assumptions, we have 90% power at a two-tailed significance (alpha) level of 0.05 to detect this 10-percentage point effect with 264 participants (33 groups of 8 participants each) in intervention and 311 participants in enhanced standard of care (575 participants). Assuming 10% attrition by the primary time point in both arms (noting the 91% retention rate in the pilot trial), we increase the group size in intervention to 9 (297 participants in 33 groups) and the number of participants in standard of care to 346, which leads to a final total sample size of 643 across both arms (**Table 2**, below). We used a power calculation specifically designed to account for the individually randomized group treatment trial design.[16] Moreover, we note that for this study design, the statistical power formula results in unequal sample sizes (i.e., larger sample size in enhanced SOC) because of clustering in the intervention arm. In practice, we will increase the number of participants in each group in the intervention arm to 10-11 (49 additional participants spread across the 33 groups), thus eliminating the imbalance between arms, so that there are 346 participants in intervention and 346 in control. We may also increase sample size later in the trial if dropout in earlier waves exceeds 10%.

Table 2: Power for expected effect size for primary outcome of Aim 1.

	Original	Equal N per arm
Power	90%	>90%
Alpha	5%	5%
Dropout Rate	10%	10%
Proportion VS* in SYV Intervention	90%	90%
Proportion VS in Standard of Care	80%	80%
Intra-cluster correlation (ICC)	0.04	0.04
Number of participants per group	9	10-11
Number of participants in SYV	297	346
Number of participants in enhanced SOC	346	346
Total Number of participants**	**643**	**692**

*VS = Virologically suppressed; **Number recruited and randomized

3.7 Time of outcome assessment and visit windows

The intervention will be rolled out across four main sites, in four different Tanzanian regions, and in four waves separated in time by 6 months (see timeline in Appendix A2). There will be two SYV groups per wave at each site (~8 groups per site). A study visit for all participants will be conducted at baseline (T_0) and approximately 4 months (T_1), 6-, 12-, and 18-months post-baseline (T_2, T_3, T_4) with 6-months post baseline being the primary endpoint. Visits will occur within a 4-week window for each timepoint (the target date +/- 2 weeks). Participants who cannot come during the 4-week window miss the visit. For the 18-month timepoint only, participants who cannot come in person will have the option to complete a phone interview.

3.8 Data management

Each site will have an internet technology and data management specialist available on site to supervise data collection and management. A data architect will work closely with all site teams and statisticians to coordinate the multifaceted data collection apparatus, including the multiple platforms (REDCap mobile, NVivo, Box) used to collect and manage data. The data manager will oversee data collection workflow, implement data quality controls, report on data collection progress, align data encoding with the statistical analysis plan to reduce the data cleaning burden on statisticians, and maintain metadata such as data dictionaries for a future data repository deposit. A data transfer agreement has been signed across all sites with investigators. Final analysis data will be transferred to and stored in Duke Box.

4. Data analysis plan

Statistical analysis will be conducted according to the CONSORT guidelines.[13,14] A flow chart will show the participation of both intervention and control arms in terms of eligibility screening, recruitment, and follow-up status. All analyses will focus on comparison of the two arms.

Characteristics of recruited participants will be reported by study arm. Continuous variables will be summarized by means and standard deviation (SD), or medians and the 25th and 75th percentile, if needed. Categorical variables will be summarized by counts and percentages. Distributions of outcomes will also be explored using graphical techniques such as box plots and histograms.

4.1 Analysis of primary and secondary outcomes

The primary and secondary analyses are designed as intent-to-treat and will be conducted using Stata/SE 18.0 and R 4.4.1.[16] The analyses covered by this statistical analysis plan will use data at baseline and at 6 month follow-up. In order to estimate risk differences and risk ratios comparing virologic suppression (and other binary outcomes) in SYV vs. enhanced SOC, we will use modified Poisson generalized estimating equation (GEE) models (with identity link and log link, respectively) to examine the effect of intervention on virologic suppression at the six-month follow-up time point. The GEE models will take into account clustering using an independence working correlation with robust standard errors to avoid bias in estimating the treatment effects.[17,18] The robust standard errors will be further adjusted for potential "small-sample" bias because there are fewer than 50 clusters.[19] We plan to adopt the use of the Kauerman and Carroll correction[20] if coefficient of variation of cluster size (at the six month follow-up time point) is smaller than 0.6 and Fay and Graubard correction[21] otherwise, to avoid any possible problems.[22] A priori, we expect the coefficient of variation to be small given that the group sizes are at most 11-12 participants and we do not expect highly variable drop-out rates by group.

Although there will be no group delivery of intervention in the control arm and therefore no clustering due to group is anticipated, in order to access the desirable properties of equal cluster sizes across arms and to mirror how recruitment and randomization will occur (i.e. by site and by wave), we will model pseudo-clusters in the enhanced SOC arm by grouping all control participants who were randomized at the same time as each group in the SYV arm.[23-26]

As a supplementary analysis, we may use a second set of estimating equations to estimate the correlation parameters. Specifically, we will use the matrix-adjusted estimating equation (MAEE) approach rather than the standard method of moments approach typically used in GEE. Together, we refer to GEE combined with MAEE as the paired GEE/MAEE approach.[27] By using a second set of estimating equations, we will be able to directly estimate the correlation parameters as well as corresponding 95% confidence intervals. Moreover, by using MAEE as the second set of estimating equations, we will be able to minimize the finite-sample bias expected for the correlation parameters themselves. Additionally, by applying finite-sample corrections to the standard errors, we can obtain confidence intervals with better coverage.

For continuous secondary outcomes, we will use the same GEE methods discussed above but will use a Gaussian distribution with identity link to obtain coefficients interpretable as mean differences between the SYV arm and enhanced SOC arm.

All analyses will be based on the intention-to-treat principle whereby all participants will be included in the analysis irrespective of their level of involvement in the intervention. All models will be adjusted for the randomization stratification variables (viral suppression, site, and sex), as is appropriate after stratified randomization.[28,29] Although baseline viral suppression status will be available as study lab values for all

participants by the time the data are analyzed, we will adjust for the version actually used in the randomization which is a combination of chart and lab values, to preserve adjustment of the actual stratification variable.[30] However, we will perform a sensitivity analysis where we adjust for baseline viral suppression based on the lab values. When analyzing the secondary outcome of log viral load, we will adjust for both the dichotomous viral suppression variable used in randomization and the log viral load from the lab values at baseline. In order to increase precision , all models will be adjusted for age, as age is expected to be related to the primary outcome.[31] Per the study timeline table, since randomization will also be implicitly stratified by wave, we will also adjust for wave.

While the primary analysis will adjust only for the variables specified in the paragraph above, we will also perform a sensitivity analysis for each outcome, using models that include additional adjustment for covariates of three other types that meet pre-specified criteria for inclusion. [31] Those three types are:

1. To increase precision of the intervention effect.
2. To account for chance imbalance in baseline covariates (i.e. chance confounding, despite the use of stratified randomization).
3. To account for missing outcome data.

Regarding precision, baseline covariates listed in Table 3 will be included in all models if the p-value for their association with viral suppression at baseline is less than 0.05.

Regarding chance imbalance between arms, given that this is an individually-randomized trial and that stratified randomization is used together with permuted blocks, it is highly unlikely that such chance imbalance will occur. Nevertheless, we will compare baseline characteristics between arms and include those as adjustors that are meaningfully different between arms ($p<0.05$).

Regarding missing data, baseline covariates predictive of missingness will be identified by assessing those (see Table 3) that are determined to be associated with dropout status at 6-month follow-up (i.e. missing primary outcome vs. not missing primary outcome). More specifically, variables whose association with dropout at 6 months has $p<0.05$ will be included as adjustors in the primary statistical model under the assumption of covariate-dependent missingness.[32] Furthermore, in the spirit of parsimony, since we wish to minimize the number of variables in the model, once we have a final list of variables for consideration from Table 3, we will carefully consider all variables to avoid inclusion of those that are collinear or otherwise redundant based on other variables in the list.

Table 3. Baseline covariates to consider for inclusion in sensitivity analysis statistical models

	Variable	**Include as adjustment covariate to improve precision**	**Include as adjustment if associated with missingness or chance imbalance**
Stratification variables	Viral suppression (as used in randomization)	Yes	N/A
	Site	Yes	N/A
	Wave	Yes	N/A
	Gender	Yes	N/A
	Age	Yes	N/A
	Primary caregiver	Assess*	Assess**
	Mother died	Assess*	Assess**
	Father died	Assess*	Assess**

Proxy SES	House has electricity	Assess*	Assess**
	House has indoor plumbing	Assess*	Assess**
	Participant owns a cellphone	Assess*	Assess**
Disclosure	Purposefully told	Assess*	Assess**
	Reports verbally disclosing HIV status to someone else	Assess*	Assess**
	A household member is living with HIV.	Assess*	Assess**
	In School	Assess*	Assess**
	Working outside the home	Assess*	Assess**
	Reports having sex	Assess*	Assess**
	Log viral load	Include for log viral load secondary outcome, assess for other outcomes*	Assess**
	Adherence (Wilson 3 question) Composite % excellent adherence mean (SD)	Assess*	Assess**
Depression, suicidality, and anxiety	PHQ 9	Assess*	Assess**
	Q9: Thoughts you would be better off dead or hurting yourself in some way (≥50% time)	Assess*	Assess**
	Report intentionally harmed self in the past	Assess*	Assess**
	Plans to harm self now	Assess*	Assess**
	If feeling sad, endorse they have someone to go to for help	Assess*	Assess**
	GAD 7 mean (SD)	Assess*	Assess**
ACEs* (Common)	Live with household member with substance misuse (Q6)	Assess*	Assess**
	Live with household member ever incarcerated (Q8)	Assess*	Assess**
	Difficulty accepting the news that you live with HIV "most of the time"	Assess*	Assess**
	UCLA trauma RI Total mean (SD)	Assess*	Assess**
	Mental health difficulties (PHQ-9 ≥10 or GAD-7 ≥10 or UCLA RI ≥18)	Assess*	Assess**
	Sexual abuse	Assess*	Assess**
	Ever had a girlfriend or boyfriend	Assess*	Assess**
	Instigator of physical violence to partner	Assess*	Assess**

	Instigator of both physical and sexual violence to partner	Assess*	Assess**
	HIV Knowledge (% correct)	Assess*	Assess**
	PLHIV Resilience	Assess*	Assess**
	Stigma	Assess*	Assess**
	Self esteem "On the whole, I am satisfied with myself" Agree+	Assess*	Assess**
	Self esteem score	Assess*	Assess**
	Self efficacy (CSE)	Assess*	Assess**
	Quality of life: rated good/very good	Assess*	Assess**
	Quality of life: satisfied with health	Assess*	Assess**

* Include in model if test of association with viral suppression at 6 months has $p<0.05$ ** Include in model if test of association with missing primary outcome at 6 months has $p<0.05$ or chance imbalance at baseline has $p<0.05$

Additionally, we will measure compliance (i.e., number of sessions attended in intervention arm) and spillover (i.e., amount of information from group sessions that control participants report having learnt).

Effect modification will be analyzed by including each moderator separately (age, sex, site, severity of mental health symptoms at baseline) in the primary outcome statistical model and including the interaction between intervention arm and the moderator. Exploratory analyses of participants randomized to SYV will compare outcomes according to degree of attendance to generate hypotheses around potential dose-response relationships. We will explore this "dose response" relationship by splitting the intervention arm into two groups: those who attended session 3 (consistently ranked as the most impactful session) and those who did not. We will also split the intervention arm by those who attended at least 80% of sessions (missed fewer than 3 sessions).

Sensitivity analyses will be performed comparing the primary outcome analyses to a cutoff of ≥50 and ≥200 copies/mL viral load.

A sensitivity analysis will also be performed to examine spillover (i.e., amount of information from group sessions that control participants learn), in which we exclude participants in the enhanced SOC arm who answer "yes" at 6-month follow-up to the question "Have you heard about the cognitive behavior therapy (CBT) triangle?"

4.1.1 ART Adherence

The secondary outcome of adherence will be measured by self-reported adherence and by ART levels in hair samples, with the latter measured by tenofovir level (a continuous outcome, as a proxy for dolutegravir adherence). Although the protocol was to collect hair samples from all participants, in practice, due to budgetary limitations and hair sample availability the lab will determine tenofovir levels in the hair of a subsample of study participants. More specifically, in each arm, we will sample all participants who had viral failure at baseline and/or at 6 months, with viral failure defined as a viral load of at least 200 copies/mL for this analysis (note that this is distinct from the primary outcome with a cut-off of 400 copies/mL used). For each participant with viral failure included in the subsample, we will also sample one participant without viral failure, attempting to match by group (SYV group or pseudo-cluster group), by gender, by arm, and by wave.

Given that selection to this subsample is related to the study outcome, it will be necessary to weight all analyses of the sub-sample data according to probability of selection to this sub-sample. Key variables to be used in calculating the probability of selection will be viral failure status, sex, arm and wave. We will include these as predictors of selection in a logistic regression model. The predictions from these logistic regression models will then be used as the propensity scores of selection into the sample. We will include the inverse of these propensity scores (as inverse probability weights) in the analysis model for hair-based adherence (i.e. ART, measured by tenofovir levels) as the outcome. We will use a method that trims the weights (such as overlap weighting[33]) to avoid extreme weights unduly influencing the results.

5. Appendix

5.1 Appendix A

5.1.1 Appendix A1: CONSORT flow-chart

Below is the CONSORT flow-chart from the SYV pilot longitudinal paper. The one for the SYV main trial will look similar to this one, but there will be no crossover participants.

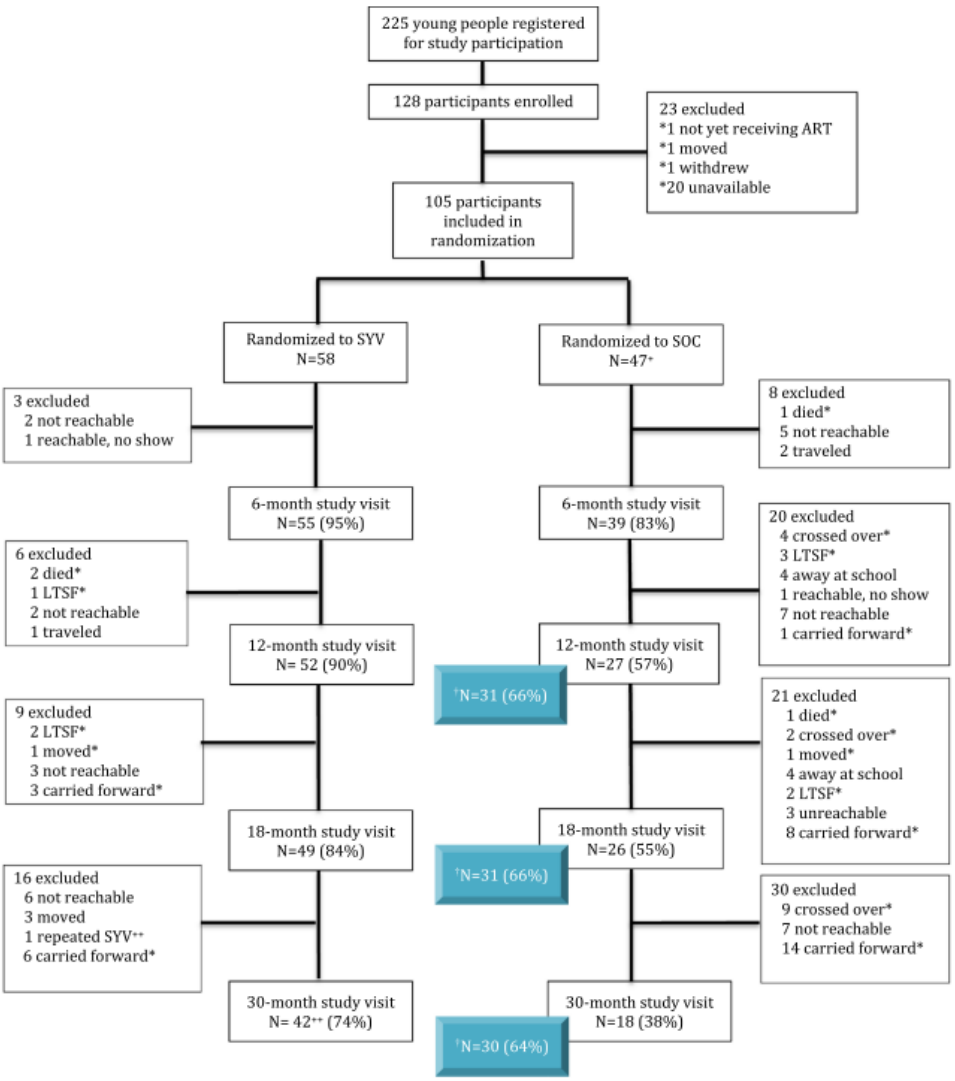

Fig. 1 CONSORT flow diagram showing the number of participants excluded at each study visit compared to participants at randomization. +1 participant missing baseline data, but study enrollment data available 6-months prior to intervention start. ++1 participant did not complete SYV intervention and joined a later cross-over wave. *did not contribute data at future time points (4 died (2 SOC & 2 SYV); 8 were lost to study follow up (LTSF); †Shaded in blue: 15 crossed over during the timeframe of study follow-up. If data available from the cross-over group follow-up visits were included then the 12-month study follow-up would be 66%; 18-month study follow up would be 66%; 30-month follow up would be 64%

5.2 Appendix A2: Study timeline

		Randomized Controlled Trial														
		Year 3 (Feb 2023)						Year 4 (Feb 2024)					Year 5			
		Mar	Apr-Jun	Jul	Aug	Sept - Nov	Dec -Jan	Feb	Mar - May	Jun July	Aug - Oct	Nov-Jan	Feb-Apr	May-July	Aug - Oct	Nov-Jan
		2	3 - 5	6	7	8-10	11-12	1	2 - 4	5-6	7-9	10-12	1-3	4-6	7-9	10-12
Wave 1	SYV	T_0	**SYV**	T_1		T_2			T_3*		T_4					
	SOC	T_0		T_1		T_2			T_3		T_4					
Wave 2	SYV				T_0	**SYV**	T_1	T_2			T_3*		T_4			
	SOC				T_0		T_1	T_2			T_3*		T_4			
Wave 3	SYV							T_0	**SYV**	T_1	T_2		T_3*		T_4	
	SOC							T_0		T_1	T_2		T_3*		T_4	
Wave 4	SYV									T_0	**SYV**	T_1 T_2		T_3*		T_4
	SOC									T_0		T_1 T_2		T_3*		T_4

5.3 Appendix B: Shell tables for main analysis

Table B1.1. Sample characteristics for all participants.

Characteristic	Fake Arm		
	Enhanced SOC N = 353[1]	SYV N = 337[1]	Overall N = 690[1]
Viral suppression status used for randomization			
Not suppressed (≥ 400)			
Suppressed (< 400)			
Missing			
Site enrolled			
ifakara			
mbeya			
moshi			
mwanza			
Wave			
wave 1			

Characteristic	Fake Arm		
	Enhanced SOC N = 353[1]	SYV N = 337[1]	Overall N = 690[1]
wave 2			
wave 3			
wave 4			
Gender			
male			
female			
Age (years)			
Primary caregiver			
biological parent (mother or father)			
mama mkubwa, mama mdogo, shangazi, baba mkubwa, baba mdogo, au mjomba			
grandmother or grandfather			
brother or sister			
other			
Mother died			
Father died			
House has electricity			
House has indoor plumbing			
Participant owns a cellphone			
Reports being purposefully told HIV status			
Reports verbally disclosing HIV status to someone else			
A household member is living with HIV.			
In school			
Working outside the home			
Missing			
Reports having sex			
Log viral load			
Missing			
Adherence (Wilson 3 question) Composite % excellent adherence			
Total PHQ-9 score			

Characteristic	Fake Arm		
	Enhanced SOC N = 353[1]	SYV N = 337[1]	Overall N = 690[1]
PQH9 Q9: Thoughts you would be better off dead or hurting yourself in some way (≥50% time)			
Report intentionally harmed self in the past			
Plans to harm self now			
If feeling sad, endorse they have someone to go to for help			
Missing			
Total GAD-7 score			
Live with household member with substance misuse (ACE Q6)			
Live with household member ever incarcerated (ACE Q8)			
Difficulty accepting the news that you live with HIV 'most of the time'			
UCLA PTSD Total Score (mean imputation)			
Mean (SD)			
Median [Q1, Q3]			
Missing			
Mental Health Difficulties (PHQ-9≥10 | GAD-7≥10 | UCLA≥35)			
Missing			
Sexual abuse			
Ever had a girlfriend or boyfriend			
Instigator of physical violence toward partner			
Missing			
Instigator of physical violence AND sexual violence toward partner			
Missing			
HIV Knowlege Test Percent Correct			
PLHIV Resilience			
Total Stigma score			
On the whole, I am satisfied with myself			
Self-esteem total score (0-30 range)			
Self efficacy (CSE)			
Quality of life: rated good/very good			
Quality of life: satisfied with health			

Characteristic	Fake Arm		
	Enhanced SOC N = 353[1]	SYV N = 337[1]	Overall N = 690[1]
Used condom last sex			
Missing			
Ever disclosed HIV to partner			
Missing			
Consumed alcohol last 6 months			
Used drugs last 6 months			

[1]n (%); Mean (SD)

Table B1.2. Outcome variables at baseline.

Characteristic	Fake Arm		
	Enhanced SOC N = 353[1]	**SYV** N = 337[1]	**Overall** N = 690[1]
[derived-lab only] Viral suppression (lab values)			
Not suppressed (>= 400)			
Suppressed (< 400)			
Missing			
[sexual_history_and_health] Q4. The last time you had sex, did you or your partner use a condom?			
no			
yes			
Missing			
[sexual_history_and_health] Q5. Have you ever disclosed your HIV status verbally to a sexual partner?			
no			
yes			
Missing			
[recreation] Q1. In the past 6 months, have you consumed any alcoholic beverages?			
no			
yes			
[recreation] Q4. In the past 6 months, have you smoked tobacco, sniffed glue, or used other drugs?			
no			
yes			
[enrollment] Q42. Have you ever disclosed your HIV status verbally to another person?			
no			
yes			
[who_qol] Q1. How would you rate your quality of life?			
very poor			
poor			

Characteristic	Fake Arm		
	Enhanced SOC N = 353[1]	SYV N = 337[1]	Overall N = 690[1]
neither poor nor good			
good			
very good			
[who_qol] Q2. How satisfied are you with your health?			
very dissatisfied			
dissatisfied			
neither satisfied nor dissatisfied			
satisfied			
very satisfied			
[derived-lab only] Log viral load			
Mean (SD)			
Median [Q1, Q3]			
Missing			
Self-reported adherence (Wilson et al. scale)			
Mean (SD)			
Median [Q1, Q3]			
[biomed] Q10. What was the NORMALIZED drug concentration in the hair (Ng/mg)?			
Mean (SD)			
Median [Q1, Q3]			
Missing			
Total PHQ-9 score			
Mean (SD)			
Median [Q1, Q3]			
UCLA PTSD Total Score (mean imputation)			
Mean (SD)			
Median [Q1, Q3]			
Total GAD-7 score			
Mean (SD)			
Median [Q1, Q3]			

Characteristic	Fake Arm		
	Enhanced SOC N = 353[1]	SYV N = 337[1]	Overall N = 690[1]
PLHIV Scale			
Mean (SD)			
Median [Q1, Q3]			
Total Stigma score			
Mean (SD)			
Median [Q1, Q3]			

[1]n (%)

Table B2.1. Sample proportions and regression results for primary and secondary binary outcomes at 6 months by arm.

Outcome	n/N (%) - SYV	n/N (%) – Enhanced SOC	RR (95% CI)	RD (95% CI)
Viral Suppression[1]	X/Y (Z%)	X/Y (Z%)	X (Y, Z)	X (Y, Z)
Viral Suppression Sensitivity – Dose response	X/Y (Z%)	X/Y (Z%)	X (Y, Z)	X (Y, Z)
Viral Suppression Sensitivity – 200 copies/mL cutoff	X/Y (Z%)	X/Y (Z%)	X (Y, Z)	X (Y, Z)
Viral Suppression Sensitivity – 50 copies/mL cutoff	X/Y (Z%)	X/Y (Z%)	X (Y, Z)	X (Y, Z)
Viral Suppression Sensitivity – adjust for lab value of baseline VS	X/Y (Z%)	X/Y (Z%)	X (Y, Z)	X (Y, Z)
Viral Suppression Sensitivity – Spillover	X/Y (Z%)	X/Y (Z%)	X (Y, Z)	X (Y, Z)
Sexual activity and condom use	X/Y (Z%)	X/Y (Z%)	X (Y, Z)	X (Y, Z)
Disclosure to sexual partner	X/Y (Z%)	X/Y (Z%)	X (Y, Z)	X (Y, Z)
Consumed alcohol last 6 months	X/Y (Z%)	X/Y (Z%)	X (Y, Z)	X (Y, Z)
Used drugs last 6 months	X/Y (Z%)	X/Y (Z%)	X (Y, Z)	X (Y, Z)
PHQ-9 ≥ 10	X/Y (Z%)	X/Y (Z%)	X (Y, Z)	X (Y, Z)
GAD-7 ≥ 10	X/Y (Z%)	X/Y (Z%)	X (Y, Z)	X (Y, Z)
UCLA ≥ 35	X/Y (Z%)	X/Y (Z%)	X (Y, Z)	X (Y, Z)
Mental Health Difficulties (PHQ-9 ≥ 10 or GAD-7 ≥ 10)	X/Y (Z%)	X/Y (Z%)	X (Y, Z)	X (Y, Z)
Mental Health Difficulties (PHQ-9 ≥ 10 or GAD-7 ≥ 10 or UCLA ≥ 35)	X/Y (Z%)	X/Y (Z%)	X (Y, Z)	X (Y, Z)

Footnote

[1] p-value for primary outcome (Viral Suppression), Risk Ratio: 0.50
p-value for primary outcome (Viral Suppression), Risk Differenece: 0.50

Table B2.2. Sample means and regression results for continuous outcomes at 6 months by arm.

Outcome	Mean (SD) - SYV	Mean (SD) - Enhanced SOC	Estimate (95% CI)
Log Viral Load	X (Y)	X (Y)	X (Y, Z)
Total PHQ-9 score	X (Y)	X (Y)	X (Y, Z)
Adherence -- Self-report	X (Y)	X (Y)	X (Y, Z)
Adherence -- ART levels in hair*	X (Y)	X (Y)	X (Y, Z)
UCLA Trauma Reaction Index survey	X (Y)	X (Y)	X (Y, Z)
GAD-7	X (Y)	X (Y)	X (Y, Z)
Rosenberg Self-Esteem	X (Y)	X (Y)	X (Y, Z)
Coping Self-Efficacy	X (Y)	X (Y)	X (Y, Z)
PLHIV Resilience Scale	X (Y)	X (Y)	X (Y, Z)
12 question stigma scale (Berger HIV Stigma scale)	X (Y)	X (Y)	X (Y, Z)
WHOQOL-HIV-BREF: Quality of life: rated good/very good	X (Y)	X (Y)	X (Y, Z)
WHOQOL-HIV-BREF: Quality of life: satisfied with health	X (Y)	X (Y)	X (Y, Z)

*Adherence is a weighted analysis (see 4.1.1)

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