BMJ Open

Todurujo na Kadurok (Empowering Youth): study design of an HIV self-testing and edutainment comic cluster randomized trial among refugee youth in a humanitarian setting in Uganda

Journal:	*BMJ Open*
Manuscript ID	bmjopen-2022-065452
Article Type:	Protocol
Date Submitted by the Author:	09-Jun-2022
Complete List of Authors:	Logie, Carmen; University of Toronto, Factor-Inwentash Faculty of Social Work; University of Toronto, Women's College Research Institute Okumu, Moses ; University of Illinois at Urbana-Champaign, School of Social Work; Uganda Christian University, Department of Social Work Loutet, Miranda; University of Toronto Dalla Lana School of Public Health Coelho, Madelaine; University of Toronto Berry, Isha ; University of Toronto Dalla Lana School of Public Health, Gittings, Lesley; University of Cape Town, ; University of Toronto, Odong Lukone, Simon; Uganda Refugee and Disaster Management Council Kisubi, Nelson; Uganda Refugee and Disaster Management Council Malon, Atama; Yumbe Hospital Kyambadde, Peter ; Mulago Hospital, Most at Risk Population Initiative
Keywords:	HIV & AIDS < INFECTIOUS DISEASES, Public health < INFECTIOUS DISEASES, PREVENTIVE MEDICINE, PUBLIC HEALTH

Todurujo na Kadurok (Empowering Youth): study design of an HIV self-testing and edutainment comic cluster randomized trial among refugee youth in a humanitarian setting in Uganda

Carmen H Logie[1, 2, 3, 4], Moses Okumu[5], Miranda Loutet[6], Madelaine Coelho[4,7], Isha Berry[6], Lesley Gittings[1,8], Simon Odong Lukone[9], Nelson Kisubi[9], Malon Atama[10], Peter Kyambadde[11,12]

[1]Factor-Inwentash Faculty of Social Work, University of Toronto, Toronto, ON, Canada
[2]United Nations University Institute for Water, Environment, and Health, Hamilton, ON, Canada
[3]Centre for Gender & Sexual Health Equity, Vancouver, BC, Canada
[4]Women's College Research Institute, Women's College Hospital, Toronto, ON, Canada
[5]School of Social Work, University of North Carolina Chapel Hill, Chapel Hill, NC, USA
[6] Dalla Lana School of Public Health, University of Toronto, Toronto, ON, Canada
[7] Department of Sociology, University of Toronto, Toronto, ON, Canada
[8] Centre for Social Science Research, University of Cape Town, South Africa
[9] Uganda Refugee and Disaster Management Council, Yumbe, Uganda
[10] Yumbe General Hospital, Yumbe, Uganda
[11]National AIDS Coordinating Program, Ugandan Ministry of Health, Kampala, Uganda
[12]Most at Risk Population Initiative (MARPI), Mulago Hospital, Kampala, Uganda

Co-authors' ORCID iDs:
Carmen H Logie http://orcid.org/0000-0002-8035-433X
Moses Okumu https://orcid.org/0000-0003-2555-3077
Miranda Loutet https://orcid.org/0000-0002-6293-3047
Isha Berry https://orcid.org/0000-0003-3138-664X
Lesley Gittings https://orcid.org/0000-0002-0463-0478
Odong Simon Lukone https://orcid.org/0000-0002-6780-1705
Nelson Kisubi https://orcid.org/0000-0002-0260-4620
Malon Atama https://orcid.org/0000-0003-1409-1970
Peter Kymbadde https://orcid.org/0000-0002-9606-218X

*Corresponding Author: Dr. Carmen Logie, University of Toronto, Factor-Inwentash Faculty of Social Work, 246 Bloor St W, Toronto, ON M5S 1V4, carmen.logie@utoronto.ca

Abstract

Introduction: Refugees experience HIV vulnerabilities due to the confluence of displacement, violence, and poverty. HIV self-testing, understudied in refugee settlements, is a promising method to increase testing uptake, yet challenges remain linking persons to confirmatory testing following a positive HIV self-test. This study aims to evaluate the effectiveness of HIV self-testing kits and "edutainment" comics in increasing HIV testing and HIV status knowledge among refugee youth aged 16-24 years in Bidi Bidi Refugee Settlement, Uganda.

Methods and analysis: This study will be conducted in Bidi Bidi. We conducted a qualitative formative phase with focus groups to generate knowledge of contextually-specific barriers and facilitators of HIV prevention, testing and care among refugee youth (aged 16-24) in Bidi Bidi. These findings were then used to create comic scenarios aligning with edutainment approaches to health promotion. We will conduct a four-arm cluster randomized controlled trial in Bidi Bidi using a 2 x 2 factorial design: 1) HIV self-testing alongside edutainment comics, 2) HIV self-testing alone, 3) edutainment comic alone, and 4) standard of care. Approximately 120 youth (30 per arm) will be enrolled and followed for 3 months. Data will be collected at baseline and 3-months after enrolment. The primary outcomes (HIV testing frequency, HIV status knowledge) and secondary outcomes (linkage to confirmatory HIV testing, HIV care linkage, HIV self-test kit use, HIV-related stigma, HIV knowledge, safer sex efficacy, condom-use, adolescent sexual and reproductive health stigma, sexual relationship power, access to SRH services) will be evaluated using descriptive statistics and regression analyses.

Ethics and dissemination: This study has been approved by the University of Toronto Research Ethics Board, the Mildmay Uganda Research Ethics Committee, and the Uganda National Council for Science and Technology. This trial is registered at ClinicalTrials.gov (#NCT05213689). Results will be published in peer-reviewed journals and findings communicated through community forums.

Strengths and limitations of this study:

- *Todurujo na Kadurok* (Empowering Youth) study is unique in exploring the use of edutainment comic books as a form of graphic medicine in addition to a clinical intervention (HIV self-testing kits) for improving HIV testing uptake and status knowledge among youth living in a humanitarian context in Uganda.
- This study will advance knowledge of HIV self-testing implementation in a refugee settlement context.
- The primary study limitations are potential loss to follow-up.
- This research will produce new information on the potential benefits of low-cost graphic medicine approaches on increasing HIV self-testing benefits among refugee youth, with implications for scaling-up HIV self-testing in humanitarian contexts.

BACKGROUND

HIV vulnerabilities among displaced and refugee adolescents are shaped by a complex interplay of factors including poverty, violence, host community HIV prevalence, HIV urbanization, HIV testing and care access, and living conditions [1–3]. Uganda is the largest refugee hosting nation in Africa with over 1.4 million refugees in 2020, with more than 240,000 living in Bidi Bidi settlement near the South Sudan border [4]. Youth represent 44.4% of all new HIV infections in Uganda, with most infections sexually transmitted [5]. HIV prevalence among adolescents and young people in Uganda is 10.8% and is markedly higher among women (15.4%) compared with men (4.8%)[6]. Less is known of HIV prevalence, testing and prevention engagement among youth living in refugee settlements in Uganda, including in Bidi Bidi [7].

There is limited inclusion of refugee adolescents and youth in sexual and reproductive health research and programming [8–10] that may result in a lack of age, gender, culturally tailored programs, which in turn may contribute to low engagement with HIV testing and prevention services in humanitarian contexts [11]. Research findings suggest that inequitable gender norms and intersecting forms of stigma, including HIV-related stigma and refugee stigma, may also limit HIV testing and prevention engagement among refugee youth [12–15]. Social network breakdown, poverty and travel distance to clinics, confidentiality concerns, language barriers and other logistic hurdles may also present obstacles to HIV testing [16,17].

HIV self-testing (HIVST) is a promising approach documented across systematic reviews to increasing HIV testing access and uptake [18–20]. This approach may mitigate confidentiality concerns, increase convenience, and reduce the risk of stigmatization, particularly important considerations for HIV testing with adolescents and youth [21–24]. HIVST involves an individual collecting their own oral specimen, conducting the test, and interpreting the results

independently with support from pictorial and written instructions. There is also a dearth of information regarding advances in HIV testing, such as HIV self-testing, among youth in humanitarian contexts [25], including countries with a high HIV prevalence and large number of refugees such as Uganda.

There remain gaps in linkage to care following a positive HIV self-test when compared with standard HIV testing services, and addressing these gaps requires innovative approaches [26]. Comics—a form of graphic medicine—integrate text and visual images and are a promising health promotion tool used to address a variety of health conditions such as HIV, sexually transmitted infections, vaccines, and dementia [27–32]. Edutainment comics have been used to educate both the general population and healthcare providers [33,34]. Comics align with the entertainment-education ('edutainment') approach to improve health knowledge, attitudes and practices applied in HIV prevention research [35,36]. In the field of HIV, comics have been used in an HIV adherence intervention in the United States as well as in PrEP research, as well as in HIV education in schools in Kenya [37–39]. Among refugees, comics have been used in mental health research in Greece and Lebanon [40,41]. We did not locate research using comics for HIV testing interventions at large, or with refugees on HIV research.

HIV prevention cascade conceptual frameworks can inform research addressing gaps in linkage to care following HIV self-testing [42,43]. Three key domains of the HIV prevention cascade include motivation, access, and effective use, and these dimensions can be tailored to identify population specific needs [43,44]. For instance, Moorhouse et al. applied the HIV prevention cascade framework to develop community-based HIV prevention interventions and noted dimensions of motivation (knowledge, risk perception, consequence of use, social norms), access (availability, acceptable provision, affordability), and effective use (skills, self-efficacy,

partner) [42]. Identifying gaps in these prevention cascade dimensions can inform intervention development and evaluation.

This cluster-randomized study, *Todurujo na Kadurok* (loosely translated to 'Empowering Youth' in Bari), aims to conduct an HIV self-testing and edutainment comic intervention and evaluate its effectiveness in increasing HIV testing and HIV status knowledge among refugee youth in Bidi Bidi refugee settlement, Uganda. The comic intervention will be theoretically informed by the HIV prevention cascade [42] to address gaps in motivation, access and effective use identified in formative research. Study findings can inform local and global responses to increase HIV testing engagement with youth in humanitarian contexts.

METHODS

Study aims and objectives

The overarching study goal is to evaluate the effectiveness of HIV self-testing, edutainment comic, or a combination of both interventions on increasing HIV testing, HIV status knowledge and linkage to confirmatory testing and care among refugee youth aged 16 to 24 years living in Bidi Bidi refugee settlement, Uganda. The primary objectives are to evaluate the effectiveness of the interventions on participants (1) HIV status knowledge and (2) HIV testing frequency. Secondary objectives include examining the impact of the intervention on: (1) HIV self-testing kit use, (2) linkage to confirmatory HIV testing for those testing positive on the HIVST, and (3) linkage to HIV care for those testing positive, (4) HIV-related stigma, (5) adolescent sexual and reproductive health stigma, (6) HIV knowledge, (7) safer sex efficacy, (8) condom use, (9) sexual relationship power, and (10) access to other sexual and reproductive health services (e.g., contraception, post-exposure prophylaxis).

Study Design

We are conducting a cluster-randomized study using a 2 x 2 factorial design (see Figure 1) [45]. This approach will specifically test the effectiveness of offering: 1) HIV self-testing alongside the edutainment comic, 2) HIV self-testing alone, 3) edutainment comic alone, and 4) standard of care, on defined primary and secondary outcomes. Factorial designs are an appropriate and efficient approach to understand synergies between interventions. As HIV self-testing is an established testing approach that is feasible and acceptable [26,45–47], we are particularly interested to see if the benefits of HIV self-testing with youth in a humanitarian context are increased with accompanying edutainment comics that are theoretically designed to address barriers to testing and care across the HIV cascade. This design can help with identifying effective strategies to reach study aims and in turn can inform intervention design to include the most effective components [48]. Data will be collected from all participants directly before providing the intervention (baseline: time 1), and again at 3-month follow-up (time 2).

Study setting

This trial will be conducted in four villages located in two zones in Bidi Bidi Refugee Settlement within the Yumbe district in Northwestern Uganda. With over 245,000 refugees largely (99.9%) from South Sudan, Bidi Bidi is the world's second-largest refugee settlement with one-quarter of the population (25%; n=61,036) youth aged 15 to 24 years [49]. In Bidi Bidi, health centers offer free regular testing for HIV and comprehensive HIV care services including adult and pediatric antiretroviral therapy (ART) and cotrimoxazole prophylaxis. However, only a few facilities in the settlement offer comprehensive HIV care such as Prevention of Mother to Child Transmission (PMTCT) services. Moreover, there are reported challenges including lack of

facility accreditation to offer HIV care, drug and test kits stock out and poor adherence to ART by the refugees [50,51].

The clinical trial study setting includes two villages in Zone 3, with more than 58,000 residents, and two villages in Zone 4 annex, with more than 52,000 residents [49]. To ensure anonymity of participants, the village numbers are not included in this protocol. The zones and villages were selected due to large geographical separation to avoid contamination of intervention arms, eagerness of youth in these areas to learn more about HIV testing, and to fill a void of HIV research in these particular areas. In Zone 3 there are the following participating health centres: Jomorogo Health Centre 3, Kongbe Health Centre 3, Yoyo Health Centre 3, Luzira Health Centre 3. In Zone 4 annex the following health centres will participate: Igamara Health Centre 3, Bolomoni Health Centre 3, Bangatuti Health Centre, and Kulikulinga Government Centre. All participants are able to access these health centres throughout the study for HIV testing and treatment.

Participants and recruitment

We will use convenience sampling methods, including peer driven recruitment supported by collaborators at Uganda Refugee and Disaster Management Council (URDMC) and eight peer navigators. Peer navigators are self-identified young refugees aged 20-24 years living in Bidi Bidi, specifically Zone 3 and Zone 4 annex, who received training from the study team in research methods and confidentiality and are supervised by URDMC. Inclusion criteria for participants in the *Todurujo na Kadurok* study include: (1) living in one of the four selected villages in Zone 3 and Zone 4 annex in Bidi Bidi; (2) identifying as a refugee or displaced person; (3) aged 16-24 years; and (4) speaking and reading one of the study languages (English,

Bari, Juba Arabic). The same recruitment methods and eligibility criteria will be used for the focus groups in Phase 1 and the cluster-randomized study in Phase 2.

For Phase 2, participants will be randomized by the village they live in. We will recruit a total of 120 participants, with 30 participants in each of the four arms. The arms will be geographically separated into four different villages from two zones to avoid contamination of the intervention effects. The villages will be randomly assigned to a study arm. Youth will be approached by peer navigators and study staff at URDMC to be recruited to the study. At the baseline visit (time 1) the youth will be provided a written consent form, which will be available in English, Bari and Juba Arabic. Once the youth have provided informed written consent they will be enrolled into the study, assigned to a study arm based on the village that they live in, and baseline data will be collected by a URDMC research assistant. Peer navigators will use multiple study reminder strategies (e.g., texts, private messages over social media) to maintain engagement until the follow-up visit at 3-months after enrolment. These efforts will be supplemented with existing outreach services to youth by URDMC.

Patient and public involvement

The study protocol was developed after a formative qualitative research phase (Phase 1). As depicted in Figure 1, this formative research in Phase 1 included four focus groups (2 with young women, 2 with young men) with refugee youth in Bidi Bidi (n=10 in each focus group; n=40 in total) aged 16-24 years to collect information on knowledge of current HIV testing opportunities and experiences in Bidi Bidi and perspectives on HIV self-testing. The qualitative findings were used to identify key themes for the development of the edutainment comics (see Table 1), in this way the study responds to the health needs and priorities of refugee youth in this humanitarian

context. These focus groups were followed by a 3-day human-centered design workshop with eight peer navigators to adapt and develop HIV self-testing edutainment materials to enhance cultural, gender, age, and contextual relevance (see Figure 1). The study is conducted as a collaboration with local physicians, clinics, and the implementing partner is a refugee agency based in Bidi Bidi. These study collaborators have been involved since the study inception and will lead implementation. Peer navigators (n=8) who share with participants refugee lived experiences, and include youth living with HIV, have meaningfully contributed to the study design through the human centered design workshops, feedback into edutainment comic development, pilot testing of study tools, and will support implementation through actively contributing to participant recruitment, engagement, and retention.

Table 1. Scenarios on the HIV prevention cascade included in the edutainment comic

Domain of prevention cascade	**Stage of the prevention cascade**	**Description**
Motivation	Risk perception	Discussion explores perceived risk for HIV and a) misinformation (e.g., sharing body lotion is not as an HIV risk factor) and b) provides information about condom breakage and post-exposure prophylaxis.
	Consequence of use	Discussion between healthcare provider and youth of how to manage a positive HIV test result, including the ability to manage confidentiality and access support services.
	Social norms	Discussion of experiences of HIV stigma and discrimination, as well as an example of receiving support from a friend.
	Knowledge	Discussion of knowledge as power, including benefits of knowing one's HIV positive and HIV negative serostatus.
Access	Access and availability	Parallel conversations between youth around testing barriers, including travel costs, and stockouts of HIV testing kits, with a discussion of locations for testing and support in Bidi Bidi.
	Acceptable provision	Discussions of a) the possibility of receiving an HIV test while accessing other health services such as contraception and condoms; b) accessing HIV testing from a healthcare provider of a different gender; c) feeling empowered to find a doctor one feels comfortable talking with about sexual health
Effective use	Partner	Discussion of HIV testing with partner to assess partner perspectives on HIV testing and evaluate concerns (e.g.,

		negative partner reaction, violence, consequence of positive test result). Healthcare provider discussion of partner testing with a couple, including possible sero-discordant results. Decision making considerations for engaging in partner testing, including motivations (empowerment, support, open communication, stronger relationship) and barriers (loss of trust, violence, conflict, break up).
	Skills	Discussion of disclosure process and decision making regarding who to disclose an HIV positive test result with.
	Self-efficacy	Discussion of how knowledge of HIV testing benefits, HIV positive serostatus, and available resources increase empowerment to take care of oneself and support others.

Intervention description

Todurujo na Kadurok is a 2 x 2 factorial cluster-randomized trial, with clusters randomized to one of the following four arms: (1) HIV self-testing and edutainment comic, (2) HIV self-testing only, (3) edutainment comic only, and (4) standard of care.

Participants in the HIV self-testing arms (arm 1; arm 2) will each receive two HIV self-testing kits (OraQuick Rapid HIV-1/2 Antibody Test, OraSure Technologies) at baseline along with verbal, written and visual instructions (in their choice of study language), as well as linkages to peer navigators and URDMC for support accessing confirmatory testing and care.

Participants in the edutainment comic arms (arm 1; arm 3) will receive a hard copy of the edutainment comic at baseline. They will meet with the peer navigator to review and discuss the comic themes and will be provided with a blank version to complete on their own. This approach to edutainment comics provides a participatory component whereby participants can contextualize the comic themes within their own lives and experiences [52]. In addition to the comic, the participants in arm 1 and 3 will also have linkages to peer navigators and URDMC for support accessing confirmatory testing and care.

Participants in the standard of care arm (arm 4) will receive verbal and written information and resources about HIV testing, care, and support services in Bidi Bidi and Yumbe Hospital from their peer navigator as well as contact information for URDMC and an overview of their programs offered. The existing standard of HIV care in Bidi Bidi is offered through clinics located in Bidi Bidi settlement and the hospital in Yumbe and includes pre- and post-test counselling for HIV, follow-up visits for HIV care in the community, intensive treatment adherence counselling for immunosuppressed and non-immunosuppressed patients in the community and facility, and community drug re-fills for people living with HIV.

Outcomes

The primary outcomes measured in this trial are:

1. Changes in HIV testing frequency: This is measured as participants' self-reported last HIV test. To capture changes, this measure is assessed at both study time points (baseline [Time 1], 3 months [Time 2]).
2. Changes in HIV status knowledge: At the final 3-month visit, a clinician supported by trained peer navigators will offer all participants a completely voluntary rapid point-of-care HIV test (Alere Determine HIV-½) to measure HIV status knowledge. HIV status knowledge will be assessed as correct for participants that agree to take the rapid test and correctly report their HIV status before receiving the result.

The secondary outcomes include:

1. Changes in linkage to confirmatory HIV testing: Participants in arm 1 and arm 2 (e.g., those given a HIVST) will be asked at Time 2 if they used their HIV self-test kit. All participants who report using the test will be asked the result, and participants who self-report a positive

result will be asked if they received confirmatory testing, and if so, where they received the test. Participants will also be provided study coupons (with only the name of the UDRMC and their study ID#) that they can provide when receiving HIV or other sexual and reproductive health services at collaborating health clinics; this clinic engagement will be linked to the participant study ID#.

2. Changes in linkage to HIV care: At Time 2, participants who seroconvert in the study will be asked if they received HIV care, including ART and counseling, since receiving an HIV-positive diagnosis.
3. HIV self-test kit use: In order to understand the use of HIV self-test kits and to reduce social desirability bias, one month after Time 2 the participants in arm 1 and arm 2 will be asked if they have unused test kits. They will be informed this information is just to guide future trials.
4. HIV-related stigma, assessed with the Reinius et al., 2017 12-item short HIV stigma assessment [53] including vicarious and felt-normative HIV stigma dimensions through an internalized AIDS-related scale from Kalichman et al. 2020 [54,55].
5. HIV knowledge assessed with the HIV knowledge questionnaire by Carey & Schroder [56].
6. Safer sex efficacy using the Condom Use Self-Efficacy Scale [57,58].
7. Condom use in past 3 -months (condom use at last sex; condom use at sex every time in last 3 months [dichotomous: yes/no]).
8. Adolescent sexual and reproductive health stigma, assessed with the Ugandan Adolescent Sexual and Reproductive Health (SRH) Stigma scale (Logie et al. 2019) adapted from Hall et al.'s Adolescent SRH Stigma scale [59]

9. Sexual relationship power (SRP) using the Relationship Control Sub-Scale from the Sexual & Relationship Power Scale [60]
10. Access to other SRH services will be assessed by asking if the participants went to any health clinic/hospital or service provider in the past 3 months to access: condoms, lubricant, contraception, post-exposure prophylaxis, pre-exposure prophylaxis, pregnancy test, sexual and gender-based violence information, sexually transmitted infections testing, or other services. Participants will be provided coupons with UDRMC logo and their study ID to bring to participating clinics when accessing services, so this variable will be assessed by self-report by participant as well as by collecting study coupons that will be attached to a list of services accessed during the study timeframe.

All participants, regardless of study arm, will receive an HIV self-test at the end of the study with accompanying instructions, information and resources to ensure the study arms without access to HIV self-testing are made aware of this approach and can access its benefits.

Sample size and power

We will recruit 120 refugee youth aged 16-24 years living in Bidi Bidi (60 adolescent girls, 60 adolescent boys) in the cluster-randomized trial. The recruited youth will come from four villages in two zones (Zone 3 and Zone 4 annex) within Bidi Bidi, and each village will be randomized to a study arm such that all youth living in the village are clustered to receive the same intervention. Calculated using G*Power 3.1, a sample size of 105 is sufficient for multivariable regression analyses (effect size: 0.2, power: 0.95, number of tested predictors: 5, critical F: 2.306) [61]. To account for 15% attrition, we have selected a sample size of 120.

Data collection and management

For the cluster-randomized trial (Phase 2), we will collect sociodemographic characteristics from participants at time 1, and exposures relevant to sexual and reproductive health and outcome data at both timepoints (time 1, time 2). Data will be collected using tablet-based structured surveys conducted by trained research assistants in all study languages. We will collect data using SurveyCTO (Dobility, Cambridge, USA), which is a secure platform whereby data collected is automatically encrypted and uploaded to a password-protected server using a Secure Sockets Layer (SSL) certificate. SurveyCTO allows for data to be collected offline and has branching logic, consistency checks, and facilitates multi-lingual data collection. No personal identifying information will be collected with the survey data, all participants will instead be given a unique participant ID to enhance confidentiality. Only study staff will have access to the dataset for the purpose of data management and outcome reporting, and all datasets will be saved on a password-protected server.

Data analysis

Analysis and reporting for the cluster-randomized trial (Phase 2) will be conducted in accordance with CONSORT (Consolidated Standards of Reporting Trials) guidelines [62]. The analyst will be blinded to group allocation. A flow diagram will be used to illustrate patient flow (consent/enrolment, randomization, baseline, and follow-up). Baseline data will be reported for all four arms and summarized as mean and standard deviations or median and interquartile range for continuous variables and as number and percentage for categorical variables. The primary analysis will involve intention-to-treat analysis (data from participants will be analyzed according to their allocation, irrespective of whether they received the intervention). Between-

group comparisons will be performed using generalized estimating equations (GEE) logistic or linear regression models – depending on which outcome is being evaluated - using unstructured correlation matrix and robust standard errors to account for clustering. For these models, the intervention effects across time (from baseline to 3-month follow-up) will be included as the main effects of intervention arm, time, and an arm*time interaction. The level of significance will be set at alpha=0.05. The results will be expressed as odds ratios or mean differences as appropriate, accompanied by 95% confidence intervals and p-values. We will conduct an adjusted analysis for the primary outcome (changes in HIV testing frequency, HIV self-test kit use, HIV status knowledge, changes to linkage to confirmatory HIV testing and to HIV care) to investigate the role of various covariates in the relative effect. Covariates, such as age and gender, will be entered as a block. We will explore gender differences in primary and secondary intervention outcomes. Given the outcomes of this study are related to behavior change and the trial is of a short duration with minimal risks, a data monitoring committee was not deemed necessary.

DISCUSSION

This study approach has the potential to inform research, practice, and policy surrounding measuring the efficacy of new programming and HIV-related testing. Study findings, therefore, have the potential to not only inform a larger, fully powered randomized controlled trial to test the effectiveness of an edutainment comic book intervention but can also inform policies on how strategies such as comic books can be integrated into school health curricula for HIV prevention. Our findings can also inform research, practice, and policy on HIV/AIDS among youth, to better meet the needs of refugee adolescents and youth. An edutainment comic book intervention

approach holds promise for meaningfully engaging youth and healthcare providers in humanitarian contexts in dialogue on STI prevention, care, and support.

ETHICS AND DISSEMINATION

Ethical approval

Ethical approval for the study was provided through the Mildmay Uganda Research Ethics Committee (REC REF 0802-2021), UNCST (SS884ES), and the University of Toronto Research Ethics Board (37496). This trial is registered at ClinicalTrials.gov (#NCT05213689). The protocol for the study was developed in accordance with the SPIRIT Statement [63,64]. To ensure the protection of human subjects, all participants in Phase 1 and 2 will be provided with enough time to provide written voluntary consent to participate in the study. All informed written consent processes will occur in a private room at a location provided by URDMC. The participant will read the consent form themselves or a peer navigator will read aloud the informed consent in a language comfortable to the participant (English, Bari or Juba Arabic) and will ask if the participant has any questions and will answer their questions. Participants will be asked to sign the consent form or provide a thumbprint to indicate their consent. The consent form will in no way be connected with focus group transcripts or data collected during the cluster-randomized trial and will be destroyed five years after data collection is completed. As Uganda's HIV and AIDS Prevention and Control Act permits youth aged 12 years or above to independently access HIV testing and counselling without parental permission, we received ethics approval to allow youth aged 16-17 years to participate without parental consent; this is a common approach to reduce barriers to youth participation in sexual and reproductive health research [65–67].

Dissemination plan

We will employ participatory methods for knowledge dissemination, working with youth peer navigators to develop strategies such as youth community forums and arts-based methods (e.g., comic books) and brief videos. We will make findings available in English, Bari and Juba Arabic. Findings will be disseminated through a variety of methods including the preparation of community reports (disseminated to the Ugandan National AIDS Program, Ministry of Health, and our collaborators [e.g., URDMC]) and peer-reviewed publications (e.g., Journal of the International AIDS Society). Irrespective of study findings, results will be published in peer-reviewed scientific journals following international authorship guidelines, and will be presented to academics and researchers at key scientific conferences.

Trial status

The formative qualitative phase of the *Todurujo na Kadurok* (Empowering Youth) study was launched in September 2021. The study team has been trained and ethics approval obtained. All qualitative activities from phase 1 and the development of the comic book have been completed. We anticipate for the intervention to begin in July 2022 along with baseline data collection, and the final follow-up survey to be conducted in October 2022. Any important protocol modifications will be included as amendments in REB and updated on the ClinicalTrials.gov registry, as and when needed. Box 1 details the information on the ClinicalTrials.gov registry.

Box 1. Items from the US National Institutes of Health Trial Registry
Data category information **Primary registry and trial identifying number:** ClinicalTrials.gov NCT05213689. **Date of registration:** 28 January 2022.

Source(s) of monetary support: ViiV Healthcare (Grant#628520-1652450711)
Primary sponsor: University of Toronto.
Primary sponsor: University of Toronto.
Contact for public and scientific queries: Carmen Logie, PhD (carmen.logie@utoronto.ca).
Public and scientific title: HIV Self-Testing and Comic Intervention with Refugee Adolescents and Youth.
Countries of recruitment: Uganda.
Health condition(s) or problem(s) studied: HIV testing, status knowledge, linkage to confirmatory and care.
Intervention(s): HIV self-testing kits and edutainment comic books.

Key inclusion criteria: living in one of the four selected villages in Zone 3 and Zone 4 annex in Bidi Bidi; identifying as a refugee or displaced person; aged 16-24 years; and speaking and reading one of the study languages (English, Bari, Juba Arabic).

Study type: interventional (clinical trial); cluster-randomized control trial with 4 study arms.
Date of first enrolment: June 2022 (estimate)
Target sample size: 120.

Primary outcome(s): HIV testing frequency, HIV status knowledge, linkage to confirmatory HIV testing, linkage to HIV care, HIV self-test kit use.
Key secondary outcomes: HIV-related stigma, HIV knowledge, safer sex efficacy, condom-use, sexual and reproductive health (SRH) stigma, sexual relationship power and access to SRH services.

Acknowledgements: We would like to acknowledge the support and contributions of: Uganda Refugee and Disaster Management Council (URDMC), Uganda Ministry of Health, Uganda National AIDS Control Program, Mildmay Uganda, Uganda Office of the Prime Minister Department of Refugees, and the peer navigators.

Contributors: Study design – CHL, MO, IB. Data collection – SOL, ML, MC, IB, LG, NK, MA, CHL, MO. Data management – ML, MC, SOL, NK, CHL. Manuscript writing – MC, ML, CHL. Manuscript editing and critical review – CHL, MO, ML, MC, IB, LG, SOL, NK, MA, PK.

Funding Statement: This work was supported by ViiV Healthcare Limited (Grant#628520-1652450711). CHL is also funded by the Canada Research Chairs programme (#Tier 2), Canada Foundation for Innovation (#JELF), and the Ontario Ministry of Research and Innovation (ERA).

Disclaimer: Funding agencies played no role in the design or execution of the study.

Competing interests: The authors have declared that no competing interests exist.

Patient and public involvement: Patients and/or the public were involved in the design, or conduct, or reporting, or dissemination plans of this research. Refer to the Methods section for further details.

Patent consent for publication: Not required.

Provenance and peer review: Not commissioned; peer reviewed for ethical and funding approval prior to submission.

REFERENCES

1. Spiegel PB, Bennedsen AR, Claass J, Bruns L, Patterson N, Yiweza D, et al. Prevalence of HIV infection in confl ict-aff ected and displaced people in seven sub-Saharan African countries: a systematic review [Internet]. Vol. 369, www.thelancet.com. 2007. Available from: www.thelancet.com
2. Mafigiri R, Matovu JKB, Makumbi FE, Ndyanabo A, Nabukalu D, Sakor M, et al. HIV prevalence and uptake of HIV/AIDS services among youths (15-24 Years) in fishing and neighboring communities of Kasensero, Rakai District, South Western Uganda. BMC Public Health. 2017 Mar 14;17(1).
3. Logie C, Okumu M, Hakiza R, Musoke DK, Berry I, Mwima S, et al. Mobile Health-Supported HIV Self-Testing Strategy Among Urban Refugee and Displaced Youth in Kampala, Uganda: Protocol for a Cluster Randomized Trial (Trushirikiane, Supporting Each Other). JMIR Research Protocol. 2021 Apr;10(2):e26192.
4. Refugee Statistics February 2022 - Bidibidi [Internet]. 2022 Mar [cited 2022 May 26]. Available from: https://data2.unhcr.org/en/documents/details/91322
5. Presidential Fast-Track Initiative On Ending HIV & AIDS In Uganda. Kampala; 2017 Jun.
6. Nanyonjo G, Asiki G, Ssetaala A, Nakaweesa T, Wambuzi M, Nanvubya A, et al. Prevalence and correlates of hiv infection among adolescents and young people living in fishing populations along lake victoria fishing communities in uganda. Pan African Medical Journal. 2020 Sep 1;37:1–12.
7. O'Laughlin KN, Rouhani SA, Faustin ZM, Ware NC. Testing experiences of HIV positive refugees in Nakivale Refugee Settlement in Uganda: Informing interventions to encourage priority shifting. Conflict and Health. 2013;7(1):1–9.
8. Jennings L, George AS, Jacobs T, Blanchet K, Singh NS. A forgotten group during humanitarian crises: a systematic review of sexual and reproductive health interventions for young people including adolescents in humanitarian settings. Conflict and Health [Internet]. 2019 Oct 3;13(1):57. Available from: https://doi.org/10.1186/s13031-019-0240-y
9. Singh NS, Smith J, Aryasinghe S, Khosla R, Say L, Blanchet K. Evaluating the effectiveness of sexual and reproductive health services during humanitarian crises: A systematic review. PloS One [Internet]. 2018;13(7):e0199300. Available from: https://journals.plos.org/plosone/article/file?id=10.1371/journal.pone.0199300&type=printable
10. Singh NS, Aryasinghe S, Smith J, Khosla R, Say L, Blanchet K. A long way to go: a systematic review to assess the utilisation of sexual and reproductive health services during humanitarian crises. BMJ Global Health [Internet]. 2018 Jul 4;3(2):e000682. Available from: https://gh.bmj.com/content/3/2/e000682
11. Liebling H, Barrett H, Artz L. South Sudanese Refugee Survivors of Sexual and Gender-Based Violence and Torture: Health and Justice Service Responses in Northern Uganda. Int J Environ Res Public Health. 2020 Mar 5;17(5).
12. Warren E, Post N, Hossain M, Blanchet K, Roberts B. Systematic review of the evidence on the effectiveness of sexual and reproductive health interventions in humanitarian crises. Vol. 5, BMJ Open. BMJ Publishing Group; 2015.

13. Logie CH, Okumu M, Musoke DK, Hakiza R, Mwima S, Kyambadde P, et al. Intersecting stigma and HIV testing practices among urban refugee adolescents and youth in Kampala, Uganda: qualitative findings. J Int AIDS Soc [Internet]. 2021;24:e25674. Available from: http://onlinelibrary.wiley.com/doi/10.1002/jia2.25674/full
14. Logie CH, Okumu M, Berry I, Loutet M, Hakiza R, Kibuuka Musoke D, et al. Social contextual factors associated with lifetime HIV testing among the Tushirikiane urban refugee youth cohort in Kampala, Uganda: Cross-sectional findings. International Journal of STD and AIDS. 2022 Mar 1;33(4):374–84.
15. Logie CH, Okumu M, Mwima SP, Kyambadde P, Hakiza R, Kibathi IP, et al. Exploring associations between adolescent sexual and reproductive health stigma and HIV testing awareness and uptake among urban refugee and displaced youth in Kampala, Uganda. Sexual and Reproductive Health Matters. 2019 Nov 29;27(3):86–106.
16. Hlongwa M, Mashamba-Thompson T, Makhunga S, Hlongwana K. Barriers to HIV testing uptake among men in sub-Saharan Africa: a scoping review. African Journal of AIDS Research. 2020 Jan 2;19(1):13–23.
17. Logie CH, Okumu M, Kibuuka Musoke D, Hakiza R, Mwima S, Kacholia V, et al. The role of context in shaping HIV testing and prevention engagement among urban refugee and displaced adolescents and youth in Kampala, Uganda: findings from a qualitative study. Tropical Medicine & International Health. 2021;00(00):1–10.
18. Witzel TC, Eshun-Wilson I, Jamil MS, Tilouche N, Figueroa C, Johnson CC, et al. Comparing the effects of HIV self-testing to standard HIV testing for key populations: a systematic review and meta-analysis. BMC Medicine. 2020;18(1).
19. Qin Y, Han L, Babbitt A, Walker JS, Liu F, Thirumurthy H, et al. Experiences Using and Organizing HIV Self-Testing: A Global Qualitative Systematic Review. AIDS [Internet]. 2018 Dec 21;32(3):371–81. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5758403/
20. Johnson CC, Kennedy C, Fonner V, Siegfried N, Figueroa C, Dalal S, et al. Examining the effects of HIV self-testing compared to standard HIV testing services: a systematic review and meta-analysis. J Int AIDS Soc [Internet]. 2017 Jun 1;20(1):21594. Available from: http://doi.wiley.com/10.7448/IAS.20.1.21594
21. Johnson C, Baggaley R, Forsythe S, van Rooyen H, Ford N, Napierala Mavedzenge S, et al. Realizing the potential for HIV self-testing. Vol. 18, AIDS and Behavior. Springer New York LLC; 2014.
22. Choko AT, Nanfuka M, Birungi J, Taasi G, Kisembo P, Helleringer S. A pilot trial of the peer-based distribution of HIV self-test kits among fishermen in Bulisa, Uganda. PLoS ONE. 2018;13(11).
23. Smith P, Wallace M, Bekker LG. Adolescents' experience of a rapid HIV self-testing device in youth-friendly clinic settings in Cape Town South Africa: A cross-sectional community based usability study: A. J Int AIDS Soc. 2016;19(1).
24. Hatzold K, Gudukeya S, Mutseta MN, Chilongosi R, Nalubamba M, Nkhoma C, et al. HIV self-testing: breaking the barriers to uptake of testing among men and adolescents in sub-Saharan Africa, experiences from STAR demonstration projects in Malawi, Zambia and Zimbabwe. J Int AIDS Soc. 2019;22(S1):43–52.
25. Logie CH, Khoshnood K, Okumu M, Rashid SF, Senova F, Meghari H, et al. Self care interventions could advance sexual and reproductive health in humanitarian settings. BMJ. 2019;l1083–l1083.

26. Johnson CC, Kennedy C, Fonner V, Siegfried N, Figueroa C, Dalal S, et al. Examining the effects of HIV self-Testing compared to standard HIV testing services: A systematic review and meta-Analysis. J Int AIDS Soc. 2017;20(1):21594.
27. Greensides DR, Berkelman R, Lansky A, Sullivan PS. Alternative HIV Testing Methods Among Populations at High Risk for HIV Infection. Public Health Reports. 2003;118.
28. Gillies PA, Stork A, Bretman M. Streetwize UK: a controlled trial of an AIDS education comic [Internet]. Vol. 5, Source: Health Education Research. 1990. Available from: https://about.jstor.org/terms
29. Gallagher-Thompson D, Tzuang M, Hinton L, Alvarez P, Rengifo J, Valverde I, et al. Effectiveness of a Fotonovela for Reducing Depression and Stress in Latino Dementia Family Caregivers. Alzheimer Disease & Associated Disorders [Internet]. 2015;29(2):146–53. Available from: www.alzheimerjournal.com
30. Krasnoryadtseva A, Dalbeth N, Petrie KJ. The effect of different styles of medical illustration on information comprehension, the perception of educational material and illness beliefs. Patient Education and Counseling. 2020 Mar 1;103(3):556–62.
31. Muzumdar JM, Pantaleo NL. Comics as a Medium for Providing Information on Adult Immunizations. Journal of Health Communication. 2017 Oct 3;22(10):783–91.
32. Celentano I, Winer RL, Jang SH, Ibrahim A, Mohamed FB, Lin J, et al. Development of a theory-based HPV vaccine promotion comic book for East African adolescents in the US. BMC Public Health. 2021 Dec 1;21(1).
33. Waite M. Writing medical comics. Vol. 42, Journal of Visual Communication in Medicine. Taylor and Francis Ltd; 2019. p. 144–50.
34. Towey F. Comics and Medicine. Cancer and Society. 2014;15(9):927–8.
35. Orozco-Olvera V, Shen F, Cluver L. The effectiveness of using entertainment education narratives to promote safer sexual behaviors of youth: A meta-analysis, 1985-2017. PLoS ONE. 2019 Feb 1;14(2).
36. Vaughan PW, Rogers EM, Singhai A, Swalehe RM. Entertainment-education and HIV/AIDS prevention: a field experiment in Tanzania. Journal of Health Communication. 2000;5:81–100.
37. Ghose T, Shubert V, Poitevien V, Choudhuri S, Gross R. Effectiveness of a Viral Load Suppression Intervention for Highly Vulnerable People Living with HIV. AIDS and Behavior. 2019 Sep 1;23(9):2443–52.
38. Kuhn A, Maatman T. Annals Graphic Medicine - Should I PrEP? Barriers to HIV-Related Preventive Care Faced by Black MSM. Annals of Internal Medicine. 2021 Apr;174(4):W37–44.
39. Obare F, Birungi H, Deacon B, Burnet R. Effectiveness of using comic books to communicate HIV and AIDS messages to in-school youth: Insights from a pilot intervention study in Nairobi, Kenya. African Population Studies. 2013 Nov 4;27(2):203.
40. Moore T. Strengths-based narrative storytelling as therapeutic intervention for refugees in Greece. World Federation of Occupational Therapists Bulletin. 2017 Jan 2;73(1):45–51.
41. Bosqui T, Mayya A, Younes L, Baker MC, Annan IM. Disseminating evidence-based research on mental health and coping to adolescents facing adversity in Lebanon: a pilot of a psychoeducational comic book 'Somoud.' Conflict and Health. 2020 Dec 1;14(1).
42. Moorhouse L, Schaefer R, Thomas R, Nyamukapa C, Skovdal M, Hallett TB, et al. Application of the HIV prevention cascade to identify, develop and evaluate interventions

to improve use of prevention methods: examples from a study in east Zimbabwe. 2019; Available from: http://onlinelibrary.wiley.com/doi/10.1002/jia2.25309/full
43. Schaefer R, Gregson S, Fearon E, Hensen B, Hallett TB, Hargreaves JR. HIV prevention cascades: a unifying framework to replicate the successes of treatment cascades [Internet]. Vol. 6. 2019. Available from: www.thelancet.com/hiv
44. HIV Prevention Cascades Stakeholder Consultation Meeting and Workshop Report on a consultation and workshop organised by the Manicaland Centre for Public Health Research* Biomedical Research and Training Institute Imperial College London * In association with UNAIDS, Zimbabwe Ministry of Health and Child Care, and Zimbabwe National AIDS Council; with funding from the Bill and Melinda Gates Foundation.
45. Montgomery AA, Peters TJ, Little P. Design, analysis and presentation of factorial randomised controlled trials. BMC Medical Research Methodology [Internet]. 2003;3(26):1–5. Available from: http://www.biomedcentral.com/1471-2288/3/26
46. Witzel TC, Eshun-Wilson I, Jamil MS, Tilouche N, Figueroa C, Johnson CC, et al. Comparing the effects of HIV self-testing to standard HIV testing for key populations: a systematic review and meta-analysis. BMC Medicine. 2020 Dec 1;18(381):1–13.
47. Qin Y, Han L, Babbitt A, Walker JS, Liu F, Thirumurthy H, et al. Experiences using and organizing HIV self-testing. AIDS. 2018 Jan 28;32(3):371–81.
48. Watkins ER, Newbold A. Factorial designs help to understand how psychological therapy works. Frontiers in Psychiatry. 2020 May 14;11(429):1–14.
49. Uganda - Refugee Statistics January 2022. Bidi Bidi; 2022 Feb.
50. Nakanwagi M, Okethwangu D, Kwesiga B, Ario AR. Availability of HIV services in BidiBidi refugee settlement, October to March 2017. UNIPH Bulletin Articles. 2021 Nov;2(2).
51. Palattiyil G, Kisaakye P, Mwenyango H, Katongole S, Mulekya F, Sidhva D, et al. Access to HIV/AIDS or TB care among refugees in Kampala, Uganda: exploring the enablers and barriers during the COVID-19 pandemic. Journal of Migration and Health [Internet]. 2022;5:100098. Available from: https://linkinghub.elsevier.com/retrieve/pii/S2666623522000216
52. Logie CH, Okumu M, Lukone SO, Loutet M, McAlpine A, Latif M, et al. Ngutulu Kagwero (agents of change): study design of a participatory comic pilot study on sexual violence prevention and post-rape clinical care with refugee youth in a humanitarian setting in Uganda. Global Health Action. 2021;14(1).
53. Reinius M, Wettergren L, Wiklander M, Svedhem V, Ekström AM, Eriksson LE. Development of a 12-item short version of the HIV stigma scale. Health and Quality of Life Outcomes. 2017 May 30;15(1).
54. Kalichman SC, Simbayi LC, Cloete A, Mthembu PP, Mkhonta RN, Ginindza T. Measuring AIDS stigmas in people living with HIV/AIDS: The Internalized AIDS-Related Stigma Scale. AIDS Care - Psychological and Socio-Medical Aspects of AIDS/HIV. 2009 Jan;21(1):87–93.
55. Pantelic M, Steinert JI, Park J, Mellors S, Murau F. "Management of a spoiled identity": Systematic review of interventions to address self-stigma among people living with and affected by HIV. BMJ Global Health. 2019 Mar 1;4(2).
56. Carey MP, Schroder KEE. Development and Psychometric Evaluation of the Brief HIV Knowledge Questionnaire. AIDS Education and Prevention. 2002;14(2):172–82.

57. Shaweno D, Tekletsadik E. Validation of the condom use self-efficacy scale in Ethiopia. BMC International Health and Human Rights [Internet]. 2013;13(22):1–8. Available from: http://www.biomedcentral.com/1472-698X/13/22
58. Brafford LJ, Beck KH. Development and validation of a condom self-efficacy scale for college students. J Am Coll Health Assoc. 1991;39(5):219–25.
59. Hall KS, Manu A, Morhe E, Harris LH, Loll D, Ela E, et al. Development and Validation of a Scale to Measure Adolescent Sexual and Reproductive Health Stigma: Results From Young Women in Ghana. Journal of Sex Research. 2018 Jan 2;55(1):60–72.
60. Pulerwitz J, Gortmaker SL, Dejong W. Measuring Sexual Relationship Power in HIV/STD Research. Sex Roles. 2000;42:637–60.
61. Faul F, Erdfelder E, Lang AG, Buchner A. G*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. Behavior Research Methods. 2007 Mar 30;39(2):175–91.
62. Smith BA, Lee HJ, Lee JH, Choi M, Jones DE, Bausell RB, et al. Quality of reporting Randomized Controlled Trials (RCTs) in the nursing literature: Application of the Consolidated Standards of Reporting Trials (CONSORT). Nursing Outlook. 2008;56(1).
63. Chan AW, Tetzlaff JM, Gøtzsche PC, Altman DG, Mann H, Berlin JA, et al. SPIRIT 2013 explanation and elaboration: guidance for protocols of clinical trials. BMJ. 2013;346.
64. Chan AW, Tetzlaff JM, Altman DG, Laupacis A, Gøtzsche PC, Krleža-Jeric K, et al. SPIRIT 2013 Statement: Defining Standard Protocol Items for Clinical Trials DEVELOPMENT OF THE SPIRIT 2013 STATEMENT [Internet]. Vol. 158, Ann Intern Med. 2013. Available from: www.annals.org
65. Flicker S, Guta A. Ethical Approaches to Adolescent Participation in Sexual Health Research. Journal of Adolescent Health. 2008 Jan;42(1):3–10.
66. Nakalega R, Akello C, Gati B, Nakabiito C, Nolan M, Kamira B, et al. Ethical considerations for involving adolescents in biomedical HIV prevention research. BMC Medical Ethics. 2021 Dec 1;22(1).
67. Day S, Kohler P, Slack C, Ezechi O, Tucker JD. Adolescent participation in HIV research: consortium experience in low and middle-income countries and scoping review. Lancet HIV [Internet]. 2020;7:844–52. Available from: www.thelancet.com/hiv

Figure Legends:

Figure 1: Flowchart of Study Phases and Participant Involvement

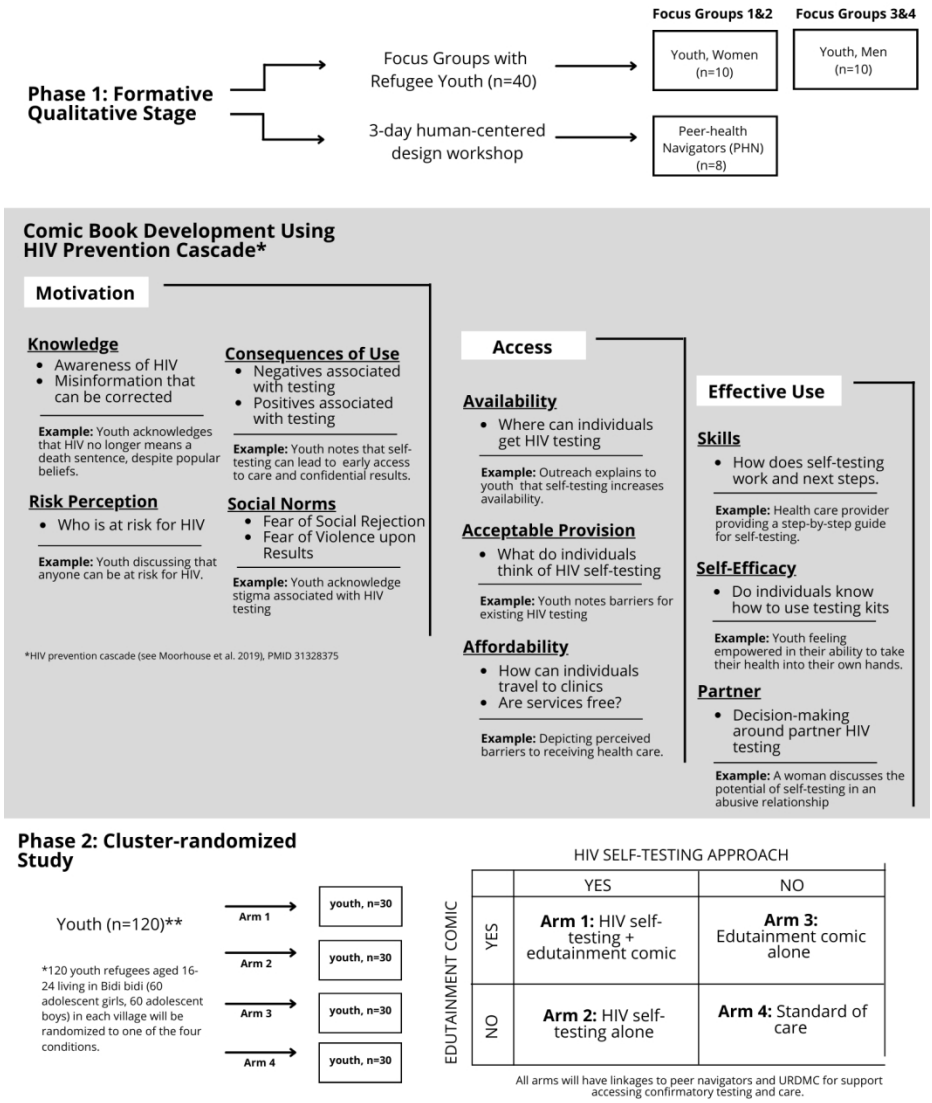

Figure 1: Flowchart of Study Phases and Participant Involvement

545x705mm (72 x 72 DPI)

SPIRIT
STANDARD PROTOCOL ITEMS: RECOMMENDATIONS FOR INTERVENTIONAL TRIALS

SPIRIT 2013 Checklist: Recommended items to address in a clinical trial protocol and related documents*

Section/item	ItemNo	Description	Page (P); Line (L)
Administrative information			
Title	1	Descriptive title identifying the study design, population, interventions, and, if applicable, trial acronym	P1; L1-3
Trial registration	2a	Trial identifier and registry name. If not yet registered, name of intended registry	P2; L59-60
	2b	All items from the World Health Organization Trial Registration Data Set	Box 1
Protocol version	3	Date and version identifier	Box 1
Funding	4	Sources and types of financial, material, and other support	P17; L407-409
Roles and responsibilities	5a	Names, affiliations, and roles of protocol contributors	P17; L403-405
	5b	Name and contact information for the trial sponsor	P1; L29-30
	5c	Role of study sponsor and funders, if any, in study design; collection, management, analysis, and interpretation of data; writing of the report; and the decision to submit the report for publication, including whether they will have ultimate authority over any of these activities	P 17; L403-405 & 411
	5d	Composition, roles, and responsibilities of the coordinating centre, steering committee, endpoint adjudication committee, data management team, and other individuals or groups overseeing the trial, if applicable (see Item 21a for data monitoring committee)	N/A
Introduction			
Background and rationale	6a	Description of research question and justification for undertaking the trial, including summary of relevant studies (published and unpublished) examining benefits and harms for each intervention	P 3-5
	6b	Explanation for choice of comparators	P9; L230-248
Objectives	7	Specific objectives or hypotheses	P5; L135-145

Trial design	8	Description of trial design including type of trial (eg, parallel group, crossover, factorial, single group), allocation ratio, and framework (eg, superiority, equivalence, noninferiority, exploratory)	P6; L147-158
Methods: Participants, interventions, and outcomes			
Study setting	9	Description of study settings (eg, community clinic, academic hospital) and list of countries where data will be collected. Reference to where list of study sites can be obtained	P6-7; L161-181
Eligibility criteria	10	Inclusion and exclusion criteria for participants. If applicable, eligibility criteria for study centres and individuals who will perform the interventions (eg, surgeons, psychotherapists)	P7; L 188-193
Interventions	11a	Interventions for each group with sufficient detail to allow replication, including how and when they will be administered	P9-10; L227-248 (Figure 1)
	11b	Criteria for discontinuing or modifying allocated interventions for a given trial participant (eg, drug dose change in response to harms, participant request, or improving/worsening disease)	N/A; low risk behaviour change intervention
	11c	Strategies to improve adherence to intervention protocols, and any procedures for monitoring adherence (eg, drug tablet return, laboratory tests)	P8; L202-205
	11d	Relevant concomitant care and interventions that are permitted or prohibited during the trial	N/A; low risk behaviour change intervention
Outcomes	12	Primary, secondary, and other outcomes, including the specific measurement variable (eg, systolic blood pressure), analysis metric (eg, change from baseline, final value, time to event), method of aggregation (eg, median, proportion), and time point for each outcome. Explanation of the clinical relevance of chosen efficacy and harm outcomes is strongly recommended	P 10-12; L 251-295
Participant timeline	13	Time schedule of enrolment, interventions (including any run-ins and washouts), assessments, and visits for participants. A schematic diagram is highly recommended (see Figure)	Figure 1
Sample size	14	Estimated number of participants needed to achieve study objectives and how it was determined, including clinical and statistical assumptions supporting any sample size calculations	P 12-13; L301-307
Recruitment	15	Strategies for achieving adequate participant enrolment to reach target sample size	P 8; L197-205
Methods: Assignment of interventions (for controlled trials)			

Allocation:

Sequence generation	16a	Method of generating the allocation sequence (eg, computer-generated random numbers), and list of any factors for stratification. To reduce predictability of a random sequence, details of any planned restriction (eg, blocking) should be provided in a separate document that is unavailable to those who enrol participants or assign interventions	P8; L194-197
Allocation concealment mechanism	16b	Mechanism of implementing the allocation sequence (eg, central telephone; sequentially numbered, opaque, sealed envelopes), describing any steps to conceal the sequence until interventions are assigned	N/A; interventions cluster-randomized and not blinded
Implementation	16c	Who will generate the allocation sequence, who will enrol participants, and who will assign participants to interventions	P8; L197-198
Blinding (masking)	17a	Who will be blinded after assignment to interventions (eg, trial participants, care providers, outcome assessors, data analysts), and how	P13; L319-321, 326
	17b	If blinded, circumstances under which unblinding is permissible, and procedure for revealing a participant's allocated intervention during the trial	N/A; low risk behaviour change intervention so unblinding will not occur

Methods: Data collection, management, and analysis

Data collection methods	18a	Plans for assessment and collection of outcome, baseline, and other trial data, including any related processes to promote data quality (eg, duplicate measurements, training of assessors) and a description of study instruments (eg, questionnaires, laboratory tests) along with their reliability and validity, if known. Reference to where data collection forms can be found, if not in the protocol	P 13; L310-321
	18b	Plans to promote participant retention and complete follow-up, including list of any outcome data to be collected for participants who discontinue or deviate from intervention protocols	P8; L202-205
Data management	19	Plans for data entry, coding, security, and storage, including any related processes to promote data quality (eg, double data entry; range checks for data values). Reference to where details of data management procedures can be found, if not in the protocol	P13; L312-321

Statistical methods	20a	Statistical methods for analysing primary and secondary outcomes. Reference to where other details of the statistical analysis plan can be found, if not in the protocol	P 13-14; L324-345
	20b	Methods for any additional analyses (eg, subgroup and adjusted analyses)	P 14; L338-343
	20c	Definition of analysis population relating to protocol non-adherence (eg, as randomised analysis), and any statistical methods to handle missing data (eg, multiple imputation)	P 14; L329-334
Methods: Monitoring			
Data monitoring	21a	Composition of data monitoring committee (DMC); summary of its role and reporting structure; statement of whether it is independent from the sponsor and competing interests; and reference to where further details about its charter can be found, if not in the protocol. Alternatively, an explanation of why a DMC is not needed	P 14; L343-345
	21b	Description of any interim analyses and stopping guidelines, including who will have access to these interim results and make the final decision to terminate the trial	N/A; low risk behaviour change intervention for a short duration
Harms	22	Plans for collecting, assessing, reporting, and managing solicited and spontaneously reported adverse events and other unintended effects of trial interventions or trial conduct	N/A; low risk behaviour change intervention for a short duration
Auditing	23	Frequency and procedures for auditing trial conduct, if any, and whether the process will be independent from investigators and the sponsor	N/A; low risk behaviour change intervention for a short duration
Ethics and dissemination			
Research ethics approval	24	Plans for seeking research ethics committee/institutional review board (REC/IRB) approval	P 15; L360-362
Protocol amendments	25	Plans for communicating important protocol modifications (eg, changes to eligibility criteria, outcomes, analyses) to relevant parties (eg, investigators, REC/IRBs, trial participants, trial registries, journals, regulators)	P 16; L395-397

Consent or assent	26a	Who will obtain informed consent or assent from potential trial participants or authorised surrogates, and how (see Item 32)	P 15-16; L363-377
	26b	Additional consent provisions for collection and use of participant data and biological specimens in ancillary studies, if applicable	N/A; no ancillary studies
Confidentiality	27	How personal information about potential and enrolled participants will be collected, shared, and maintained in order to protect confidentiality before, during, and after the trial	P 13; L317-319
Declaration of interests	28	Financial and other competing interests for principal investigators for the overall trial and each study site	P 17; L413
Access to data	29	Statement of who will have access to the final trial dataset, and disclosure of contractual agreements that limit such access for investigators	P13; L319-321
Ancillary and post-trial care	30	Provisions, if any, for ancillary and post-trial care, and for compensation to those who suffer harm from trial participation	N/A; low risk behaviour change intervention for a short duration
Dissemination policy	31a	Plans for investigators and sponsor to communicate trial results to participants, healthcare professionals, the public, and other relevant groups (eg, via publication, reporting in results databases, or other data sharing arrangements), including any publication restrictions	P 16; L380-388
	31b	Authorship eligibility guidelines and any intended use of professional writers	P 16; L386-388
	31c	Plans, if any, for granting public access to the full protocol, participant-level dataset, and statistical code	P 17; L424-429
Appendices			
Informed consent materials	32	Model consent form and other related documentation given to participants and authorised surrogates	Supplementary material
Biological specimens	33	Plans for collection, laboratory evaluation, and storage of biological specimens for genetic or molecular analysis in the current trial and for future use in ancillary studies, if applicable	N/A; no biological specimens collected

*It is strongly recommended that this checklist be read in conjunction with the SPIRIT 2013 Explanation & Elaboration for important clarification on the items. Amendments to the protocol should be tracked and dated. The SPIRIT checklist is copyrighted by the SPIRIT

BMJ Open

Todurujo na Kadurok (Empowering Youth): study design of an HIV self-testing and edutainment comic cluster randomized trial among refugee youth in a humanitarian setting in Uganda

Journal:	*BMJ Open*
Manuscript ID	bmjopen-2022-065452.R1
Article Type:	Protocol
Date Submitted by the Author:	05-Sep-2022
Complete List of Authors:	Logie, Carmen; University of Toronto, Factor-Inwentash Faculty of Social Work; University of Toronto, Women's College Research Institute Okumu, Moses ; University of Illinois at Urbana-Champaign, School of Social Work; Uganda Christian University, Department of Social Work Loutet, Miranda; University of Toronto Dalla Lana School of Public Health Coelho, Madelaine; University of Toronto Berry, Isha ; University of Toronto Dalla Lana School of Public Health, Gittings, Lesley; University of Cape Town, ; University of Toronto, Odong Lukone, Simon; Uganda Refugee and Disaster Management Council Kisubi, Nelson; Uganda Refugee and Disaster Management Council Malon, Atama; Yumbe Hospital Kyambadde, Peter ; Mulago Hospital, Most at Risk Population Initiative
Primary Subject Heading:	HIV/AIDS
Secondary Subject Heading:	Global health, Public health, Sexual health, Research methods
Keywords:	HIV & AIDS < INFECTIOUS DISEASES, Public health < INFECTIOUS DISEASES, PREVENTIVE MEDICINE, PUBLIC HEALTH

Todurujo na Kadurok (Empowering Youth): study design of an HIV self-testing and edutainment comic cluster randomized trial among refugee youth in a humanitarian setting in Uganda

Carmen H Logie[1, 2, 3, 4], Moses Okumu[5], Miranda Loutet[6], Madelaine Coelho[4,7], Isha Berry[6], Lesley Gittings[1,8], Simon Odong Lukone[9], Nelson Kisubi[9], Malon Atama[10], Peter Kyambadde[11,12]

[1]Factor-Inwentash Faculty of Social Work, University of Toronto, Toronto, ON, Canada
[2]United Nations University Institute for Water, Environment, and Health, Hamilton, ON, Canada
[3]Centre for Gender & Sexual Health Equity, Vancouver, BC, Canada
[4]Women's College Research Institute, Women's College Hospital, Toronto, ON, Canada
[5]School of Social Work, University of North Carolina Chapel Hill, Chapel Hill, NC, USA
[6] Dalla Lana School of Public Health, University of Toronto, Toronto, ON, Canada
[7] Department of Sociology, University of Toronto, Toronto, ON, Canada
[8] Centre for Social Science Research, University of Cape Town, South Africa
[9] Uganda Refugee and Disaster Management Council, Yumbe, Uganda
[10] Yumbe General Hospital, Yumbe, Uganda
[11]National AIDS Coordinating Program, Ugandan Ministry of Health, Kampala, Uganda
[12]Most at Risk Population Initiative (MARPI), Mulago Hospital, Kampala, Uganda

Co-authors' ORCID iDs:
Carmen H Logie http://orcid.org/0000-0002-8035-433X
Moses Okumu https://orcid.org/0000-0003-2555-3077
Miranda Loutet https://orcid.org/0000-0002-6293-3047
Isha Berry https://orcid.org/0000-0003-3138-664X
Lesley Gittings https://orcid.org/0000-0002-0463-0478
Odong Simon Lukone https://orcid.org/0000-0002-6780-1705
Nelson Kisubi https://orcid.org/0000-0002-0260-4620
Malon Atama https://orcid.org/0000-0003-1409-1970
Peter Kymbadde https://orcid.org/0000-0002-9606-218X

*Corresponding Author: Dr. Carmen Logie, University of Toronto, Factor-Inwentash Faculty of Social Work, 246 Bloor St W, Toronto, ON M5S 1V4, carmen.logie@utoronto.ca

Abstract

Introduction: Refugees experience HIV vulnerabilities due to the confluence of displacement, violence, and poverty. HIV self-testing, understudied in refugee settlements, is a promising method to increase testing uptake, yet challenges remain linking persons to confirmatory testing following a positive HIV self-test. This study aims to evaluate the effectiveness of HIV self-testing kits and "edutainment" comics in increasing HIV testing and HIV status knowledge among refugee youth aged 16-24 years in Bidi Bidi Refugee Settlement, Uganda.

Methods and analysis: This study will be conducted in Bidi Bidi. We conducted a qualitative formative phase to generate knowledge of contextually-specific barriers and facilitators of HIV prevention, testing and care among refugee youth (aged 16-24) in Bidi Bidi. These findings were then used to create comic scenarios aligning with health promotion edutainment approaches and inform a four-arm cluster randomized controlled trial in Bidi Bidi using a 2 x 2 factorial design: 1) HIV self-testing alongside edutainment comics, 2) HIV self-testing alone, 3) edutainment comic alone, and 4) standard of care. Approximately 120 youth (30 per arm) will be enrolled in the trial and followed for 3 months. Data will be collected at baseline and 3-months after enrolment. The primary outcomes (HIV testing frequency, HIV status knowledge) and secondary outcomes (linkage to confirmatory HIV testing, HIV care linkage, HIV self-test kit use, HIV-related stigma, HIV knowledge, safer sex efficacy, condom use, adolescent sexual and reproductive health stigma, sexual relationship power, SRH service access) will be evaluated using descriptive statistics and regression analyses.

Ethics and dissemination: This study has been approved by the University of Toronto Research Ethics Board, the Mildmay Uganda Research Ethics Committee, and the Uganda National Council for Science and Technology. This trial is registered at ClinicalTrials.gov (#NCT05213689). Results will be published in peer-reviewed journals and findings communicated through community forums.

Strengths and limitations of this study:

- *Todurujo na Kadurok* (Empowering Youth) study is unique in exploring the use of edutainment comic books as a form of graphic medicine in addition to a clinical intervention (HIV self-testing kits) for improving HIV testing uptake and status knowledge among youth living in a humanitarian context in Uganda.
- This study will advance knowledge of HIV self-testing implementation in a refugee settlement context.
- The primary study limitations are potential loss to follow-up.
- This research will produce new information on the potential benefits of low-cost graphic medicine approaches on increasing HIV self-testing benefits among refugee youth, with implications for scaling-up HIV self-testing in humanitarian contexts.

BACKGROUND

HIV vulnerabilities among displaced and refugee adolescents are shaped by a complex interplay of factors including poverty, violence, host community HIV prevalence, HIV urbanization, HIV testing and care access, and living conditions [1–3]. There is a dearth of data on HIV prevalence among refugee and displaced persons [1, 2]. Displaced and refugee populations often do not have the same access to HIV testing and treatment as host populations, and therefore, the United Nations has prioritized refugees as a key population for HIV policy and programming [2]. A systematic review of studies conducted among refugee, migrant and displaced girls and young women across the African continent found that information regarding STIs and HIV prevalence among this population is not well characterized, comprehensive HIV and STI knowledge is low, and access and availability of sexual health services is constrained due to distance, costs and stigma [3].

Uganda is the largest refugee hosting nation in Africa with over 1.4 million refugees in 2020, with more than 240,000 living in Bidi Bidi settlement near the South Sudan border [4]. Youth represent 44.4% of all new HIV infections in Uganda, with most infections sexually transmitted [5]. HIV prevalence among adolescents and young people in Uganda is 10.8% and is markedly higher among women (15.4%) compared with men (4.8%)[6]. Less is known of HIV prevalence, testing and prevention engagement among youth living in refugee settlements in Uganda, including in Bidi Bidi [7].

There is limited inclusion of refugee adolescents and youth in sexual and reproductive health research and programming [8–10] that may result in a lack of age, gender, culturally tailored programs, which in turn may contribute to low engagement with HIV testing and prevention services in humanitarian contexts [11]. Studies conducted among urban refugee youth

in Kampala, Uganda have found that inequitable gender norms and intersecting forms of stigma, including HIV-related stigma and refugee stigma, may also limit HIV testing and prevention engagement among refugee youth [12–15]. Social network breakdown, poverty and travel distance to clinics, confidentiality concerns, language barriers and other logistic hurdles may also present obstacles to HIV testing [16,17].

HIV self-testing (HIVST) is a promising approach documented across systematic reviews to increasing HIV testing access and uptake [18–20]. This approach may mitigate confidentiality concerns, increase convenience, and reduce the risk of stigmatization, particularly important considerations for HIV testing with adolescents and youth [21–24]. HIVST involves an individual collecting their own oral specimen, conducting the test, and interpreting the results independently with support from pictorial and written instructions. There is also a dearth of information regarding advances in HIV testing, such as HIV self-testing, among youth in humanitarian contexts [25], including countries with a high HIV prevalence and large number of refugees such as Uganda.

There remain gaps in linkage to care following a positive HIV self-test when compared with standard HIV testing services, and addressing these gaps requires innovative approaches [26]. Innovative approaches can often be population-specific and community-driven, repurposing tools that are used in other fields of work. Comics—a form of graphic medicine—integrate text and visual images and are a promising health promotion tool used to address a variety of health conditions such as HIV, sexually transmitted infections, vaccines, and dementia [27–32]. Edutainment comics have been used to educate both the general population and healthcare providers [33,34]. Comics align with the entertainment-education ('edutainment') approach to improve health knowledge, attitudes and practices applied in HIV prevention research [35,36]. In

the field of HIV, comics were used in the Undetectables Intervention for antiretroviral therapy adherence in the United States, PrEP research in the United States, as well as in HIV education in schools in Kenya that improved students' knowledge about HIV, reduced stigma towards people living with HIV, and increased likelihood and intention of testing [37–39]. Among refugees, comics have been used in mental health research in Greece and Lebanon [40,41]. We did not locate research on HIV testing interventions applying comics in humanitarian settings.

This cluster randomized trial, *Todurujo na Kadurok* (loosely translated to 'Empowering Youth' in Bari), aims to conduct an HIV self-testing and edutainment comic intervention and evaluate its effectiveness in increasing HIV testing and HIV status knowledge among refugee youth in Bidi Bidi refugee settlement, Uganda. The comic intervention will be theoretically informed by the HIV prevention cascade [42-44] to address gaps in motivation, access and effective use identified in formative research. Study findings can inform local and global responses to increase HIV testing engagement with youth in humanitarian contexts.

METHODS

Study aims and objectives

The overarching study goal is to evaluate the effectiveness of HIV self-testing, edutainment comic, or a combination of both interventions on increasing HIV testing, HIV status knowledge and linkage to confirmatory testing and care among refugee youth aged 16 to 24 years living in Bidi Bidi refugee settlement, Uganda. The primary objectives are to evaluate the effectiveness of the interventions on participants (1) HIV status knowledge and (2) HIV testing frequency. Secondary objectives include examining the impact of the intervention on: (1) HIV self-testing kit use, (2) linkage to confirmatory HIV testing for those testing positive on the HIVST, and (3)

linkage to HIV care for those testing positive, (4) HIV-related stigma, (5) adolescent sexual and reproductive health stigma, (6) HIV knowledge, (7) safer sex efficacy, (8) condom use, (9) sexual relationship power, and (10) access to other sexual and reproductive health services (e.g., contraception, post-exposure prophylaxis).

Study Design

We are conducting a cluster randomized trial using a 2 x 2 factorial design (see Figure 1) [45]. This approach will specifically test the effectiveness of offering: 1) HIV self-testing alongside the edutainment comic, 2) HIV self-testing alone, 3) edutainment comic alone, and 4) standard of care, on defined primary and secondary outcomes. Factorial designs are an appropriate and efficient approach to understand synergies between interventions. As HIV self-testing is an established testing approach that is feasible and acceptable [26,45–47], we are particularly interested to see if the benefits of HIV self-testing with youth in a humanitarian context are increased with accompanying edutainment comics that are theoretically designed to address barriers to testing and care across the HIV cascade. This design can help with identifying effective strategies to reach study aims and in turn can inform intervention design to include the most effective components [48]. Study design and research implementation was in collaboration between the University of Toronto and a refugee agency based in Bidi Bidi called Uganda Refugee and Disaster Management Council (URDMC). Data will be collected from all participants directly before providing the intervention (baseline: time 1), and again at 3-month follow-up (time 2).

Study setting

This trial will be conducted in four villages located in two zones in Bidi Bidi Refugee Settlement within the Yumbe district in Northwestern Uganda. With over 245,000 refugees largely (99.9%) from South Sudan, Bidi Bidi is the world's second-largest refugee settlement with one-quarter of the population (25%; n=61,036) youth aged 15 to 24 years [49]. In Bidi Bidi, health centers offer free regular testing for HIV and comprehensive HIV care services including adult and pediatric antiretroviral therapy (ART) and cotrimoxazole prophylaxis. However, only a few facilities in the settlement offer comprehensive HIV care such as Prevention of Mother to Child Transmission (PMTCT) services. Moreover, there are reported challenges including lack of facility accreditation to offer HIV care, drug and test kits stock out and poor adherence to ART by the refugees [50,51].

The clinical trial study setting includes two villages in Zone 3, with more than 58,000 residents, and two villages in Zone 4 annex, with more than 52,000 residents [49]. To ensure anonymity of participants, the village numbers are not included in this protocol. The zones and villages were selected due to large geographical separation to avoid contamination of intervention arms, eagerness of youth in these areas to learn more about HIV testing, and to fill a void of HIV research in these particular areas. In Zone 3 there are the following participating health centres: Jomorogo Health Centre 3, Kongbe Health Centre 3, Yoyo Health Centre 3, Luzira Health Centre 3. In Zone 4 annex the following health centres will participate: Igamara Health Centre 3, Bolomoni Health Centre 3, Bangatuti Health Centre, and Kulikulinga Government Centre. All participants will be able to access these health centres throughout the study for HIV testing and treatment.

Participants and recruitment

We will use convenience sampling methods, including peer driven recruitment supported by collaborators at URDMC and eight peer navigators. Peer navigators are self-identified young refugees aged 20-24 years living in Bidi Bidi, specifically Zone 3 and Zone 4 annex, who received training from the study team in research methods and confidentiality and are supervised by URDMC. Inclusion criteria for participants in the *Todurujo na Kadurok* study include: (1) living in one of the four selected villages in Zone 3 and Zone 4 annex in Bidi Bidi; (2) identifying as a refugee or displaced person; (3) aged 16-24 years; and (4) speaking and reading one of the study languages (English, Bari, Juba Arabic).

For the cluster randomized controlled trial, participants will be randomized by the village they live in. URDMC and peer navigators will recruit a total of 120 participants, with 30 participants in each of the four arms. The arms will be geographically separated into four different villages from two zones to avoid contamination of the intervention effects. The villages will be randomly assigned to a study arm. Youth will be approached by peer navigators and study staff at URDMC to be recruited to the study. At the baseline visit (time 1) the youth will be provided a written consent form, which will be available in English, Bari and Juba Arabic. Once the youth have provided informed written consent they will be enrolled into the study, assigned to a study arm based on the village that they live in, and baseline data will be collected by a URDMC research assistant. Peer navigators will use multiple study reminder strategies (e.g., texts, private messages over social media) to maintain engagement until the follow-up visit at 3-months after enrolment. These efforts will be supplemented with existing outreach services to youth by URDMC.

Patient and public involvement

This study protocol was developed after a formative qualitative research phase. As depicted in Figure 1, this formative research in Phase 1 included four focus groups conducted by two URDMC research assistants (2 with young women, 2 with young men) with refugee youth in Bidi Bidi (n=10 in each focus group; n=40 in total) aged 16-24 years to collect information on knowledge of current HIV testing opportunities and experiences in Bidi Bidi and perspectives on HIV self-testing. HIV prevention cascade conceptual frameworks were used by analysts at the University of Toronto in the analysis of the qualitative data to inform the study to address gaps in linkage to care following HIV self-testing [42,43]. Three key domains of the HIV prevention cascade include motivation, access, and effective use, and these dimensions can be tailored to identify population specific needs [43,44]. For instance, Moorhouse et al. applied the HIV prevention cascade framework to develop community-based HIV prevention interventions and noted dimensions of *motivation* (knowledge, risk perception, consequence of use, social norms), *access* (availability, acceptable provision, affordability), and *effective use* (skills, self-efficacy, partner) [42]. These qualitative findings were used to identify key themes for the development of the edutainment comics (see Table 1); in this way the study responds to the health needs and priorities of refugee youth in this humanitarian context.

These focus groups were followed by a 3-day human-centered design workshop led by URDMC research managers who engaged eight peer navigators to adapt and develop HIV self-testing edutainment materials to enhance cultural, gender, age, and contextual relevance (see Figure 1). The study was designed and will be conducted as a collaboration with local physicians, clinics, and the implementing partner is a refugee agency based in Bidi Bidi. These study collaborators have been involved since the study inception and will lead implementation. Peer navigators (n=8) who share the participants' refugee lived experiences, and include youth

living with HIV, have meaningfully contributed to the study design through the human centered design workshops, feedback into edutainment comic development, pilot testing of study tools, and will support implementation of the cluster randomized controlled trial through actively contributing to participant recruitment, engagement, and retention.

Table 1. Scenarios on the HIV prevention cascade included in the edutainment comic

Domain of prevention cascade	**Stage of the prevention cascade**	**Description**
Motivation	Risk perception	Discussion explores perceived risk for HIV and a) misinformation (e.g., sharing body lotion is not as an HIV risk factor) and b) provides information about condom breakage and post-exposure prophylaxis.
	Consequence of use	Discussion between healthcare provider and youth of how to manage a positive HIV test result, including the ability to manage confidentiality and access support services.
	Social norms	Discussion of experiences of HIV stigma and discrimination, as well as an example of receiving support from a friend.
	Knowledge	Discussion of knowledge as power, including benefits of knowing one's HIV positive and HIV negative serostatus.
Access	Access and availability	Parallel conversations between youth around testing barriers, including travel costs, and stockouts of HIV testing kits, with a discussion of locations for testing and support in Bidi Bidi.
	Acceptable provision	Discussions of a) the possibility of receiving an HIV test while accessing other health services such as contraception and condoms; b) accessing HIV testing from a healthcare provider of a different gender; c) feeling empowered to find a doctor one feels comfortable talking with about sexual health
Effective use	Partner	Discussion of HIV testing with partner to assess partner perspectives on HIV testing and evaluate concerns (e.g., negative partner reaction, violence, consequence of positive test result). Healthcare provider discussion of partner testing with a couple, including possible sero-discordant results. Decision making considerations for engaging in partner testing, including motivations (empowerment, support, open communication, stronger relationship) and barriers (loss of trust, violence, conflict, break up).
	Skills	Discussion of disclosure process and decision making regarding who to disclose an HIV positive test result with.
	Self-efficacy	Discussion of how knowledge of HIV testing benefits, HIV positive serostatus, and available resources increase empowerment to take care of oneself and support others.

Intervention description

Todurujo na Kadurok is a 2 x 2 factorial cluster randomized trial, with clusters randomized to one of the following four arms: (1) HIV self-testing and edutainment comic, (2) HIV self-testing only, (3) edutainment comic only, and (4) standard of care.

Participants in the HIV self-testing arms (arm 1; arm 2) will each receive two HIV self-testing kits (OraQuick Rapid HIV-1/2 Antibody Test, OraSure Technologies) at baseline along with verbal, written and visual instructions (in their choice of study language), as well as linkages to peer navigators and URDMC for support accessing confirmatory testing and care.

Participants in the edutainment comic arms (arm 1; arm 3) will receive a hard copy of the edutainment comic at baseline. They will meet with the peer navigator to review and discuss the comic themes and will be provided with a blank version to complete on their own. This approach to edutainment comics provides a participatory component whereby participants can contextualize the comic themes within their own lives and experiences [52]. In addition to the comic, the participants in arm 1 and 3 will also have linkages to peer navigators and URDMC for support accessing confirmatory testing and care.

Participants in the standard of care arm (arm 4) will receive verbal and written information and resources about HIV testing, care, and support services in Bidi Bidi and Yumbe Hospital from their peer navigator as well as contact information for URDMC and an overview of their programs offered. The existing standard of HIV care in Bidi Bidi is offered through clinics located in Bidi Bidi settlement and the hospital in Yumbe and includes pre- and post-test counselling for HIV, follow-up visits for HIV care in the community, intensive treatment adherence counselling for immunosuppressed and non-immunosuppressed patients in the community and facility, and community drug re-fills for people living with HIV.

Outcomes

The primary outcomes measured in this trial will be:

1. Changes in HIV testing frequency: This is measured as participants' self-reported last HIV test. To capture changes, this measure is assessed at both study time points (baseline [Time 1], 3 months [Time 2]).
2. Changes in HIV status knowledge: At the final 3-month visit, a clinician supported by trained peer navigators will offer all participants a completely voluntary rapid point-of-care HIV test (Alere Determine HIV-½) to measure HIV status knowledge. HIV status knowledge will be assessed as correct for participants that agree to take the rapid test and correctly report their HIV status before receiving the result.

The secondary outcomes include:

1. Changes in linkage to confirmatory HIV testing: Participants in arm 1 and arm 2 (e.g., those given a HIVST) will be asked at Time 2 if they used their HIV self-test kit. All participants who report using the test will be asked the result, and participants who self-report a positive result will be asked if they received confirmatory testing, and if so, where they received the test. Participants will also be provided study coupons (with only the name of the UDRMC and their study ID#) that they can provide when receiving HIV or other sexual and reproductive health services at collaborating health clinics; this clinic engagement will be linked to the participant study ID#.
2. Changes in linkage to HIV care: At Time 2, participants who seroconvert in the study will be asked if they received HIV care, including ART and counseling, since receiving an HIV-positive diagnosis.

3. HIV self-test kit use: In order to understand the use of HIV self-test kits and to reduce social desirability bias, one month after Time 2 the participants in arm 1 and arm 2 will be asked if they have unused test kits. They will be informed this information is just to guide future trials.
4. HIV-related stigma, assessed with the Reinius et al., 2017 12-item short HIV stigma assessment [53] including vicarious and felt-normative HIV stigma dimensions through an internalized AIDS-related scale from Kalichman et al. 2020 [54,55].
5. HIV knowledge assessed with the HIV knowledge questionnaire by Carey & Schroder [56].
6. Safer sex efficacy using the Condom Use Self-Efficacy Scale [57,58].
7. Condom use in past 3 -months (condom use at last sex; condom use at sex every time in last 3 months [dichotomous: yes/no]).
8. Adolescent sexual and reproductive health stigma, assessed with the Ugandan Adolescent Sexual and Reproductive Health (SRH) Stigma scale (Logie et al. 2019) adapted from Hall et al.'s Adolescent SRH Stigma scale [59]
9. Sexual relationship power (SRP) using the Relationship Control Sub-Scale from the Sexual & Relationship Power Scale [60]
10. Access to other SRH services will be assessed by asking if the participants went to any health clinic/hospital or service provider in the past 3 months to access: condoms, lubricant, contraception, post-exposure prophylaxis, pre-exposure prophylaxis, pregnancy test, sexual and gender-based violence information, sexually transmitted infections testing, or other services. Participants will be provided coupons with UDRMC logo and their study ID to bring to participating clinics when accessing services, so this variable will be assessed by

self-report by participant as well as by collecting study coupons that will be attached to a list of services accessed during the study timeframe.

All participants, regardless of study arm, will receive an HIV self-test at the end of the study with accompanying instructions, information and resources to ensure the study arms without access to HIV self-testing are made aware of this approach and can access its benefits.

Sample size and power

We will recruit 120 refugee youth aged 16-24 years living in Bidi Bidi (60 adolescent girls, 60 adolescent boys) in the cluster randomized trial. The recruited youth will come from four villages in two zones (Zone 3 and Zone 4 annex) within Bidi Bidi, and each village will be randomized to a study arm such that all youth living in the village are clustered to receive the same intervention. Calculated using G*Power 3.1, a sample size of 105 is sufficient for multivariable regression analyses (effect size: 0.2, power: 0.95, number of tested predictors: 5, critical F: 2.306) [61]. To account for 15% attrition, we have selected a sample size of 120.

Data collection and management

For the cluster randomized trial, we will collect sociodemographic characteristics from participants at time 1, and exposures relevant to sexual and reproductive health and outcome data at both timepoints (time 1, time 2). Data will be collected using tablet-based structured surveys conducted by trained URDMC research assistants in all study languages. Data will be collected using SurveyCTO (Dobility, Cambridge, USA), which is a secure platform whereby data collected is automatically encrypted and uploaded to a password-protected server using a Secure Sockets Layer (SSL) certificate. SurveyCTO allows for data to be collected offline and has

branching logic, consistency checks, and facilitates multi-lingual data collection. No personal identifying information will be collected with the survey data, all participants will instead be given a unique participant ID to enhance confidentiality. Only study staff at URDMC and University of Toronto will have access to the dataset for the purpose of data management and outcome reporting, and all datasets will be saved on a password-protected server.

Data analysis

Analysis and reporting for the cluster randomized trial will be conducted in accordance with CONSORT (Consolidated Standards of Reporting Trials) guidelines [62]. The analyst at the University of Toronto will be blinded to group allocation. A flow diagram will be used to illustrate patient flow (consent/enrolment, randomization, baseline, and follow-up). Baseline data will be reported for all four arms and summarized as mean and standard deviations or median and interquartile range for continuous variables and as number and percentage for categorical variables. The primary analysis will involve intention-to-treat analysis (data from participants will be analyzed according to their allocation, irrespective of whether they received the intervention). Between-group comparisons will be performed using generalized estimating equations (GEE) logistic or linear regression models – depending on which outcome is being evaluated - using unstructured correlation matrix and robust standard errors to account for clustering. For these models, the intervention effects across time (from baseline to 3-month follow-up) will be included as the main effects of intervention arm, time, and an arm*time interaction. The level of significance will be set at alpha=0.05. The results will be expressed as odds ratios or mean differences as appropriate, accompanied by 95% confidence intervals and p-values. We will conduct an adjusted analysis for the primary outcome (changes in HIV testing

frequency, HIV self-test kit use, HIV status knowledge, changes to linkage to confirmatory HIV testing and to HIV care) to investigate the role of various covariates in the relative effect. Covariates, such as age and gender, will be entered as a block. We will explore gender differences in primary and secondary intervention outcomes. Given the outcomes of this study are related to behavior change and the trial is of a short duration with minimal risks, a data monitoring committee was not deemed necessary.

DISCUSSION

This study approach has the potential to inform research, practice, and policy surrounding measuring the efficacy of new programming and HIV-related testing. Study findings, therefore, have the potential to not only inform a larger, fully powered randomized controlled trial to test the effectiveness of an edutainment comic book intervention but can also inform policies on how strategies such as comic books can be integrated into school health curricula for HIV prevention. Our findings can also inform research, practice, and policy on HIV/AIDS among youth, to better meet the needs of refugee adolescents and youth. An edutainment comic book intervention approach holds promise for meaningfully engaging youth and healthcare providers in humanitarian contexts in dialogue on STI prevention, care, and support.

Strengths and limitations of this study

The Todurujo na Kadurok cluster randomized trial is unique in exploring HIV self-testing feasibility and uptake among youth living in a large refugee settlement using innovative community-based health promotion activities. The study design will allow us to assess if HIV self-testing along, edutainment comics or HIV self-testing alongside the edutainment comics

increase HIV testing frequency and status knowledge compared to standard of care. By clustering the interventions to areas within Bidi Bidi Refugee Settlement we aim to mitigate threats to internal validity and contamination of the intervention effects. The study is subject to limitations commonly incurred by prospective longitudinal studies – loss to follow-up and missing data. However, we will mitigate these limitations by using peer navigators to recruit and follow-up on participants in the community, and will also conduct digital questionnaires on tablets that are programmed to flag missing data.

ETHICS AND DISSEMINATION

Ethical approval

Ethical approval for the study was provided through the Mildmay Uganda Research Ethics Committee (REC REF 0802-2021), UNCST (SS884ES), and the University of Toronto Research Ethics Board (37496). This trial is registered at ClinicalTrials.gov (#NCT05213689). The protocol for the study was developed in accordance with the SPIRIT Statement [63,64]. To ensure the protection of human subjects, all participants in the formative phase and the cluster randomized controlled trial will be provided with enough time to provide written voluntary consent to participate in the study. All informed written consent processes will occur in a private room at a location provided by URDMC. The participant will read the consent form themselves or a peer navigator will read aloud the informed consent in a language comfortable to the participant (English, Bari or Juba Arabic) and will ask if the participant has any questions and will answer their questions. Participants will be asked to sign the consent form or provide a thumbprint to indicate their consent. The consent form will in no way be connected with focus group transcripts or data collected during the cluster randomized trial and will be destroyed five

years after data collection is completed. As Uganda's HIV and AIDS Prevention and Control Act permits youth aged 12 years or above to independently access HIV testing and counselling without parental permission, we received ethics approval to allow youth aged 16-17 years to participate without parental consent; this is a common approach to reduce barriers to youth participation in sexual and reproductive health research [65–67].

Emotional risks include that participants may feel uncomfortable, anxious, or upset taking an HIV test, stigma due to accidental disclosure of HIV serostatus, psychosocial harm as a result of learning HIV status, discussing HIV, STI, sexual risk factors, and social capital. The study has been designed to minimize psychological/emotional risks of feeling uncomfortable, anxious, or upset with study questions and topics of discussion through wellbeing-focussed training for data collectors. URDMC will also collaborate with a local psychological aid organization to support peer navigators and participants during any mental distress. Moreover, we will ensure the confidentiality of all participants by not collecting identifying information (i.e., no full names, no date of birth).

Dissemination plan

We will employ participatory methods for knowledge dissemination, working with youth peer navigators to develop strategies such as youth community forums and arts-based methods (e.g., comic books) and brief videos. We will make findings available in English, Bari and Juba Arabic. Findings will be disseminated through a variety of methods including the preparation of community reports (disseminated to the Ugandan National AIDS Program, Ministry of Health, and our collaborators [e.g., URDMC]) and peer-reviewed publications (e.g., Journal of the International AIDS Society). Irrespective of study findings, results will be published in peer-

reviewed scientific journals following international authorship guidelines, and will be presented to academics and researchers at key scientific conferences.

Trial status

The formative qualitative phase of the *Todurujo na Kadurok* (Empowering Youth) study was launched in September 2021. The study team has been trained and ethics approval obtained. All qualitative activities from phase 1 and the development of the comic book have been completed. We anticipate for the intervention to begin in Fall 2022 along with baseline data collection, and the final follow-up survey to be conducted 3-months later in late 2022. Any important protocol modifications will be included as amendments in REB and updated on the ClinicalTrials.gov registry, as and when needed. Box 1 details the information on the ClinicalTrials.gov registry.

Box 1. Items from the US National Institutes of Health Trial Registry

Data category information
Primary registry and trial identifying number: ClinicalTrials.gov NCT05213689.
Date of registration: 28 January 2022.
Source(s) of monetary support: ViiV Healthcare (Grant#628520-1652450711)
Primary sponsor: University of Toronto.
Primary sponsor: University of Toronto.
Contact for public and scientific queries: Carmen Logie, PhD (carmen.logie@utoronto.ca).
Public and scientific title: HIV Self-Testing and Comic Intervention with Refugee Adolescents and Youth.
Countries of recruitment: Uganda.
Health condition(s) or problem(s) studied: HIV testing, status knowledge, linkage to confirmatory and care.
Intervention(s): HIV self-testing kits and edutainment comic books.

Key inclusion criteria: living in one of the four selected villages in Zone 3 and Zone 4 annex in Bidi Bidi; identifying as a refugee or displaced person; aged 16-24 years; and speaking and reading one of the study languages (English, Bari, Juba Arabic).

Study type: interventional (clinical trial); cluster randomized control trial with 4 study arms.
Date of first enrolment: June 2022 (estimate)
Target sample size: 120.

Primary outcome(s): HIV testing frequency, HIV status knowledge, linkage to confirmatory HIV testing, linkage to HIV care, HIV self-test kit use.
Key secondary outcomes: HIV-related stigma, HIV knowledge, safer sex efficacy, condom-use, sexual and reproductive health (SRH) stigma, sexual relationship power and access to SRH services.

Acknowledgements: We would like to acknowledge the support and contributions of: Uganda Refugee and Disaster Management Council (URDMC), Uganda Ministry of Health, Uganda National AIDS Control Program, Mildmay Uganda, Uganda Office of the Prime Minister Department of Refugees, and the peer navigators.

Contributors: Study design – CHL, MO, IB. Data collection – SOL, ML, MC, IB, LG, NK, MA, CHL, MO. Data management – ML, MC, SOL, NK, CHL. Manuscript writing – MC, ML, CHL. Manuscript editing and critical review – CHL, MO, ML, MC, IB, LG, SOL, NK, MA, PK.

Funding Statement: This work was supported by ViiV Healthcare Limited (Grant#628520-1652450711). CHL is also funded by the Canada Research Chairs programme (#Tier 2), Canada Foundation for Innovation (#JELF), and the Ontario Ministry of Research and Innovation (ERA).

Disclaimer: Funding agencies played no role in the design or execution of the study.

Competing interests: The authors have declared that no competing interests exist.

Patient and public involvement: Patients and/or the public were involved in the design, or conduct, or reporting, or dissemination plans of this research. Refer to the Methods section for further details.

Patent consent for publication: Not required.

Provenance and peer review: Not commissioned; peer reviewed for ethical and funding approval prior to submission.

REFERENCES

1. Spiegel PB, Bennedsen AR, Claass J, Bruns L, Patterson N, Yiweza D, et al. Prevalence of HIV infection in conflict-afftected and displaced people in seven sub-Saharan African countries: a systematic review [Internet]. Vol. 369, www.thelancet.com. 2007. Available from: www.thelancet.com
2. UNAIDS. In Danger UNAIDS 2022 Update. Geneva, Switzerland; 2022.
3. Ivanova O, Rai M, Kemigisha E. A Systematic Review of Sexual and Reproductive Health Knowledge, Experiences and Access to Services among Refugee, Migrant and Displaced Girls and Young Women in Africa. Int J Environ Res Public Health. 2018;15(1583):1–12.
4. Refugee Statistics February 2022 - Bidibidi [Internet]. 2022 Mar [cited 2022 May 26]. Available from: https://data2.unhcr.org/en/documents/details/91322
5. Presidential Fast-Track Initiative On Ending HIV & AIDS In Uganda. Kampala; 2017 Jun.
6. Nanyonjo G, Asiki G, Ssetaala A, Nakaweesa T, Wambuzi M, Nanvubya A, et al. Prevalence and correlates of hiv infection among adolescents and young people living in fishing populations along lake victoria fishing communities in uganda. Pan African Medical Journal. 2020 Sep 1;37:1–12.
7. O'Laughlin KN, Rouhani SA, Faustin ZM, Ware NC. Testing experiences of HIV positive refugees in Nakivale Refugee Settlement in Uganda: Informing interventions to encourage priority shifting. Conflict and Health. 2013;7(1):1–9.
8. Jennings L, George AS, Jacobs T, Blanchet K, Singh NS. A forgotten group during humanitarian crises: a systematic review of sexual and reproductive health interventions for young people including adolescents in humanitarian settings. Conflict and Health [Internet]. 2019 Oct 3;13(1):57. Available from: https://doi.org/10.1186/s13031-019-0240-y
9. Singh NS, Smith J, Aryasinghe S, Khosla R, Say L, Blanchet K. Evaluating the effectiveness of sexual and reproductive health services during humanitarian crises: A systematic review. PloS One [Internet]. 2018;13(7):e0199300. Available from: https://journals.plos.org/plosone/article/file?id=10.1371/journal.pone.0199300&type=printable
10. Singh NS, Aryasinghe S, Smith J, Khosla R, Say L, Blanchet K. A long way to go: a systematic review to assess the utilisation of sexual and reproductive health services during humanitarian crises. BMJ Global Health [Internet]. 2018 Jul 4;3(2):e000682. Available from: https://gh.bmj.com/content/3/2/e000682
11. Liebling H, Barrett H, Artz L. South Sudanese Refugee Survivors of Sexual and Gender-Based Violence and Torture: Health and Justice Service Responses in Northern Uganda. Int J Environ Res Public Health. 2020 Mar 5;17(5).
12. Warren E, Post N, Hossain M, Blanchet K, Roberts B. Systematic review of the evidence on the effectiveness of sexual and reproductive health interventions in humanitarian crises. Vol. 5, BMJ Open. BMJ Publishing Group; 2015.
13. Logie CH, Okumu M, Musoke DK, Hakiza R, Mwima S, Kyambadde P, et al. Intersecting stigma and HIV testing practices among urban refugee adolescents and youth in Kampala, Uganda: qualitative findings. J Int AIDS Soc [Internet]. 2021;24:e25674. Available from: http://onlinelibrary.wiley.com/doi/10.1002/jia2.25674/full

14. Logie CH, Okumu M, Berry I, Loutet M, Hakiza R, Kibuuka Musoke D, et al. Social contextual factors associated with lifetime HIV testing among the Tushirikiane urban refugee youth cohort in Kampala, Uganda: Cross-sectional findings. International Journal of STD and AIDS. 2022 Mar 1;33(4):374–84.
15. Logie CH, Okumu M, Mwima SP, Kyambadde P, Hakiza R, Kibathi IP, et al. Exploring associations between adolescent sexual and reproductive health stigma and HIV testing awareness and uptake among urban refugee and displaced youth in Kampala, Uganda. Sexual and Reproductive Health Matters. 2019 Nov 29;27(3):86–106.
16. Hlongwa M, Mashamba-Thompson T, Makhunga S, Hlongwana K. Barriers to HIV testing uptake among men in sub-Saharan Africa: a scoping review. African Journal of AIDS Research. 2020 Jan 2;19(1):13–23.
17. Logie CH, Okumu M, Kibuuka Musoke D, Hakiza R, Mwima S, Kacholia V, et al. The role of context in shaping HIV testing and prevention engagement among urban refugee and displaced adolescents and youth in Kampala, Uganda: findings from a qualitative study. Tropical Medicine & International Health. 2021;00(00):1–10.
18. Witzel TC, Eshun-Wilson I, Jamil MS, Tilouche N, Figueroa C, Johnson CC, et al. Comparing the effects of HIV self-testing to standard HIV testing for key populations: a systematic review and meta-analysis. BMC Medicine. 2020;18(1).
19. Qin Y, Han L, Babbitt A, Walker JS, Liu F, Thirumurthy H, et al. Experiences Using and Organizing HIV Self-Testing: A Global Qualitative Systematic Review. AIDS [Internet]. 2018 Dec 21;32(3):371–81. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5758403/
20. Johnson CC, Kennedy C, Fonner V, Siegfried N, Figueroa C, Dalal S, et al. Examining the effects of HIV self-testing compared to standard HIV testing services: a systematic review and meta-analysis. J Int AIDS Soc [Internet]. 2017 Jun 1;20(1):21594. Available from: http://doi.wiley.com/10.7448/IAS.20.1.21594
21. Johnson C, Baggaley R, Forsythe S, van Rooyen H, Ford N, Napierala Mavedzenge S, et al. Realizing the potential for HIV self-testing. Vol. 18, AIDS and Behavior. Springer New York LLC; 2014.
22. Choko AT, Nanfuka M, Birungi J, Taasi G, Kisembo P, Helleringer S. A pilot trial of the peer-based distribution of HIV self-test kits among fishermen in Bulisa, Uganda. PLoS ONE. 2018;13(11).
23. Smith P, Wallace M, Bekker LG. Adolescents' experience of a rapid HIV self-testing device in youth-friendly clinic settings in Cape Town South Africa: A cross-sectional community based usability study: A. J Int AIDS Soc. 2016;19(1).
24. Hatzold K, Gudukeya S, Mutseta MN, Chilongosi R, Nalubamba M, Nkhoma C, et al. HIV self-testing: breaking the barriers to uptake of testing among men and adolescents in sub-Saharan Africa, experiences from STAR demonstration projects in Malawi, Zambia and Zimbabwe. J Int AIDS Soc. 2019;22(S1):43–52.
25. Logie CH, Khoshnood K, Okumu M, Rashid SF, Senova F, Meghari H, et al. Self care interventions could advance sexual and reproductive health in humanitarian settings. BMJ. 2019;l1083–l1083.
26. Johnson CC, Kennedy C, Fonner V, Siegfried N, Figueroa C, Dalal S, et al. Examining the effects of HIV self-Testing compared to standard HIV testing services: A systematic review and meta-Analysis. J Int AIDS Soc. 2017;20(1):21594.

27. Greensides DR, Berkelman R, Lansky A, Sullivan PS. Alternative HIV Testing Methods Among Populations at High Risk for HIV Infection. Public Health Reports. 2003;118.
28. Gillies PA, Stork A, Bretman M. Streetwize UK: a controlled trial of an AIDS education comic [Internet]. Vol. 5, Source: Health Education Research. 1990. Available from: https://about.jstor.org/terms
29. Gallagher-Thompson D, Tzuang M, Hinton L, Alvarez P, Rengifo J, Valverde I, et al. Effectiveness of a Fotonovela for Reducing Depression and Stress in Latino Dementia Family Caregivers. Alzheimer Disease & Associated Disorders [Internet]. 2015;29(2):146–53. Available from: www.alzheimerjournal.com
30. Krasnoryadtseva A, Dalbeth N, Petrie KJ. The effect of different styles of medical illustration on information comprehension, the perception of educational material and illness beliefs. Patient Education and Counseling. 2020 Mar 1;103(3):556–62.
31. Muzumdar JM, Pantaleo NL. Comics as a Medium for Providing Information on Adult Immunizations. Journal of Health Communication. 2017 Oct 3;22(10):783–91.
32. Celentano I, Winer RL, Jang SH, Ibrahim A, Mohamed FB, Lin J, et al. Development of a theory-based HPV vaccine promotion comic book for East African adolescents in the US. BMC Public Health. 2021 Dec 1;21(1).
33. Waite M. Writing medical comics. Vol. 42, Journal of Visual Communication in Medicine. Taylor and Francis Ltd; 2019. p. 144–50.
34. Towey F. Comics and Medicine. Cancer and Society. 2014;15(9):927–8.
35. Orozco-Olvera V, Shen F, Cluver L. The effectiveness of using entertainment education narratives to promote safer sexual behaviors of youth: A meta-analysis, 1985-2017. PLoS ONE. 2019 Feb 1;14(2).
36. Vaughan PW, Rogers EM, Singhai A, Swalehe RM. Entertainment-education and HIV/AIDS prevention: a field experiment in Tanzania. Journal of Health Communication. 2000;5:81–100.
37. Ghose T, Shubert V, Poitevien V, Choudhuri S, Gross R. Effectiveness of a Viral Load Suppression Intervention for Highly Vulnerable People Living with HIV. AIDS and Behavior. 2019 Sep 1;23(9):2443–52.
38. Kuhn A, Maatman T. Annals Graphic Medicine - Should I PrEP? Barriers to HIV-Related Preventive Care Faced by Black MSM. Annals of Internal Medicine. 2021 Apr;174(4):W37–44.
39. Obare F, Birungi H, Deacon B, Burnet R. Effectiveness of using comic books to communicate HIV and AIDS messages to in-school youth: Insights from a pilot intervention study in Nairobi, Kenya. African Population Studies. 2013 Nov 4;27(2):203.
40. Moore T. Strengths-based narrative storytelling as therapeutic intervention for refugees in Greece. World Federation of Occupational Therapists Bulletin. 2017 Jan 2;73(1):45–51.
41. Bosqui T, Mayya A, Younes L, Baker MC, Annan IM. Disseminating evidence-based research on mental health and coping to adolescents facing adversity in Lebanon: a pilot of a psychoeducational comic book 'Somoud.' Conflict and Health. 2020 Dec 1;14(1).
42. Moorhouse L, Schaefer R, Thomas R, Nyamukapa C, Skovdal M, Hallett TB, et al. Application of the HIV prevention cascade to identify, develop and evaluate interventions to improve use of prevention methods: examples from a study in east Zimbabwe. 2019; Available from: http://onlinelibrary.wiley.com/doi/10.1002/jia2.25309/full

43. Schaefer R, Gregson S, Fearon E, Hensen B, Hallett TB, Hargreaves JR. HIV prevention cascades: a unifying framework to replicate the successes of treatment cascades [Internet]. Vol. 6. 2019. Available from: www.thelancet.com/hiv
44. HIV Prevention Cascades Stakeholder Consultation Meeting and Workshop Report on a consultation and workshop organised by the Manicaland Centre for Public Health Research* Biomedical Research and Training Institute Imperial College London * In association with UNAIDS, Zimbabwe Ministry of Health and Child Care, and Zimbabwe National AIDS Council; with funding from the Bill and Melinda Gates Foundation.
45. Montgomery AA, Peters TJ, Little P. Design, analysis and presentation of factorial randomised controlled trials. BMC Medical Research Methodology [Internet]. 2003;3(26):1–5. Available from: http://www.biomedcentral.com/1471-2288/3/26
46. Witzel TC, Eshun-Wilson I, Jamil MS, Tilouche N, Figueroa C, Johnson CC, et al. Comparing the effects of HIV self-testing to standard HIV testing for key populations: a systematic review and meta-analysis. BMC Medicine. 2020 Dec 1;18(381):1–13.
47. Qin Y, Han L, Babbitt A, Walker JS, Liu F, Thirumurthy H, et al. Experiences using and organizing HIV self-testing. AIDS. 2018 Jan 28;32(3):371–81.
48. Watkins ER, Newbold A. Factorial designs help to understand how psychological therapy works. Frontiers in Psychiatry. 2020 May 14;11(429):1–14.
49. Uganda - Refugee Statistics January 2022. Bidi Bidi; 2022 Feb.
50. Nakanwagi M, Okethwangu D, Kwesiga B, Ario AR. Availability of HIV services in BidiBidi refugee settlement, October to March 2017. UNIPH Bulletin Articles. 2021 Nov;2(2).
51. Palattiyil G, Kisaakye P, Mwenyango H, Katongole S, Mulekya F, Sidhva D, et al. Access to HIV/AIDS or TB care among refugees in Kampala, Uganda: exploring the enablers and barriers during the COVID-19 pandemic. Journal of Migration and Health [Internet]. 2022;5:100098. Available from: https://linkinghub.elsevier.com/retrieve/pii/S2666623522000216
52. Logie CH, Okumu M, Lukone SO, Loutet M, McAlpine A, Latif M, et al. Ngutulu Kagwero (agents of change): study design of a participatory comic pilot study on sexual violence prevention and post-rape clinical care with refugee youth in a humanitarian setting in Uganda. Global Health Action. 2021;14(1).
53. Reinius M, Wettergren L, Wiklander M, Svedhem V, Ekström AM, Eriksson LE. Development of a 12-item short version of the HIV stigma scale. Health and Quality of Life Outcomes. 2017 May 30;15(1).
54. Kalichman SC, Simbayi LC, Cloete A, Mthembu PP, Mkhonta RN, Ginindza T. Measuring AIDS stigmas in people living with HIV/AIDS: The Internalized AIDS-Related Stigma Scale. AIDS Care - Psychological and Socio-Medical Aspects of AIDS/HIV. 2009 Jan;21(1):87–93.
55. Pantelic M, Steinert JI, Park J, Mellors S, Murau F. "Management of a spoiled identity": Systematic review of interventions to address self-stigma among people living with and affected by HIV. BMJ Global Health. 2019 Mar 1;4(2).
56. Carey MP, Schroder KEE. Development and Psychometric Evaluation of the Brief HIV Knowledge Questionnaire. AIDS Education and Prevention. 2002;14(2):172–82.
57. Shaweno D, Tekletsadik E. Validation of the condom use self-efficacy scale in Ethiopia. BMC International Health and Human Rights [Internet]. 2013;13(22):1–8. Available from: http://www.biomedcentral.com/1472-698X/13/22

58. Brafford LJ, Beck KH. Development and validation of a condom self-efficacy scale for college students. J Am Coll Health Assoc. 1991;39(5):219–25.
59. Hall KS, Manu A, Morhe E, Harris LH, Loll D, Ela E, et al. Development and Validation of a Scale to Measure Adolescent Sexual and Reproductive Health Stigma: Results From Young Women in Ghana. Journal of Sex Research. 2018 Jan 2;55(1):60–72.
60. Pulerwitz J, Gortmaker SL, Dejong W. Measuring Sexual Relationship Power in HIV/STD Research. Sex Roles. 2000;42:637–60.
61. Faul F, Erdfelder E, Lang AG, Buchner A. G*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. Behavior Research Methods. 2007 Mar 30;39(2):175–91.
62. Smith BA, Lee HJ, Lee JH, Choi M, Jones DE, Bausell RB, et al. Quality of reporting Randomized Controlled Trials (RCTs) in the nursing literature: Application of the Consolidated Standards of Reporting Trials (CONSORT). Nursing Outlook. 2008;56(1).
63. Chan AW, Tetzlaff JM, Gøtzsche PC, Altman DG, Mann H, Berlin JA, et al. SPIRIT 2013 explanation and elaboration: guidance for protocols of clinical trials. BMJ. 2013;346.
64. Chan AW, Tetzlaff JM, Altman DG, Laupacis A, Gøtzsche PC, Krleža-Jeric K, et al. SPIRIT 2013 Statement: Defining Standard Protocol Items for Clinical Trials DEVELOPMENT OF THE SPIRIT 2013 STATEMENT [Internet]. Vol. 158, Ann Intern Med. 2013. Available from: www.annals.org
65. Flicker S, Guta A. Ethical Approaches to Adolescent Participation in Sexual Health Research. Journal of Adolescent Health. 2008 Jan;42(1):3–10.
66. Nakalega R, Akello C, Gati B, Nakabiito C, Nolan M, Kamira B, et al. Ethical considerations for involving adolescents in biomedical HIV prevention research. BMC Medical Ethics. 2021 Dec 1;22(1).
67. Day S, Kohler P, Slack C, Ezechi O, Tucker JD. Adolescent participation in HIV research: consortium experience in low and middle-income countries and scoping review. Lancet HIV [Internet]. 2020;7:844–52. Available from: www.thelancet.com/hiv

Figure Legends:

Figure 1: Flowchart of Study Phases and Participant Involvement

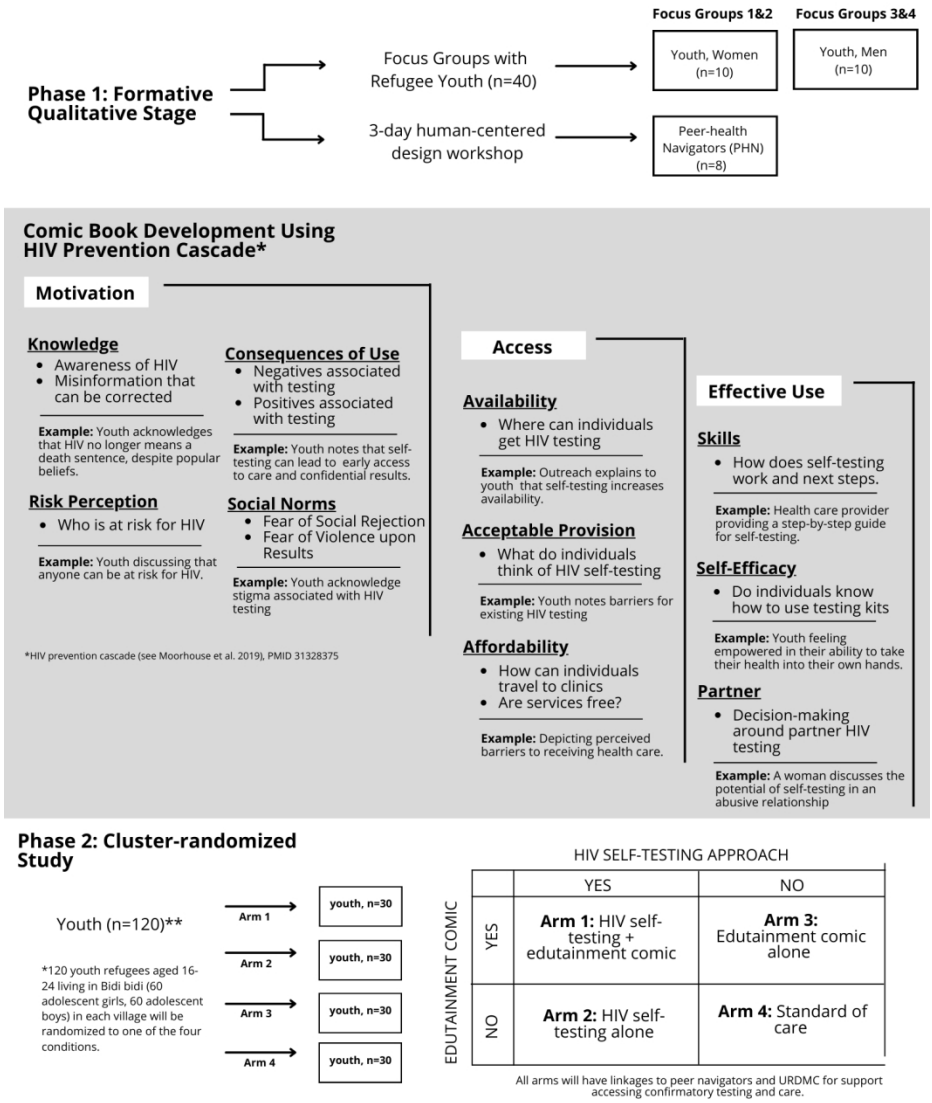

Figure 1: Flowchart of Study Phases and Participant Involvement

545x705mm (72 x 72 DPI)

SPIRIT 2013 Checklist: Recommended items to address in a clinical trial protocol and related documents*

Section/item	ItemNo	Description	Page (P); Line (L)
Administrative information			
Title	1	Descriptive title identifying the study design, population, interventions, and, if applicable, trial acronym	P1; L1-3
Trial registration	2a	Trial identifier and registry name. If not yet registered, name of intended registry	P2; L59-60
	2b	All items from the World Health Organization Trial Registration Data Set	Box 1
Protocol version	3	Date and version identifier	Box 1
Funding	4	Sources and types of financial, material, and other support	P17; L407-409
Roles and responsibilities	5a	Names, affiliations, and roles of protocol contributors	P17; L403-405
	5b	Name and contact information for the trial sponsor	P1; L29-30
	5c	Role of study sponsor and funders, if any, in study design; collection, management, analysis, and interpretation of data; writing of the report; and the decision to submit the report for publication, including whether they will have ultimate authority over any of these activities	P 17; L403-405 & 411
	5d	Composition, roles, and responsibilities of the coordinating centre, steering committee, endpoint adjudication committee, data management team, and other individuals or groups overseeing the trial, if applicable (see Item 21a for data monitoring committee)	N/A
Introduction			
Background and rationale	6a	Description of research question and justification for undertaking the trial, including summary of relevant studies (published and unpublished) examining benefits and harms for each intervention	P 3-5
	6b	Explanation for choice of comparators	P9; L230-248
Objectives	7	Specific objectives or hypotheses	P5; L135-145

Trial design	8	Description of trial design including type of trial (eg, parallel group, crossover, factorial, single group), allocation ratio, and framework (eg, superiority, equivalence, noninferiority, exploratory)	P6; L147-158
Methods: Participants, interventions, and outcomes			
Study setting	9	Description of study settings (eg, community clinic, academic hospital) and list of countries where data will be collected. Reference to where list of study sites can be obtained	P6-7; L161-181
Eligibility criteria	10	Inclusion and exclusion criteria for participants. If applicable, eligibility criteria for study centres and individuals who will perform the interventions (eg, surgeons, psychotherapists)	P7; L 188-193
Interventions	11a	Interventions for each group with sufficient detail to allow replication, including how and when they will be administered	P9-10; L227-248 (Figure 1)
	11b	Criteria for discontinuing or modifying allocated interventions for a given trial participant (eg, drug dose change in response to harms, participant request, or improving/worsening disease)	N/A; low risk behaviour change intervention
	11c	Strategies to improve adherence to intervention protocols, and any procedures for monitoring adherence (eg, drug tablet return, laboratory tests)	P8; L202-205
	11d	Relevant concomitant care and interventions that are permitted or prohibited during the trial	N/A; low risk behaviour change intervention
Outcomes	12	Primary, secondary, and other outcomes, including the specific measurement variable (eg, systolic blood pressure), analysis metric (eg, change from baseline, final value, time to event), method of aggregation (eg, median, proportion), and time point for each outcome. Explanation of the clinical relevance of chosen efficacy and harm outcomes is strongly recommended	P 10-12; L 251-295
Participant timeline	13	Time schedule of enrolment, interventions (including any run-ins and washouts), assessments, and visits for participants. A schematic diagram is highly recommended (see Figure)	Figure 1
Sample size	14	Estimated number of participants needed to achieve study objectives and how it was determined, including clinical and statistical assumptions supporting any sample size calculations	P 12-13; L301-307
Recruitment	15	Strategies for achieving adequate participant enrolment to reach target sample size	P 8; L197-205
Methods: Assignment of interventions (for controlled trials)			

Allocation:			
Sequence generation	16a	Method of generating the allocation sequence (eg, computer-generated random numbers), and list of any factors for stratification. To reduce predictability of a random sequence, details of any planned restriction (eg, blocking) should be provided in a separate document that is unavailable to those who enrol participants or assign interventions	P8; L194-197
Allocation concealment mechanism	16b	Mechanism of implementing the allocation sequence (eg, central telephone; sequentially numbered, opaque, sealed envelopes), describing any steps to conceal the sequence until interventions are assigned	N/A; interventions cluster-randomized and not blinded
Implementation	16c	Who will generate the allocation sequence, who will enrol participants, and who will assign participants to interventions	P8; L197-198
Blinding (masking)	17a	Who will be blinded after assignment to interventions (eg, trial participants, care providers, outcome assessors, data analysts), and how	P13; L319-321, 326
	17b	If blinded, circumstances under which unblinding is permissible, and procedure for revealing a participant's allocated intervention during the trial	N/A; low risk behaviour change intervention so unblinding will not occur
Methods: Data collection, management, and analysis			
Data collection methods	18a	Plans for assessment and collection of outcome, baseline, and other trial data, including any related processes to promote data quality (eg, duplicate measurements, training of assessors) and a description of study instruments (eg, questionnaires, laboratory tests) along with their reliability and validity, if known. Reference to where data collection forms can be found, if not in the protocol	P 13; L310-321
	18b	Plans to promote participant retention and complete follow-up, including list of any outcome data to be collected for participants who discontinue or deviate from intervention protocols	P8; L202-205
Data management	19	Plans for data entry, coding, security, and storage, including any related processes to promote data quality (eg, double data entry; range checks for data values). Reference to where details of data management procedures can be found, if not in the protocol	P13; L312-321

Statistical methods	20a	Statistical methods for analysing primary and secondary outcomes. Reference to where other details of the statistical analysis plan can be found, if not in the protocol	P 13-14; L324-345
	20b	Methods for any additional analyses (eg, subgroup and adjusted analyses)	P 14; L338-343
	20c	Definition of analysis population relating to protocol non-adherence (eg, as randomised analysis), and any statistical methods to handle missing data (eg, multiple imputation)	P 14; L329-334
Methods: Monitoring			
Data monitoring	21a	Composition of data monitoring committee (DMC); summary of its role and reporting structure; statement of whether it is independent from the sponsor and competing interests; and reference to where further details about its charter can be found, if not in the protocol. Alternatively, an explanation of why a DMC is not needed	P 14; L343-345
	21b	Description of any interim analyses and stopping guidelines, including who will have access to these interim results and make the final decision to terminate the trial	N/A; low risk behaviour change intervention for a short duration
Harms	22	Plans for collecting, assessing, reporting, and managing solicited and spontaneously reported adverse events and other unintended effects of trial interventions or trial conduct	N/A; low risk behaviour change intervention for a short duration
Auditing	23	Frequency and procedures for auditing trial conduct, if any, and whether the process will be independent from investigators and the sponsor	N/A; low risk behaviour change intervention for a short duration
Ethics and dissemination			
Research ethics approval	24	Plans for seeking research ethics committee/institutional review board (REC/IRB) approval	P 15; L360-362
Protocol amendments	25	Plans for communicating important protocol modifications (eg, changes to eligibility criteria, outcomes, analyses) to relevant parties (eg, investigators, REC/IRBs, trial participants, trial registries, journals, regulators)	P 16; L395-397

Consent or assent	26a	Who will obtain informed consent or assent from potential trial participants or authorised surrogates, and how (see Item 32)	P 15-16; L363-377
	26b	Additional consent provisions for collection and use of participant data and biological specimens in ancillary studies, if applicable	N/A; no ancillary studies
Confidentiality	27	How personal information about potential and enrolled participants will be collected, shared, and maintained in order to protect confidentiality before, during, and after the trial	P 13; L317-319
Declaration of interests	28	Financial and other competing interests for principal investigators for the overall trial and each study site	P 17; L413
Access to data	29	Statement of who will have access to the final trial dataset, and disclosure of contractual agreements that limit such access for investigators	P13; L319-321
Ancillary and post-trial care	30	Provisions, if any, for ancillary and post-trial care, and for compensation to those who suffer harm from trial participation	N/A; low risk behaviour change intervention for a short duration
Dissemination policy	31a	Plans for investigators and sponsor to communicate trial results to participants, healthcare professionals, the public, and other relevant groups (eg, via publication, reporting in results databases, or other data sharing arrangements), including any publication restrictions	P 16; L380-388
	31b	Authorship eligibility guidelines and any intended use of professional writers	P 16; L386-388
	31c	Plans, if any, for granting public access to the full protocol, participant-level dataset, and statistical code	P 17; L424-429
Appendices			
Informed consent materials	32	Model consent form and other related documentation given to participants and authorised surrogates	Supplementary material
Biological specimens	33	Plans for collection, laboratory evaluation, and storage of biological specimens for genetic or molecular analysis in the current trial and for future use in ancillary studies, if applicable	N/A; no biological specimens collected

*It is strongly recommended that this checklist be read in conjunction with the SPIRIT 2013 Explanation & Elaboration for important clarification on the items. Amendments to the protocol should be tracked and dated. The SPIRIT checklist is copyrighted by the SPIRIT

BMJ Open

Todurujo na Kadurok (Empowering Youth): study protocol of an HIV self-testing and edutainment comic cluster randomized trial among refugee youth in a humanitarian setting in Uganda

Journal:	*BMJ Open*
Manuscript ID	bmjopen-2022-065452.R2
Article Type:	Protocol
Date Submitted by the Author:	24-Oct-2022
Complete List of Authors:	Logie, Carmen; University of Toronto, Factor-Inwentash Faculty of Social Work; University of Toronto, Women's College Research Institute Okumu, Moses ; University of Illinois at Urbana-Champaign, School of Social Work; Uganda Christian University, Department of Social Work Loutet, Miranda; University of Toronto Dalla Lana School of Public Health Coelho, Madelaine; University of Toronto Berry, Isha ; University of Toronto Dalla Lana School of Public Health, Gittings, Lesley; University of Cape Town, ; University of Toronto, Odong Lukone, Simon; Uganda Refugee and Disaster Management Council Kisubi, Nelson; Uganda Refugee and Disaster Management Council Malon, Atama; Yumbe Hospital Kyambadde, Peter ; Mulago Hospital, Most at Risk Population Initiative
Primary Subject Heading:	HIV/AIDS
Secondary Subject Heading:	Global health, Public health, Sexual health, Research methods
Keywords:	HIV & AIDS < INFECTIOUS DISEASES, Public health < INFECTIOUS DISEASES, PREVENTIVE MEDICINE, PUBLIC HEALTH

Todurujo na Kadurok (Empowering Youth): study protocol of an HIV self-testing and edutainment comic cluster randomized trial among refugee youth in a humanitarian setting in Uganda

Carmen H Logie[1, 2, 3, 4], Moses Okumu[5], Miranda Loutet[6], Madelaine Coelho[4,7], Isha Berry[6], Lesley Gittings[1,8], Simon Odong Lukone[9], Nelson Kisubi[9], Malon Atama[10], Peter Kyambadde[11,12]

[1]Factor-Inwentash Faculty of Social Work, University of Toronto, Toronto, ON, Canada
[2]United Nations University Institute for Water, Environment, and Health, Hamilton, ON, Canada
[3]Centre for Gender & Sexual Health Equity, Vancouver, BC, Canada
[4]Women's College Research Institute, Women's College Hospital, Toronto, ON, Canada
[5]School of Social Work, University of North Carolina Chapel Hill, Chapel Hill, NC, USA
[6] Dalla Lana School of Public Health, University of Toronto, Toronto, ON, Canada
[7] Department of Sociology, University of Toronto, Toronto, ON, Canada
[8] Centre for Social Science Research, University of Cape Town, South Africa
[9] Uganda Refugee and Disaster Management Council, Yumbe, Uganda
[10] Yumbe General Hospital, Yumbe, Uganda
[11]National AIDS Coordinating Program, Ugandan Ministry of Health, Kampala, Uganda
[12]Most at Risk Population Initiative (MARPI), Mulago Hospital, Kampala, Uganda

Co-authors' ORCID iDs:
Carmen H Logie http://orcid.org/0000-0002-8035-433X
Moses Okumu https://orcid.org/0000-0003-2555-3077
Miranda Loutet https://orcid.org/0000-0002-6293-3047
Isha Berry https://orcid.org/0000-0003-3138-664X
Lesley Gittings https://orcid.org/0000-0002-0463-0478
Odong Simon Lukone https://orcid.org/0000-0002-6780-1705
Nelson Kisubi https://orcid.org/0000-0002-0260-4620
Malon Atama https://orcid.org/0000-0003-1409-1970
Peter Kymbadde https://orcid.org/0000-0002-9606-218X

*Corresponding Author: Dr. Carmen Logie, University of Toronto, Factor-Inwentash Faculty of Social Work, 246 Bloor St W, Toronto, ON M5S 1V4, carmen.logie@utoronto.ca

Abstract

Introduction: Refugees experience HIV vulnerabilities due to the confluence of displacement, violence, and poverty. HIV self-testing, understudied with refugees, is a promising method to increase testing uptake, yet challenges remain with linkages to confirmatory testing following a positive HIV self-test. This study aims to evaluate the effectiveness of HIV self-testing kits and "edutainment" comics in increasing HIV testing and HIV status knowledge among refugee youth aged 16-24 years in Bidi Bidi Refugee Settlement, Uganda.

Methods and analysis: This study will be conducted in Bidi Bidi. We conducted a qualitative formative phase with focus groups (n=40) to generate knowledge of barriers and facilitators of HIV prevention, testing and care among refugee youth (aged 16-24) in Bidi Bidi. These findings were used to create comic scenarios aligning with edutainment approaches to health promotion and inform a four-arm cluster randomized controlled trial in Bidi Bidi using a 2x2 factorial design: 1) HIV self-testing alongside edutainment comics, 2) HIV self-testing alone, 3) edutainment comic alone, and 4) standard of care. The target sample size will be 120 youth (30 per arm), who will be enrolled in the trial and followed for 3 months. Data will be collected at baseline and 3-months after enrolment. The primary outcomes (HIV testing frequency, HIV status knowledge) and secondary outcomes (linkage to confirmatory HIV testing, HIV care linkage, HIV self-test kit use, HIV-related stigma, HIV knowledge, safer sex efficacy, condom-use, adolescent sexual and reproductive health stigma, sexual relationship power, access to SRH services) will be evaluated using descriptive statistics and regression analyses.

Ethics and dissemination: This study was approved by the University of Toronto Research Ethics Board, Mildmay Uganda Research Ethics Committee, and the Uganda National Council for Science and Technology. This trial is registered at ClinicalTrials.gov (#NCT05213689). Results will be shared in peer-reviewed publications and community knowledge sharing.

Strengths and limitations of this study:

- The formative qualitative phase informed intervention design (edutainment comics, HIV self-testing) to ensure they are tailored to youth in a humanitarian context.
- Applying community-based research approaches in study design can improve the implementation and sustainability of HIV testing, prevention, and care.
- The study setting will allow for multiple interventions to be tested with sufficient sample size among youth living in a humanitarian context.
- The primary study limitations are potential loss to follow-up.
- Knowledge translation will be an important aspect of this study protocol, with implications for scaling-up HIV self-testing in humanitarian contexts.

BACKGROUND

HIV vulnerabilities among displaced and refugee adolescents are shaped by a complex interplay of factors including poverty, violence, host community HIV prevalence, HIV urbanization, HIV testing and care access, and living conditions [1–3]. There is a dearth of data on HIV rates among displaced and refugees, but globally in 2006 5.4% of people and 7.2% of children living with HIV were affected by conflict, humanitarian crises and/or displacement [1]. Displaced and refugee populations often do not have the same access to HIV testing and treatment as host populations, and therefore, the United Nations has prioritized refugees as a key population for HIV policy and programming in their 2022 report [2]. A systematic review of studies conducted among refugee, migrant and displaced girls and young women across the African continent reported limited knowledge regarding HIV and other sexually transmitted infections among this population and that access and availability of sexual health services is constrained by distance, costs and stigma [3].

Uganda is the largest refugee hosting nation in Africa with over 1.4 million refugees in 2020, with more than 240,000 living in Bidi Bidi settlement near the South Sudan border [4]. Youth represent 44.4% of all new HIV infections in Uganda, with most infections sexually transmitted [5]. HIV prevalence among adolescents and young people in Uganda is 10.8% and is markedly higher among women (15.4%) compared with men (4.8%)[6]. Less is known of HIV prevalence, testing and prevention engagement among youth living in refugee settlements in Uganda, including in Bidi Bidi [7].

There is limited inclusion of refugee adolescents and youth in sexual and reproductive health research and programming [8–10] that may result in a lack of age, gender, culturally tailored programs, which in turn may contribute to low engagement with HIV testing and

prevention services in humanitarian contexts [11]. Studies conducted among urban refugee youth in Kampala, Uganda have found that inequitable gender norms and intersecting forms of stigma, including HIV-related stigma and refugee stigma, may also limit HIV testing and prevention engagement among refugee youth [12–15]. Social network breakdown, poverty and travel distance to clinics, confidentiality concerns, language barriers and other logistic hurdles may also present obstacles to HIV testing [16,17].

HIV self-testing (HIVST) is a promising approach documented across systematic reviews to increasing HIV testing access and uptake [18–20]. This approach may mitigate confidentiality concerns, increase convenience, and reduce the risk of stigmatization, particularly important considerations for HIV testing with adolescents and youth [21–24]. HIVST involves an individual collecting their own oral specimen, conducting the test, and interpreting the results independently with support from pictorial and written instructions. There is also a dearth of information regarding advances in HIV testing, such as HIV self-testing, among youth in humanitarian contexts [25], including countries with a high HIV prevalence and large number of refugees such as Uganda.

There remain gaps in linkage to care following a positive HIV self-test when compared with standard HIV testing services, and addressing these gaps requires innovative approaches [26]. Innovative approaches will often be population-specific and community-driven, repurposing tools that are used in other fields of work. Comics—a form of graphic medicine—integrate text and visual images and are a promising health promotion tool used to address a variety of health conditions such as HIV, sexually transmitted infections, vaccines, and dementia [27–32]. Edutainment comics have been used to educate both the general population and healthcare providers [33,34]. Comics align with the entertainment-education ('edutainment')

approach to improve health knowledge, attitudes and practices applied in HIV prevention research [35,36]. In the field of HIV, comics have been used in an HIV adherence intervention in the United States, PrEP research, as well as in HIV education in schools in Kenya that improved students' knowledge about HIV, reduced stigma towards people living with HIV, and increased likelihood and intention of testing [37–39]. Among refugees, comics have been used in mental health research in Greece and Lebanon [40,41]. We did not locate research using comics focussed on HIV testing interventions at large, or with refugees on HIV research.

This cluster randomized trial, *Todurujo na Kadurok* (loosely translated to 'Empowering Youth' in Bari), aims to conduct an HIV self-testing and edutainment comic intervention and evaluate its effectiveness in increasing HIV testing and HIV status knowledge among refugee youth in Bidi Bidi refugee settlement, Uganda. The comic intervention will be theoretically informed by the HIV prevention cascade [42-44] to address gaps in motivation, access and effective use identified in formative research. Study findings can inform local and global responses to increase HIV testing engagement with youth in humanitarian contexts.

METHODS

Study aims and objectives

The overarching study goal is to evaluate the effectiveness of HIV self-testing, edutainment comic, or a combination of both interventions on increasing HIV testing, HIV status knowledge and linkage to confirmatory testing and care among refugee youth aged 16 to 24 years living in Bidi Bidi refugee settlement, Uganda. The primary objectives are to evaluate the effectiveness of the interventions on participants (1) HIV status knowledge and (2) HIV testing frequency. Secondary objectives include examining the impact of the intervention on: (1) HIV self-testing

kit use, (2) linkage to confirmatory HIV testing for those testing positive on the HIVST, and (3) linkage to HIV care for those testing positive, (4) HIV-related stigma, (5) adolescent sexual and reproductive health stigma, (6) HIV knowledge, (7) safer sex efficacy, (8) condom use, (9) sexual relationship power, and (10) access to other sexual and reproductive health services (e.g., contraception, post-exposure prophylaxis).

Study Design

We are conducting a cluster randomized trial using a 2 x 2 factorial design (see Figure 1) [45]. This approach will specifically test the effectiveness of offering: 1) HIV self-testing alongside the edutainment comic, 2) HIV self-testing alone, 3) edutainment comic alone, and 4) standard of care, on defined primary and secondary outcomes. Factorial designs are an appropriate and efficient approach to understand synergies between interventions. As HIV self-testing is an established testing approach that is feasible and acceptable [26,45–47], we are particularly interested to see if the benefits of HIV self-testing with youth in a humanitarian context are increased with accompanying edutainment comics that are theoretically designed to address barriers to testing and care across the HIV cascade. This design can help with identifying effective strategies to reach study aims and in turn can inform intervention design to include the most effective components [48]. Study design and research implementation was in collaboration between the University of Toronto and Uganda Refugee and Disaster Management Council (URDMC), a refugee agency based in Bidi Bidi. Data will be collected from all participants directly before providing the intervention (baseline: time 1), and again at 3-month follow-up (time 2).

Study setting

This trial will be conducted in four villages located in two zones in Bidi Bidi Refugee Settlement within the Yumbe district in Northwestern Uganda. With over 245,000 refugees largely (99.9%) from South Sudan, Bidi Bidi is the world's second-largest refugee settlement with one-quarter of the population (25%; n=61,036) youth aged 15 to 24 years [49]. In Bidi Bidi, health centers offer free regular testing for HIV and comprehensive HIV care services including adult and pediatric antiretroviral therapy (ART) and cotrimoxazole prophylaxis. However, only a few facilities in the settlement offer comprehensive HIV care such as Prevention of Mother to Child Transmission (PMTCT) services. Moreover, there are reported challenges including lack of facility accreditation to offer HIV care, drug and test kits stock out and poor adherence to ART by the refugees [50,51].

The clinical trial study setting includes two villages in Zone 3, with more than 58,000 residents, and two villages in Zone 4 annex, with more than 52,000 residents [49]. To ensure anonymity of participants, the village numbers are not included in this protocol. The zones and villages were selected due to large geographical separation to avoid contamination of intervention arms, eagerness of youth in these areas to learn more about HIV testing, and to fill a void of HIV research in these particular areas. In Zone 3 there are the following participating health centres: Jomorogo Health Centre 3, Kongbe Health Centre 3, Yoyo Health Centre 3, Luzira Health Centre 3. In Zone 4 annex the following health centres will participate: Igamara Health Centre 3, Bolomoni Health Centre 3, Bangatuti Health Centre, and Kulikulinga Government Centre. All participants will be able to access these health centres throughout the study for HIV testing and treatment.

Participants and recruitment

We will use convenience sampling methods, including peer driven recruitment supported by collaborators at URDMC and eight peer navigators. Peer navigators are self-identified young refugees aged 20-24 years living in Bidi Bidi, specifically Zone 3 and Zone 4 annex, who received training from the study team in research methods and confidentiality and are supervised by URDMC. Inclusion criteria for participants in the *Todurujo na Kadurok* study include: (1) living in one of the four selected villages in Zone 3 and Zone 4 annex in Bidi Bidi; (2) identifying as a refugee or displaced person; (3) aged 16-24 years; and (4) speaking and reading one of the study languages (English, Bari, Juba Arabic).

For the cluster randomized controlled trial, participants will be randomized by the village they live in. URDMC and peer navigators will recruit a total of 120 participants, with 30 participants in each of the four arms. The arms will be geographically separated into four different villages from two zones to avoid contamination of the intervention effects. The villages will be randomly assigned to a study arm. Youth will be approached by peer navigators and study staff at URDMC to be recruited to the study. At the baseline visit (time 1) the youth will be provided a written consent form, which will be available in English, Bari and Juba Arabic. Once the youth have provided informed written consent they will be enrolled into the study, assigned to a study arm based on the village that they live in, and baseline data will be collected by a URDMC research assistant. Peer navigators will use multiple study reminder strategies (e.g., texts, private messages over social media) to maintain engagement until the follow-up visit at 3-months after enrolment. These efforts will be supplemented with existing outreach services to youth by URDMC.

Patient and public involvement

This study protocol was developed after a formative qualitative research phase. As depicted in Figure 1, this formative research in Phase 1 included four focus groups conducted by two URDMC research assistants (2 with young women, 2 with young men) with refugee youth in Bidi Bidi (n=10 in each focus group; n=40 in total) aged 16-24 years to collect information on knowledge of current HIV testing opportunities and experiences in Bidi Bidi and perspectives on HIV self-testing. HIV prevention cascade conceptual frameworks were used by analysts at the University of Toronto in the analysis of the qualitative data to inform the study to address gaps in linkage to care following HIV self-testing [42,43]. Three key domains of the HIV prevention cascade include motivation, access, and effective use, and these dimensions can be tailored to identify population specific needs [43,44]. For instance, Moorhouse et al. applied the HIV prevention cascade framework to develop community-based HIV prevention interventions and noted dimensions of motivation (knowledge, risk perception, consequence of use, social norms), access (availability, acceptable provision, affordability), and effective use (skills, self-efficacy, partner) [42]. The qualitative findings were used to identify key themes for the development of the edutainment comics (see Table 1), in this way the study responds to the health needs and priorities of refugee youth in this humanitarian context.

These focus groups were followed by a 3-day human-centered design workshop led by URDMC research managers who engaged eight peer navigators to adapt and develop HIV self-testing edutainment materials to enhance cultural, gender, age, and contextual relevance (see Figure 1). The study was designed and will be conducted as a collaboration with local physicians, clinics, and the implementing partner is a refugee agency based in Bidi Bidi. These study collaborators have been involved since the study inception and will lead implementation. Peer navigators (n=8) who share the participants' refugee lived experiences, and include youth

living with HIV, have meaningfully contributed to the study design through the human centered design workshops, feedback into edutainment comic development, pilot testing of study tools, and will support implementation of the cluster randomized controlled trial through actively contributing to participant recruitment, engagement, and retention.

Table 1. Scenarios on the HIV prevention cascade included in the edutainment comic

Domain of prevention cascade	**Stage of the prevention cascade**	**Description**
Motivation	Risk perception	Discussion explores perceived risk for HIV and a) misinformation (e.g., sharing body lotion is not as an HIV risk factor) and b) provides information about condom breakage and post-exposure prophylaxis.
	Consequence of use	Discussion between healthcare provider and youth of how to manage a positive HIV test result, including the ability to manage confidentiality and access support services.
	Social norms	Discussion of experiences of HIV stigma and discrimination, as well as an example of receiving support from a friend.
	Knowledge	Discussion of knowledge as power, including benefits of knowing one's HIV positive and HIV negative serostatus.
Access	Access and availability	Parallel conversations between youth around testing barriers, including travel costs, and stockouts of HIV testing kits, with a discussion of locations for testing and support in Bidi Bidi.
	Acceptable provision	Discussions of a) the possibility of receiving an HIV test while accessing other health services such as contraception and condoms; b) accessing HIV testing from a healthcare provider of a different gender; c) feeling empowered to find a doctor one feels comfortable talking with about sexual health
Effective use	Partner	Discussion of HIV testing with partner to assess partner perspectives on HIV testing and evaluate concerns (e.g., negative partner reaction, violence, consequence of positive test result). Healthcare provider discussion of partner testing with a couple, including possible sero-discordant results. Decision making considerations for engaging in partner testing, including motivations (empowerment, support, open communication, stronger relationship) and barriers (loss of trust, violence, conflict, break up).
	Skills	Discussion of disclosure process and decision making regarding who to disclose an HIV positive test result with.
	Self-efficacy	Discussion of how knowledge of HIV testing benefits, HIV positive serostatus, and available resources increase empowerment to take care of oneself and support others.

Intervention description

Todurujo na Kadurok is a 2 x 2 factorial cluster randomized trial, with clusters randomized to one of the following four arms: (1) HIV self-testing and edutainment comic, (2) HIV self-testing only, (3) edutainment comic only, and (4) standard of care.

Participants in the HIV self-testing arms (arm 1; arm 2) will each receive two HIV self-testing kits (OraQuick Rapid HIV-1/2 Antibody Test, OraSure Technologies) at baseline along with verbal, written and visual instructions (in their choice of study language), as well as linkages to peer navigators and URDMC for support accessing confirmatory testing and care.

Participants in the edutainment comic arms (arm 1; arm 3) will receive a hard copy of the edutainment comic at baseline. They will meet with the peer navigator to review and discuss the comic themes and will be provided with a blank version to complete on their own. This approach to edutainment comics provides a participatory component whereby participants can contextualize the comic themes within their own lives and experiences [52]. In addition to the comic, the participants in arms 1 and 3 will also have linkages to peer navigators and URDMC for support accessing confirmatory testing and care.

Participants in the standard of care arm (arm 4) will receive verbal and written information and resources about HIV testing, care, and support services in Bidi Bidi and Yumbe Hospital from their peer navigator as well as contact information for URDMC and an overview of their programs offered. The existing standard of HIV care in Bidi Bidi is offered through clinics located in Bidi Bidi settlement and the hospital in Yumbe and includes pre- and post-test counselling for HIV, follow-up visits for HIV care in the community, intensive treatment adherence counselling for immunosuppressed and non-immunosuppressed patients in the community and facility, and community drug re-fills for people living with HIV.

Outcomes

The primary outcomes measured in this trial will be:

1. Changes in HIV testing frequency: This is measured as participants' self-reported last HIV test. To capture changes, this measure is assessed at both study time points (baseline [Time 1], 3 months [Time 2]).
2. Changes in HIV status knowledge: At the final 3-month visit, a clinician supported by trained peer navigators will offer all participants a completely voluntary rapid point-of-care HIV test (Alere Determine HIV-½) to measure HIV status knowledge. HIV status knowledge will be assessed as correct for participants that agree to take the rapid test and correctly report their HIV status before receiving the result.

The secondary outcomes include:

1. Changes in linkage to confirmatory HIV testing: Participants in arm 1 and arm 2 (e.g., those given a HIVST) will be asked at Time 2 if they used their HIV self-test kit. All participants who report using the test will be asked the result, and participants who self-report a positive result will be asked if they received confirmatory testing, and if so, where they received the test. Participants will also be provided study coupons (with only the name of the UDRMC and their study ID#) that they can provide when receiving HIV or other sexual and reproductive health services at collaborating health clinics; this clinic engagement will be linked to the participant study ID#.
2. Changes in linkage to HIV care: At Time 2, participants who seroconvert in the study will be asked if they received HIV care, including ART and counseling, since receiving an HIV-positive diagnosis.

3. HIV self-test kit use: In order to understand the use of HIV self-test kits and to reduce social desirability bias, one month after Time 2 the participants in arm 1 and arm 2 will be asked if they have unused test kits. They will be informed this information is just to guide future trials.
4. HIV-related stigma, assessed with the Reinius et al., 2017 12-item short HIV stigma assessment [53] including vicarious and felt-normative HIV stigma dimensions through an internalized AIDS-related scale from Kalichman et al. 2020 [54,55].
5. HIV knowledge assessed with the HIV knowledge questionnaire by Carey & Schroder [56].
6. Safer sex efficacy using the Condom Use Self-Efficacy Scale [57,58].
7. Condom use in past 3 -months (condom use at last sex; condom use at sex every time in last 3 months [dichotomous: yes/no]).
8. Adolescent sexual and reproductive health stigma, assessed with the Ugandan Adolescent Sexual and Reproductive Health (SRH) Stigma scale (Logie et al. 2019) adapted from Hall et al.'s Adolescent SRH Stigma scale [59]
9. Sexual relationship power (SRP) using the Relationship Control Sub-Scale from the Sexual & Relationship Power Scale [60]
10. Access to other SRH services will be assessed by asking if the participants went to any health clinic/hospital or service provider in the past 3 months to access: condoms, lubricant, contraception, post-exposure prophylaxis, pre-exposure prophylaxis, pregnancy test, sexual and gender-based violence information, sexually transmitted infections testing, or other services. Participants will be provided coupons with UDRMC logo and their study ID to bring to participating clinics when accessing services, so this variable will be assessed by

self-report by participant as well as by collecting study coupons that will be attached to a list of services accessed during the study timeframe.

All participants, regardless of study arm, will receive an HIV self-test at the end of the study with accompanying instructions, information and resources to ensure the study arms without access to HIV self-testing are made aware of this approach and can access its benefits.

Sample size and power

We will recruit 120 refugee youth aged 16-24 years living in Bidi Bidi (60 adolescent girls, 60 adolescent boys) in the cluster randomized trial. The recruited youth will come from four villages in two zones (Zone 3 and Zone 4 annex) within Bidi Bidi, and each village will be randomized to a study arm such that all youth living in the village are clustered to receive the same intervention. Calculated using G*Power 3.1, a sample size of 105 is sufficient for multivariable regression analyses (effect size: 0.2, power: 0.95, number of tested predictors: 5, critical F: 2.306) [61]. To account for 15% attrition, we have selected a sample size of 120.

Data collection and management

For the cluster randomized trial, we will collect sociodemographic characteristics from participants at time 1, and exposures relevant to sexual and reproductive health and outcome data at both timepoints (time 1, time 2). Data will be collected using tablet-based structured surveys conducted by trained URDMC research assistants in all study languages. Data will be collected using SurveyCTO (Dobility, Cambridge, USA), which is a secure platform whereby data collected is automatically encrypted and uploaded to a password-protected server using a Secure Sockets Layer (SSL) certificate. SurveyCTO allows for data to be collected offline and has

branching logic, consistency checks, and facilitates multi-lingual data collection. No personal identifying information will be collected with the survey data, all participants will instead be given a unique participant ID to enhance confidentiality. Only study staff at URDMC and University of Toronto will have access to the dataset for the purpose of data management and outcome reporting, and all datasets will be saved on a password-protected server.

Data analysis

Analysis and reporting for the cluster randomized trial will be conducted in accordance with CONSORT (Consolidated Standards of Reporting Trials) guidelines [62]. The analyst at the University of Toronto will be blinded to group allocation. A flow diagram will be used to illustrate patient flow (consent/enrolment, randomization, baseline, and follow-up). Baseline data will be reported for all four arms and summarized as mean and standard deviations or median and interquartile range for continuous variables and as number and percentage for categorical variables. The primary analysis will involve intention-to-treat analysis (data from participants will be analyzed according to their allocation, irrespective of whether they received the intervention). Between-group comparisons will be performed using generalized estimating equations (GEE) logistic or linear regression models – depending on which outcome is being evaluated - using unstructured correlation matrix and robust standard errors to account for clustering. For these models, the intervention effects across time (from baseline to 3-month follow-up) will be included as the main effects of intervention arm, time, and an arm*time interaction. The level of significance will be set at alpha=0.05. The results will be expressed as odds ratios or mean differences as appropriate, accompanied by 95% confidence intervals and p-values. We will conduct an adjusted analysis for the primary outcome (changes in HIV testing

frequency, HIV self-test kit use, HIV status knowledge, changes to linkage to confirmatory HIV testing and to HIV care) to investigate the role of various covariates in the relative effect. Covariates, such as age and gender, will be entered as a block. We will explore gender differences in primary and secondary intervention outcomes. Given the outcomes of this study are related to behavior change and the trial is of a short duration with minimal risks, a data monitoring committee was not deemed necessary.

DISCUSSION

This study approach has the potential to inform research, practice, and policy surrounding measuring the efficacy of new programming and HIV-related testing. Study findings, therefore, have the potential to not only inform a larger, fully powered randomized controlled trial to test the effectiveness of an edutainment comic book intervention but can also inform policies on how strategies such as comic books can be integrated into school health curricula for HIV prevention. Our findings can also inform research, practice, and policy on HIV/AIDS among youth, to better meet the needs of refugee adolescents and youth. An edutainment comic book intervention approach holds promise for meaningfully engaging youth and healthcare providers in humanitarian contexts in dialogue on STI prevention, care, and support.

Strengths and limitations of this study

The Todurujo na Kadurok cluster randomized trial is unique in exploring HIV self-testing feasibility and uptake among youth living in a large refugee settlement using innovative community-based health promotion activities. The study design will allow us to assess if HIV self-testing along, edutainment comics or HIV self-testing alongside the edutainment comics increase HIV testing frequency and status knowledge compared to standard of care. By

clustering the interventions to areas within Bidi Bidi Refugee Settlement we aim to mitigate threats to internal validity and contamination of the intervention effects.

The study is subject to limitations commonly incurred by prospective longitudinal studies – loss to follow-up and missing data. However, we will mitigate these limitations by using peer navigators to recruit and follow-up on participants in the community and also by using digital questionnaires on tablets that are programmed to flag missing data.

ETHICS AND DISSEMINATION

Ethical approval

Ethical approval for the study was provided through the Mildmay Uganda Research Ethics Committee (REC REF 0802-2021), UNCST (SS884ES), and the University of Toronto Research Ethics Board (37496). This trial is registered at ClinicalTrials.gov (#NCT05213689). The protocol for the study was developed in accordance with the SPIRIT Statement [63,64]. To ensure the protection of human subjects, all participants in the formative phase and the cluster randomized controlled trial will be provided with enough time to provide written voluntary consent to participate in the study. All informed written consent processes will occur in a private room at a location provided by URDMC. The participant will read the consent form themselves or a peer navigator will read aloud the informed consent in a language comfortable to the participant (English, Bari or Juba Arabic) and will ask if the participant has any questions and will answer their questions. Participants will be asked to sign the consent form or provide a thumbprint to indicate their consent. The consent form will in no way be connected with focus group transcripts or data collected during the cluster randomized trial and will be destroyed five years after data collection is completed. As Uganda's HIV and AIDS Prevention and Control Act

permits youth aged 12 years or above to independently access HIV testing and counselling without parental permission, we received ethics approval to allow youth aged 16-17 years to participate without parental consent; this is a common approach to reduce barriers to youth participation in sexual and reproductive health research [65–67].

Emotional risks include that participants may feel uncomfortable, anxious, or upset taking an HIV test, stigma due to accidental disclosure of HIV serostatus, psychosocial harm as a result of learning HIV status, discussing HIV, STI, sexual risk factors, and social capital. The study has been designed to minimize psychological/emotional risks of feeling uncomfortable, anxious, or upset with study questions and topics of discussion through wellbeing-focussed training for data collectors. URDMC will also collaborate with a local psychological aid organization to support peer navigators and participants during any mental distress. Moreover, we will ensure the confidentiality of all participants by not collecting identifying information (i.e., no full names, no date of birth).

Dissemination plan

We will employ participatory methods for knowledge dissemination, working with youth peer navigators to develop strategies such as youth community forums and arts-based methods (e.g., comic books) and brief videos. We will make findings available in English, Bari and Juba Arabic. Findings will be disseminated through a variety of methods including the preparation of community reports (disseminated to the Ugandan National AIDS Program, Ministry of Health, and our collaborators [e.g., URDMC]) and peer-reviewed publications (e.g., Journal of the International AIDS Society). Irrespective of study findings, results will be published in peer-

reviewed scientific journals following international authorship guidelines, and will be presented to academics and researchers at key scientific conferences.

Trial status

The formative qualitative phase of the *Todurujo na Kadurok* (Empowering Youth) study was launched in September 2021. The study team has been trained and ethics approval obtained. All qualitative activities from phase 1 and the development of the comic book have been completed. We anticipate for the intervention to begin in Fall 2022 along with baseline data collection, and the final follow-up survey to be conducted 3-months later in late 2022. Any important protocol modifications will be included as amendments in REB and updated on the ClinicalTrials.gov registry, as and when needed. Box 1 details the information on the ClinicalTrials.gov registry.

Box 1. Items from the US National Institutes of Health Trial Registry

Data category information
Primary registry and trial identifying number: ClinicalTrials.gov NCT05213689.
Date of registration: 28 January 2022.
Source(s) of monetary support: ViiV Healthcare (Grant#628520-1652450711)
Primary sponsor: University of Toronto.
Primary sponsor: University of Toronto.
Contact for public and scientific queries: Carmen Logie, PhD (carmen.logie@utoronto.ca).
Public and scientific title: HIV Self-Testing and Comic Intervention with Refugee Adolescents and Youth.
Countries of recruitment: Uganda.
Health condition(s) or problem(s) studied: HIV testing, status knowledge, linkage to confirmatory and care.
Intervention(s): HIV self-testing kits and edutainment comic books.

Key inclusion criteria: living in one of the four selected villages in Zone 3 and Zone 4 annex in Bidi Bidi; identifying as a refugee or displaced person; aged 16-24 years; and speaking and reading one of the study languages (English, Bari, Juba Arabic).

Study type: interventional (clinical trial); cluster randomized control trial with 4 study arms.
Date of first enrolment: June 2022 (estimate)
Target sample size: 120.

Primary outcome(s): HIV testing frequency, HIV status knowledge, linkage to confirmatory HIV testing, linkage to HIV care, HIV self-test kit use.
Key secondary outcomes: HIV-related stigma, HIV knowledge, safer sex efficacy, condom-use, sexual and reproductive health (SRH) stigma, sexual relationship power and access to SRH services.

Acknowledgements: We would like to acknowledge the support and contributions of: Uganda Refugee and Disaster Management Council (URDMC), Uganda Ministry of Health, Uganda National AIDS Control Program, Mildmay Uganda, Uganda Office of the Prime Minister Department of Refugees, and the peer navigators.

Contributors: Study design – CHL, MO, IB. Data collection – SOL, ML, MC, IB, LG, NK, MA, CHL, MO. Data management – ML, MC, SOL, NK, CHL. Manuscript writing – MC, ML, CHL. Manuscript editing and critical review – CHL, MO, ML, MC, IB, LG, SOL, NK, MA, PK.

Funding Statement: This work was supported by ViiV Healthcare Limited (Grant#628520-1652450711). CHL is also funded by the Canada Research Chairs programme (#Tier 2), Canada Foundation for Innovation (#JELF), and the Ontario Ministry of Research and Innovation (ERA).

Disclaimer: Funding agencies played no role in the design or execution of the study.

Competing interests: The authors have declared that no competing interests exist.

Patient and public involvement: Patients and/or the public were involved in the design, or conduct, or reporting, or dissemination plans of this research. Refer to the Methods section for further details.

Patent consent for publication: Not required.

Provenance and peer review: Not commissioned; peer reviewed for ethical and funding approval prior to submission.

REFERENCES

1. Spiegel PB, Bennedsen AR, Claass J, Bruns L, Patterson N, Yiweza D, et al. Prevalence of HIV infection in confl ict-aff ected and displaced people in seven sub-Saharan African countries: a systematic review [Internet]. Vol. 369, www.thelancet.com. 2007. Available from: www.thelancet.com
2. Mafigiri R, Matovu JKB, Makumbi FE, Ndyanabo A, Nabukalu D, Sakor M, et al. HIV prevalence and uptake of HIV/AIDS services among youths (15-24 Years) in fishing and neighboring communities of Kasensero, Rakai District, South Western Uganda. BMC Public Health. 2017 Mar 14;17(1).
3. Logie C, Okumu M, Hakiza R, Musoke DK, Berry I, Mwima S, et al. Mobile Health-Supported HIV Self-Testing Strategy Among Urban Refugee and Displaced Youth in Kampala, Uganda: Protocol for a Cluster Randomized Trial (Trushirikiane, Supporting Each Other). JMIR Research Protocol. 2021 Apr;10(2):e26192.
4. Refugee Statistics February 2022 - Bidibidi [Internet]. 2022 Mar [cited 2022 May 26]. Available from: https://data2.unhcr.org/en/documents/details/91322
5. Presidential Fast-Track Initiative On Ending HIV & AIDS In Uganda. Kampala; 2017 Jun.
6. Nanyonjo G, Asiki G, Ssetaala A, Nakaweesa T, Wambuzi M, Nanvubya A, et al. Prevalence and correlates of hiv infection among adolescents and young people living in fishing populations along lake victoria fishing communities in uganda. Pan African Medical Journal. 2020 Sep 1;37:1–12.
7. O'Laughlin KN, Rouhani SA, Faustin ZM, Ware NC. Testing experiences of HIV positive refugees in Nakivale Refugee Settlement in Uganda: Informing interventions to encourage priority shifting. Conflict and Health. 2013;7(1):1–9.
8. Jennings L, George AS, Jacobs T, Blanchet K, Singh NS. A forgotten group during humanitarian crises: a systematic review of sexual and reproductive health interventions for young people including adolescents in humanitarian settings. Conflict and Health [Internet]. 2019 Oct 3;13(1):57. Available from: https://doi.org/10.1186/s13031-019-0240-y
9. Singh NS, Smith J, Aryasinghe S, Khosla R, Say L, Blanchet K. Evaluating the effectiveness of sexual and reproductive health services during humanitarian crises: A systematic review. PloS One [Internet]. 2018;13(7):e0199300. Available from: https://journals.plos.org/plosone/article/file?id=10.1371/journal.pone.0199300&type=printable
10. Singh NS, Aryasinghe S, Smith J, Khosla R, Say L, Blanchet K. A long way to go: a systematic review to assess the utilisation of sexual and reproductive health services during humanitarian crises. BMJ Global Health [Internet]. 2018 Jul 4;3(2):e000682. Available from: https://gh.bmj.com/content/3/2/e000682
11. Liebling H, Barrett H, Artz L. South Sudanese Refugee Survivors of Sexual and Gender-Based Violence and Torture: Health and Justice Service Responses in Northern Uganda. Int J Environ Res Public Health. 2020 Mar 5;17(5).
12. Warren E, Post N, Hossain M, Blanchet K, Roberts B. Systematic review of the evidence on the effectiveness of sexual and reproductive health interventions in humanitarian crises. Vol. 5, BMJ Open. BMJ Publishing Group; 2015.

13. Logie CH, Okumu M, Musoke DK, Hakiza R, Mwima S, Kyambadde P, et al. Intersecting stigma and HIV testing practices among urban refugee adolescents and youth in Kampala, Uganda: qualitative findings. J Int AIDS Soc [Internet]. 2021;24:e25674. Available from: http://onlinelibrary.wiley.com/doi/10.1002/jia2.25674/full
14. Logie CH, Okumu M, Berry I, Loutet M, Hakiza R, Kibuuka Musoke D, et al. Social contextual factors associated with lifetime HIV testing among the Tushirikiane urban refugee youth cohort in Kampala, Uganda: Cross-sectional findings. International Journal of STD and AIDS. 2022 Mar 1;33(4):374–84.
15. Logie CH, Okumu M, Mwima SP, Kyambadde P, Hakiza R, Kibathi IP, et al. Exploring associations between adolescent sexual and reproductive health stigma and HIV testing awareness and uptake among urban refugee and displaced youth in Kampala, Uganda. Sexual and Reproductive Health Matters. 2019 Nov 29;27(3):86–106.
16. Hlongwa M, Mashamba-Thompson T, Makhunga S, Hlongwana K. Barriers to HIV testing uptake among men in sub-Saharan Africa: a scoping review. African Journal of AIDS Research. 2020 Jan 2;19(1):13–23.
17. Logie CH, Okumu M, Kibuuka Musoke D, Hakiza R, Mwima S, Kacholia V, et al. The role of context in shaping HIV testing and prevention engagement among urban refugee and displaced adolescents and youth in Kampala, Uganda: findings from a qualitative study. Tropical Medicine & International Health. 2021;00(00):1–10.
18. Witzel TC, Eshun-Wilson I, Jamil MS, Tilouche N, Figueroa C, Johnson CC, et al. Comparing the effects of HIV self-testing to standard HIV testing for key populations: a systematic review and meta-analysis. BMC Medicine. 2020;18(1).
19. Qin Y, Han L, Babbitt A, Walker JS, Liu F, Thirumurthy H, et al. Experiences Using and Organizing HIV Self-Testing: A Global Qualitative Systematic Review. AIDS [Internet]. 2018 Dec 21;32(3):371–81. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5758403/
20. Johnson CC, Kennedy C, Fonner V, Siegfried N, Figueroa C, Dalal S, et al. Examining the effects of HIV self-testing compared to standard HIV testing services: a systematic review and meta-analysis. J Int AIDS Soc [Internet]. 2017 Jun 1;20(1):21594. Available from: http://doi.wiley.com/10.7448/IAS.20.1.21594
21. Johnson C, Baggaley R, Forsythe S, van Rooyen H, Ford N, Napierala Mavedzenge S, et al. Realizing the potential for HIV self-testing. Vol. 18, AIDS and Behavior. Springer New York LLC; 2014.
22. Choko AT, Nanfuka M, Birungi J, Taasi G, Kisembo P, Helleringer S. A pilot trial of the peer-based distribution of HIV self-test kits among fishermen in Bulisa, Uganda. PLoS ONE. 2018;13(11).
23. Smith P, Wallace M, Bekker LG. Adolescents' experience of a rapid HIV self-testing device in youth-friendly clinic settings in Cape Town South Africa: A cross-sectional community based usability study: A. J Int AIDS Soc. 2016;19(1).
24. Hatzold K, Gudukeya S, Mutseta MN, Chilongosi R, Nalubamba M, Nkhoma C, et al. HIV self-testing: breaking the barriers to uptake of testing among men and adolescents in sub-Saharan Africa, experiences from STAR demonstration projects in Malawi, Zambia and Zimbabwe. J Int AIDS Soc. 2019;22(S1):43–52.
25. Logie CH, Khoshnood K, Okumu M, Rashid SF, Senova F, Meghari H, et al. Self care interventions could advance sexual and reproductive health in humanitarian settings. BMJ. 2019;l1083–l1083.

26. Johnson CC, Kennedy C, Fonner V, Siegfried N, Figueroa C, Dalal S, et al. Examining the effects of HIV self-Testing compared to standard HIV testing services: A systematic review and meta-Analysis. J Int AIDS Soc. 2017;20(1):21594.
27. Greensides DR, Berkelman R, Lansky A, Sullivan PS. Alternative HIV Testing Methods Among Populations at High Risk for HIV Infection. Public Health Reports. 2003;118.
28. Gillies PA, Stork A, Bretman M. Streetwize UK: a controlled trial of an AIDS education comic [Internet]. Vol. 5, Source: Health Education Research. 1990. Available from: https://about.jstor.org/terms
29. Gallagher-Thompson D, Tzuang M, Hinton L, Alvarez P, Rengifo J, Valverde I, et al. Effectiveness of a Fotonovela for Reducing Depression and Stress in Latino Dementia Family Caregivers. Alzheimer Disease & Associated Disorders [Internet]. 2015;29(2):146–53. Available from: www.alzheimerjournal.com
30. Krasnoryadtseva A, Dalbeth N, Petrie KJ. The effect of different styles of medical illustration on information comprehension, the perception of educational material and illness beliefs. Patient Education and Counseling. 2020 Mar 1;103(3):556–62.
31. Muzumdar JM, Pantaleo NL. Comics as a Medium for Providing Information on Adult Immunizations. Journal of Health Communication. 2017 Oct 3;22(10):783–91.
32. Celentano I, Winer RL, Jang SH, Ibrahim A, Mohamed FB, Lin J, et al. Development of a theory-based HPV vaccine promotion comic book for East African adolescents in the US. BMC Public Health. 2021 Dec 1;21(1).
33. Waite M. Writing medical comics. Vol. 42, Journal of Visual Communication in Medicine. Taylor and Francis Ltd; 2019. p. 144–50.
34. Towey F. Comics and Medicine. Cancer and Society. 2014;15(9):927–8.
35. Orozco-Olvera V, Shen F, Cluver L. The effectiveness of using entertainment education narratives to promote safer sexual behaviors of youth: A meta-analysis, 1985-2017. PLoS ONE. 2019 Feb 1;14(2).
36. Vaughan PW, Rogers EM, Singhai A, Swalehe RM. Entertainment-education and HIV/AIDS prevention: a field experiment in Tanzania. Journal of Health Communication. 2000;5:81–100.
37. Ghose T, Shubert V, Poitevien V, Choudhuri S, Gross R. Effectiveness of a Viral Load Suppression Intervention for Highly Vulnerable People Living with HIV. AIDS and Behavior. 2019 Sep 1;23(9):2443–52.
38. Kuhn A, Maatman T. Annals Graphic Medicine - Should I PrEP? Barriers to HIV-Related Preventive Care Faced by Black MSM. Annals of Internal Medicine. 2021 Apr;174(4):W37–44.
39. Obare F, Birungi H, Deacon B, Burnet R. Effectiveness of using comic books to communicate HIV and AIDS messages to in-school youth: Insights from a pilot intervention study in Nairobi, Kenya. African Population Studies. 2013 Nov 4;27(2):203.
40. Moore T. Strengths-based narrative storytelling as therapeutic intervention for refugees in Greece. World Federation of Occupational Therapists Bulletin. 2017 Jan 2;73(1):45–51.
41. Bosqui T, Mayya A, Younes L, Baker MC, Annan IM. Disseminating evidence-based research on mental health and coping to adolescents facing adversity in Lebanon: a pilot of a psychoeducational comic book 'Somoud.' Conflict and Health. 2020 Dec 1;14(1).
42. Moorhouse L, Schaefer R, Thomas R, Nyamukapa C, Skovdal M, Hallett TB, et al. Application of the HIV prevention cascade to identify, develop and evaluate interventions

to improve use of prevention methods: examples from a study in east Zimbabwe. 2019; Available from: http://onlinelibrary.wiley.com/doi/10.1002/jia2.25309/full

43. Schaefer R, Gregson S, Fearon E, Hensen B, Hallett TB, Hargreaves JR. HIV prevention cascades: a unifying framework to replicate the successes of treatment cascades [Internet]. Vol. 6. 2019. Available from: www.thelancet.com/hiv

44. HIV Prevention Cascades Stakeholder Consultation Meeting and Workshop Report on a consultation and workshop organised by the Manicaland Centre for Public Health Research* Biomedical Research and Training Institute Imperial College London * In association with UNAIDS, Zimbabwe Ministry of Health and Child Care, and Zimbabwe National AIDS Council; with funding from the Bill and Melinda Gates Foundation.

45. Montgomery AA, Peters TJ, Little P. Design, analysis and presentation of factorial randomised controlled trials. BMC Medical Research Methodology [Internet]. 2003;3(26):1–5. Available from: http://www.biomedcentral.com/1471-2288/3/26

46. Witzel TC, Eshun-Wilson I, Jamil MS, Tilouche N, Figueroa C, Johnson CC, et al. Comparing the effects of HIV self-testing to standard HIV testing for key populations: a systematic review and meta-analysis. BMC Medicine. 2020 Dec 1;18(381):1–13.

47. Qin Y, Han L, Babbitt A, Walker JS, Liu F, Thirumurthy H, et al. Experiences using and organizing HIV self-testing. AIDS. 2018 Jan 28;32(3):371–81.

48. Watkins ER, Newbold A. Factorial designs help to understand how psychological therapy works. Frontiers in Psychiatry. 2020 May 14;11(429):1–14.

49. Uganda - Refugee Statistics January 2022. Bidi Bidi; 2022 Feb.

50. Nakanwagi M, Okethwangu D, Kwesiga B, Ario AR. Availability of HIV services in BidiBidi refugee settlement, October to March 2017. UNIPH Bulletin Articles. 2021 Nov;2(2).

51. Palattiyil G, Kisaakye P, Mwenyango H, Katongole S, Mulekya F, Sidhva D, et al. Access to HIV/AIDS or TB care among refugees in Kampala, Uganda: exploring the enablers and barriers during the COVID-19 pandemic. Journal of Migration and Health [Internet]. 2022;5:100098. Available from: https://linkinghub.elsevier.com/retrieve/pii/S2666623522000216

52. Logie CH, Okumu M, Lukone SO, Loutet M, McAlpine A, Latif M, et al. Ngutulu Kagwero (agents of change): study design of a participatory comic pilot study on sexual violence prevention and post-rape clinical care with refugee youth in a humanitarian setting in Uganda. Global Health Action. 2021;14(1).

53. Reinius M, Wettergren L, Wiklander M, Svedhem V, Ekström AM, Eriksson LE. Development of a 12-item short version of the HIV stigma scale. Health and Quality of Life Outcomes. 2017 May 30;15(1).

54. Kalichman SC, Simbayi LC, Cloete A, Mthembu PP, Mkhonta RN, Ginindza T. Measuring AIDS stigmas in people living with HIV/AIDS: The Internalized AIDS-Related Stigma Scale. AIDS Care - Psychological and Socio-Medical Aspects of AIDS/HIV. 2009 Jan;21(1):87–93.

55. Pantelic M, Steinert JI, Park J, Mellors S, Murau F. "Management of a spoiled identity": Systematic review of interventions to address self-stigma among people living with and affected by HIV. BMJ Global Health. 2019 Mar 1;4(2).

56. Carey MP, Schroder KEE. Development and Psychometric Evaluation of the Brief HIV Knowledge Questionnaire. AIDS Education and Prevention. 2002;14(2):172–82.

57. Shaweno D, Tekletsadik E. Validation of the condom use self-efficacy scale in Ethiopia. BMC International Health and Human Rights [Internet]. 2013;13(22):1–8. Available from: http://www.biomedcentral.com/1472-698X/13/22
58. Brafford LJ, Beck KH. Development and validation of a condom self-efficacy scale for college students. J Am Coll Health Assoc. 1991;39(5):219–25.
59. Hall KS, Manu A, Morhe E, Harris LH, Loll D, Ela E, et al. Development and Validation of a Scale to Measure Adolescent Sexual and Reproductive Health Stigma: Results From Young Women in Ghana. Journal of Sex Research. 2018 Jan 2;55(1):60–72.
60. Pulerwitz J, Gortmaker SL, Dejong W. Measuring Sexual Relationship Power in HIV/STD Research. Sex Roles. 2000;42:637–60.
61. Faul F, Erdfelder E, Lang AG, Buchner A. G*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. Behavior Research Methods. 2007 Mar 30;39(2):175–91.
62. Smith BA, Lee HJ, Lee JH, Choi M, Jones DE, Bausell RB, et al. Quality of reporting Randomized Controlled Trials (RCTs) in the nursing literature: Application of the Consolidated Standards of Reporting Trials (CONSORT). Nursing Outlook. 2008;56(1).
63. Chan AW, Tetzlaff JM, Gøtzsche PC, Altman DG, Mann H, Berlin JA, et al. SPIRIT 2013 explanation and elaboration: guidance for protocols of clinical trials. BMJ. 2013;346.
64. Chan AW, Tetzlaff JM, Altman DG, Laupacis A, Gøtzsche PC, Krleža-Jeric K, et al. SPIRIT 2013 Statement: Defining Standard Protocol Items for Clinical Trials DEVELOPMENT OF THE SPIRIT 2013 STATEMENT [Internet]. Vol. 158, Ann Intern Med. 2013. Available from: www.annals.org
65. Flicker S, Guta A. Ethical Approaches to Adolescent Participation in Sexual Health Research. Journal of Adolescent Health. 2008 Jan;42(1):3–10.
66. Nakalega R, Akello C, Gati B, Nakabiito C, Nolan M, Kamira B, et al. Ethical considerations for involving adolescents in biomedical HIV prevention research. BMC Medical Ethics. 2021 Dec 1;22(1).
67. Day S, Kohler P, Slack C, Ezechi O, Tucker JD. Adolescent participation in HIV research: consortium experience in low and middle-income countries and scoping review. Lancet HIV [Internet]. 2020;7:844–52. Available from: www.thelancet.com/hiv

Figure Legends:

Figure 1: Flowchart of Study Phases and Participant Involvement

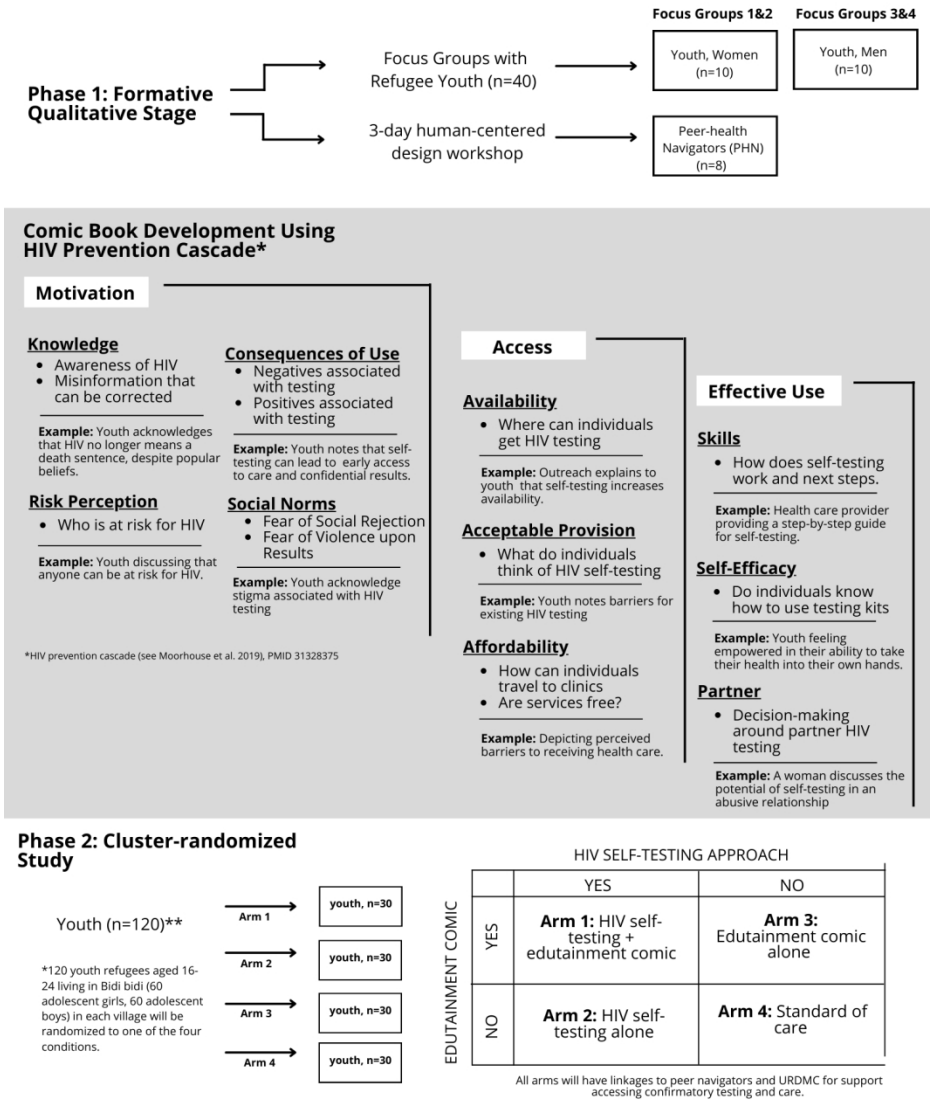

Figure 1: Flowchart of Study Phases and Participant Involvement

545x705mm (72 x 72 DPI)

SPIRIT 2013 Checklist: Recommended items to address in a clinical trial protocol and related documents*

Section/item	ItemNo	Description	Page (P); Line (L)
Administrative information			
Title	1	Descriptive title identifying the study design, population, interventions, and, if applicable, trial acronym	P1; L1-3
Trial registration	2a	Trial identifier and registry name. If not yet registered, name of intended registry	P2; L59-60
	2b	All items from the World Health Organization Trial Registration Data Set	Box 1
Protocol version	3	Date and version identifier	Box 1
Funding	4	Sources and types of financial, material, and other support	P17; L407-409
Roles and responsibilities	5a	Names, affiliations, and roles of protocol contributors	P17; L403-405
	5b	Name and contact information for the trial sponsor	P1; L29-30
	5c	Role of study sponsor and funders, if any, in study design; collection, management, analysis, and interpretation of data; writing of the report; and the decision to submit the report for publication, including whether they will have ultimate authority over any of these activities	P 17; L403-405 & 411
	5d	Composition, roles, and responsibilities of the coordinating centre, steering committee, endpoint adjudication committee, data management team, and other individuals or groups overseeing the trial, if applicable (see Item 21a for data monitoring committee)	N/A
Introduction			
Background and rationale	6a	Description of research question and justification for undertaking the trial, including summary of relevant studies (published and unpublished) examining benefits and harms for each intervention	P 3-5
	6b	Explanation for choice of comparators	P9; L230-248
Objectives	7	Specific objectives or hypotheses	P5; L135-145

Trial design	8	Description of trial design including type of trial (eg, parallel group, crossover, factorial, single group), allocation ratio, and framework (eg, superiority, equivalence, noninferiority, exploratory)	P6; L147-158
Methods: Participants, interventions, and outcomes			
Study setting	9	Description of study settings (eg, community clinic, academic hospital) and list of countries where data will be collected. Reference to where list of study sites can be obtained	P6-7; L161-181
Eligibility criteria	10	Inclusion and exclusion criteria for participants. If applicable, eligibility criteria for study centres and individuals who will perform the interventions (eg, surgeons, psychotherapists)	P7; L 188-193
Interventions	11a	Interventions for each group with sufficient detail to allow replication, including how and when they will be administered	P9-10; L227-248 (Figure 1)
	11b	Criteria for discontinuing or modifying allocated interventions for a given trial participant (eg, drug dose change in response to harms, participant request, or improving/worsening disease)	N/A; low risk behaviour change intervention
	11c	Strategies to improve adherence to intervention protocols, and any procedures for monitoring adherence (eg, drug tablet return, laboratory tests)	P8; L202-205
	11d	Relevant concomitant care and interventions that are permitted or prohibited during the trial	N/A; low risk behaviour change intervention
Outcomes	12	Primary, secondary, and other outcomes, including the specific measurement variable (eg, systolic blood pressure), analysis metric (eg, change from baseline, final value, time to event), method of aggregation (eg, median, proportion), and time point for each outcome. Explanation of the clinical relevance of chosen efficacy and harm outcomes is strongly recommended	P 10-12; L 251-295
Participant timeline	13	Time schedule of enrolment, interventions (including any run-ins and washouts), assessments, and visits for participants. A schematic diagram is highly recommended (see Figure)	Figure 1
Sample size	14	Estimated number of participants needed to achieve study objectives and how it was determined, including clinical and statistical assumptions supporting any sample size calculations	P 12-13; L301-307
Recruitment	15	Strategies for achieving adequate participant enrolment to reach target sample size	P 8; L197-205
Methods: Assignment of interventions (for controlled trials)			

Allocation:			
Sequence generation	16a	Method of generating the allocation sequence (eg, computer-generated random numbers), and list of any factors for stratification. To reduce predictability of a random sequence, details of any planned restriction (eg, blocking) should be provided in a separate document that is unavailable to those who enrol participants or assign interventions	P8; L194-197
Allocation concealment mechanism	16b	Mechanism of implementing the allocation sequence (eg, central telephone; sequentially numbered, opaque, sealed envelopes), describing any steps to conceal the sequence until interventions are assigned	N/A; interventions cluster-randomized and not blinded
Implementation	16c	Who will generate the allocation sequence, who will enrol participants, and who will assign participants to interventions	P8; L197-198
Blinding (masking)	17a	Who will be blinded after assignment to interventions (eg, trial participants, care providers, outcome assessors, data analysts), and how	P13; L319-321, 326
	17b	If blinded, circumstances under which unblinding is permissible, and procedure for revealing a participant's allocated intervention during the trial	N/A; low risk behaviour change intervention so unblinding will not occur
Methods: Data collection, management, and analysis			
Data collection methods	18a	Plans for assessment and collection of outcome, baseline, and other trial data, including any related processes to promote data quality (eg, duplicate measurements, training of assessors) and a description of study instruments (eg, questionnaires, laboratory tests) along with their reliability and validity, if known. Reference to where data collection forms can be found, if not in the protocol	P 13; L310-321
	18b	Plans to promote participant retention and complete follow-up, including list of any outcome data to be collected for participants who discontinue or deviate from intervention protocols	P8; L202-205
Data management	19	Plans for data entry, coding, security, and storage, including any related processes to promote data quality (eg, double data entry; range checks for data values). Reference to where details of data management procedures can be found, if not in the protocol	P13; L312-321

Statistical methods	20a	Statistical methods for analysing primary and secondary outcomes. Reference to where other details of the statistical analysis plan can be found, if not in the protocol	P 13-14; L324-345
	20b	Methods for any additional analyses (eg, subgroup and adjusted analyses)	P 14; L338-343
	20c	Definition of analysis population relating to protocol non-adherence (eg, as randomised analysis), and any statistical methods to handle missing data (eg, multiple imputation)	P 14; L329-334
Methods: Monitoring			
Data monitoring	21a	Composition of data monitoring committee (DMC); summary of its role and reporting structure; statement of whether it is independent from the sponsor and competing interests; and reference to where further details about its charter can be found, if not in the protocol. Alternatively, an explanation of why a DMC is not needed	P 14; L343-345
	21b	Description of any interim analyses and stopping guidelines, including who will have access to these interim results and make the final decision to terminate the trial	N/A; low risk behaviour change intervention for a short duration
Harms	22	Plans for collecting, assessing, reporting, and managing solicited and spontaneously reported adverse events and other unintended effects of trial interventions or trial conduct	N/A; low risk behaviour change intervention for a short duration
Auditing	23	Frequency and procedures for auditing trial conduct, if any, and whether the process will be independent from investigators and the sponsor	N/A; low risk behaviour change intervention for a short duration
Ethics and dissemination			
Research ethics approval	24	Plans for seeking research ethics committee/institutional review board (REC/IRB) approval	P 15; L360-362
Protocol amendments	25	Plans for communicating important protocol modifications (eg, changes to eligibility criteria, outcomes, analyses) to relevant parties (eg, investigators, REC/IRBs, trial participants, trial registries, journals, regulators)	P 16; L395-397

Consent or assent	26a	Who will obtain informed consent or assent from potential trial participants or authorised surrogates, and how (see Item 32)	P 15-16; L363-377
	26b	Additional consent provisions for collection and use of participant data and biological specimens in ancillary studies, if applicable	N/A; no ancillary studies
Confidentiality	27	How personal information about potential and enrolled participants will be collected, shared, and maintained in order to protect confidentiality before, during, and after the trial	P 13; L317-319
Declaration of interests	28	Financial and other competing interests for principal investigators for the overall trial and each study site	P 17; L413
Access to data	29	Statement of who will have access to the final trial dataset, and disclosure of contractual agreements that limit such access for investigators	P13; L319-321
Ancillary and post-trial care	30	Provisions, if any, for ancillary and post-trial care, and for compensation to those who suffer harm from trial participation	N/A; low risk behaviour change intervention for a short duration
Dissemination policy	31a	Plans for investigators and sponsor to communicate trial results to participants, healthcare professionals, the public, and other relevant groups (eg, via publication, reporting in results databases, or other data sharing arrangements), including any publication restrictions	P 16; L380-388
	31b	Authorship eligibility guidelines and any intended use of professional writers	P 16; L386-388
	31c	Plans, if any, for granting public access to the full protocol, participant-level dataset, and statistical code	P 17; L424-429
Appendices			
Informed consent materials	32	Model consent form and other related documentation given to participants and authorised surrogates	Supplementary material
Biological specimens	33	Plans for collection, laboratory evaluation, and storage of biological specimens for genetic or molecular analysis in the current trial and for future use in ancillary studies, if applicable	N/A; no biological specimens collected

*It is strongly recommended that this checklist be read in conjunction with the SPIRIT 2013 Explanation & Elaboration for important clarification on the items. Amendments to the protocol should be tracked and dated. The SPIRIT checklist is copyrighted by the SPIRIT