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Siyakhana: A Hybrid Type 2 Effectiveness-Implementation Stepped-Wedge Trial to Reduce Stigma Towards Substance Use and Depression Among Community Health Workers in HIV/TB Care in South Africa

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Abstract

Introduction: Substance use (SU) and other mental health conditions, such as depression, contribute to poor engagement in HIV and TB care in South Africa, a country with the highest global prevalence of HIV and a significant TB burden. Yet, community health workers (CHWs) —frontline lay health workers who play a central role in re-engaging patients in HIV/TB care— receive little-to-no training on supporting patients with SU or other mental health concerns. CHWs also display stigma towards patients with SU and depression, which may contribute to HIV/TB

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Declarations of Interest

None

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care disengagement. We developed and tested a CHW training (*"Siyakhana"*) to reduce CHW stigma towards SU and depression in HIV/TB care.

Methods: A cluster randomized, stepped-wedge hybrid type 2 effectiveness-implementation trial (*N*=82 CHWs) evaluated *Siyakhana* across six clinics in a low-resource area of Cape Town, SA. The three-day *Siyakhana* training included psychoeducation, self-care strategies, non-judgmental communication, problem solving, and contact-based stigma reduction using lived experience narratives. Pre-training and three- and six-months post-training assessments were conducted. Primary effectiveness outcomes were CHW stigma towards SU and depression, assessed using the Social Distance Scale. Primary implementation outcomes were guided by Proctor's model, including fidelity, acceptability, appropriateness, and feasibility, assessed using structured coding of role plays and a validated quantitative measure for assessing implementation outcomes in low- and middle-income countries.

Results: Participants were on average 46.8 years old (*SD*=8.9), 99% female, and 100% Black African. Ninety-five percent of CHWs completed the *Siyakhana* training, with approximately 90% retention over six months. A linear mixed effects model showed a significant effect of the *Siyakhana* training on reducing SU stigma over six months after adjusting for time (β=−1.46, *SE*=0.67, $p<0.05$), but no effect on depression stigma (β=−0.20, *SE*=0.57, $p>0.05$). CHW fidelity was 89.4% (*SD*=11.3%) at six-months. Quantitative implementation outcomes indicated high acceptability (*M*=2.85, *SD*=0.27), appropriateness (*M*=2.77, *SD*=0.31), and feasibility (*M*=2.41, *SD*=0.38).

Conclusions: *Siyakhana* was associated with reductions in CHW SU stigma in the context of HIV/TB care, with promising implementation outcomes. Findings will inform a larger randomized trial evaluating the effectiveness and implementation of *Siyakhana* and examine whether shifting CHW stigma improves patient-level health outcomes.

Trial Registration: ClinicalTrials.gov: NCT05282173.

Keywords

stigma; substance use; depression; implementation science; task-sharing; low-and-middle income country; global mental health

1. Introduction

South Africa is home to the greatest number of people with HIV (PWH) globally (UNAIDS, 2022), with high rates of TB and HIV/TB comorbidity (World Health Organization, 2024). Alongside the HIV and TB epidemics, substance use (SU) and other behavioral health challenges are highly prevalent, contributing to South Africa's high incidence of HIV and TB (Osman et al., 2020). Only half of all patients with TB complete treatment and less than two-thirds with HIV achieve virological suppression on antiretroviral therapy (ART), with rates even lower among individuals with SU and other behavioral health concerns like depression (Naidoo et al., 2017; Zuma et al., 2022). Without implementing strategies to enhance patient engagement in care and address co-occurring SU and depression, South Africa is unlikely to meet global targets for ending HIV and TB by 2030.

In response to challenges with TB and HIV care engagement and adherence, the Department of Health has implemented and scaled up community health worker (CHW) programs to support TB and HIV care engagement (Mash et al., 2020; Thomas et al., 2021). CHWs conduct home visits to promote care re-engagement for individuals who have fallen out of HIV and/or TB care (Ngcobo et al., 2022; Thomas et al., 2021). These CHWs often encounter patients with symptoms of SU and depression due to the high prevalence of these conditions (Myers et al., 2021, 2023; Peltzer et al., 2012). In our prior work (Magidson et al., 2021; Myers et al., 2022), approximately one-third of clinic-based patients with HIV/TB screened positive for SU or depression, with rates likely even higher among patients with HIV/TB care disengagement (Myers et al., 2021; Peltzer et al., 2012; Truong et al., 2021).

Despite the burden of SU and depression among people with HIV/TB, and the high likelihood of CHWs encountering these individuals in their work to promote care engagement and adherence, CHWs receive limited training on how to identify and communicate with patients with SU or depression (Sorsdahl et al., 2021). Further, our team has identified high levels of SU and depression stigma among CHWs (Magidson et al., 2022; Regenauer et al., 2020, Regenauer et al., 2024). These high levels stigma are concerning as evidence suggests that healthcare providers who have negative attitudes towards patients with depression or SU spend less time with these patients, are less likely to implement evidence-based practices, and are less likely to deliver patient-centered care (Reis et al., 2005). SU and/or depression stigma among healthcare providers leads to lower quality care, including shorter visits and a more task-oriented vs. collaborative approach with patients (Nyblade et al., 2019; Peckover & Chidlaw, 2007). In response to experiences of SU and depression stigma, patients may delay seeking treatment (van Boekel et al., 2013) or discontinue treatment (Knaak et al., 2017) which may adversely affect their physical health (Zewdu et al., 2019). Indeed, patients in South Africa, have reported prematurely terminating HIV/TB care after experiencing SU or depression stigma from health providers (Clement et al., 2015; Myers et al., 2018). Despite SU and depression stigma among CHWs being a major barrier to HIV/TB care, few studies have explored how to reduce CHW stigmas a means to improve re-engagement in HIV/TB care (Clement et al., 2015).

These high levels of stigma are understandable given CHWs' lack of SU and depression training and documented associations between poor SU/depression literacy and SU/depression stigma (Green et al., 2021; Simões de Almeida et al., 2023). Researchers have piloted some depression and SU trainings for CHWs (Jacobs et al., 2021; Scott et al., 2020; Sibeko et al., 2018). However, these programs have yet to be incorporated into the South African Department of Health's standard training package for CHW accreditation. This is likely due to their resource-intensity as they are delivered over five or more days by mental health professionals and because their effectiveness for shifting CHW-level stigma and their ability to be implemented remains unknown. Critically, these prior trainings did not incorporate contact with people with lived experience of SU and depression treatment and recovery. This is important as interventions combining provider education with contact-based approaches are more effective for shifting provider SU and mental health (including depression) stigma compared to education-only approaches (Bielenberg et al., 2021; Clay et al., 2020). Despite SU and depression stigma among CHWs being a major barrier to HIV/TB care engagement, few studies in low and middle-income countries (LMICs) have

tested stigma interventions that combine education with contact-based strategies (Clay et al., 2020; Kohrt et al., 2018). In response, this study aimed to evaluate the preliminary effectiveness and implementation of "*Siyakhana*"—an isiXhosa word meaning "we build each other up"—a SU and depression stigma reduction training for CHWs working with patients who have disengaged from HIV/TB care in the Western Cape, South Africa. This study evaluated the effectiveness of *Siyakhana* on depression and SU stigma among CHWs over six months, and implementation outcomes including CHW fidelity to the training principles, and acceptability, feasibility, and appropriateness of the training.

2. Material and Methods

This study was approved by the Human Research Ethics Committee (HREC) at the South African Medical Research Council (Protocol EC039–10/2021) and the City of Cape Town. All participants provided written consent after an informed consent process prior to being enrolled in the study. Myers et al. (2024) describes the methods in detail.

2.1. Design and Setting

This study was a hybrid Type 2, stepped-wedge cluster randomized controlled pilot trial evaluating the *Siyakhana* CHW training. Randomization occurred at the cluster-level (comprised of two clinics per cluster). In collaboration with the City of Cape Town and two non-governmental organizations (NGOs) that employ CHWs, our team partnered with six publicly funded primary care clinics that deploy CHWs into Khayelitsha. The Khayelitsha health district is located within the City of Cape Town Metropolitan Area and serves a low-income community with high rates of HIV, TB, SU, and depression. Clinics in this district provide integrated HIV and TB treatment to patients residing in their geographic catchment areas. Each clinic had a similarly sized team of 10 to 15 CHWs that conducted home visits to patients who had disengaged from HIV/TB (i.e., missed two consecutive monthly visits for HIV/TB care).

2.2. Participants and Procedures

CHW participants were recruited between May and June 2022. NGOs that employed CHWs to work at the six clinics invited all CHWs working in HIV/TB care at these clinics to participate. Trained study staff met with these CHWs to explain the study procedures, assess their interest in and eligibility for study participation.

Inclusion criteria were: (1) at least 18 years old; (2) working as a CHW at one of the six participating clinics; and (3) working with patients with HIV/TB who may have depression or SU concerns. CHWs were not eligible if they were unable or unwilling to complete the training in English or the study assessments in English or isiXhosa.

Upon providing written informed consent, all participants completed a baseline assessment consisting of self-report questions on demographic and job characteristics; previous SU and depression training and education; and attitudes towards patients with HIV/TB who had symptoms of SU or depression. To increase the feasibility of conducting many assessments in a short period of time, assessments were delivered in a "classroom style", where one study staff member read questions to a group of CHWs who independently recorded their answers

on a paper assessment. A second study staff member was available to assist participants when needed. To protect confidentiality, all paper forms were identified with a participant ID number only. Later, all written answers were transferred by a trained research assistant to a secure and de-identified REDCap database (Harris et al., 2009). Across all sites, informed consent procedures and baseline assessments were completed within an approximately one-month period (June to July 2022).

After baseline assessments were completed at each site, clinics were randomized to the first *Siyakhana* training time (Cluster 1; Clinics 1 and 2), the second training time (Cluster 2; Clinics 3 and 4), or the third training time (Cluster 3; Clinics 5 and 6). Prior to receiving any training, clusters had a treatment as usual (TAU) period where they were not exposed to additional study procedures. After approximately three weeks of TAU (three-weeks post-randomization, on average six-weeks post-baseline), CHWs at clinics randomized to Cluster 1 completed a pre-training assessment that included re-administration of baseline self-report measures and a video-recorded roleplay in which the CHW interacted with a hypothetical patient with HIV and depression or SU, played by a staff member (see Supplementary file for script). Roleplays were conducted in isiXhosa. CHWs were informed that these roleplays would be used to assess their baseline skills. After this assessment, CHWs received the *Siyakhana* training. Identical procedures were followed at Cluster 2 clinics (after approximately seven weeks of TAU; 10-weeks post-baseline) and at Cluster 3 clinics (after about nine weeks of TAU; 12-weeks post-baseline).

Approximately three- and six-months after *Siyakhana* training, CHWs completed follow-up assessments that involved re-administration of baseline stigma measures, videotaped roleplays to assess fidelity, and training implementation questions. As per Department of Health regulations, CHWs were not compensated for participation in training or assessments as these activities occurred within their working hours. Study assessments occurred at CHWs' workplaces. Costs associated with travel to the training venue were reimbursed. Figure 1 depicts the study design including timing of assessments, randomization, and training.

2.3. *Siyakhana* Training

Siyakhana was developed and adapted based on several rounds of formative, qualitative feedback from patients, CHWs, and other stakeholders (Magidson et al., 2022; Myers et al., 2024). The training was field-tested with a small group of CHWs and their supervisors (Regenauer et al., 2024). After the field test, the training was adapted to enhance feasibility and acceptability by incorporating training into CHWs' normal work, using visual guides to present information, and reframing the training goal from stigma-reduction to empowering CHWs with additional tools for working with patients with SU/depression.

The conceptual model for *Siyakhana* integrates the Situation Information Motivation Behavioral Skills Model of Care Initiation and Maintenance (sIMB-CIM; Amico et al., 2011) with the Link and Phelan (Link & Phelan, 2001) stigma framework. Drawing on the sIMB-CIM (Amico et al., 2011), *Siyakhana* provides CHWs with accurate information on HIV, TB, SU, and depression and the impact of SU and depression stigma on patient outcomes (including intersectional stigma); teaches evidence-based skills for interacting

with patients with HIV/TB and SU and depression to promote motivation and behavior change (i.e., motivational interviewing techniques, problem-solving skills, nonjudgmental communication; and teaches self-care skills (i.e., mindfulness, examining balance in life and values). The information and skills provided in *Siyakhana* were adapted from prior CHW trainings to enhance mental health literacy and skills for supporting patients with SU and/or depression (Jacobs et al., 2021; Magidson et al., 2021; Scott et al., 2020; Sibeko et al., 2018). Drawing on Link and Phelan's (2001) stigma framework, *Siyakhana* also included exposure to lived experience narratives and social contact with trainers with lived experience of SU, depression and intersectional stigma as a strategy for shifting CHW attitudes to patients with SU and depression. The training utilized lecture, discussion, and role-play methods, with equal weight given to depression and SU content. Table 1 describes the education and contact-based components of *Siyakhana*.

All trainings were delivered by a South African Health Professions Council-registered psychological counsellor and peer interventionist, both with lived experience and similar backgrounds to the CHWs. Training occurred over three consecutive days in English; all Western Cape Department of Health training is delivered in English. Native isiXhosa speaking staff were available to address questions and further explain concepts in isiXhosa. In response to clinic managers' request to limit impact on service delivery, we offered each cluster two opportunities for training. About 50% of CHWs from each clinic within the cluster attended the training; overall n=12–15 CHWs per training.

All CHWs were offered at least one group supervision session with a registered psychological counselor or social worker before the three-month follow-up, and another session between the three- and six-month follow-up. Supervision involved reviewing skills from the training (including skills rehearsal), debriefing on challenging cases related to SU and depression, debriefing on personal life circumstances related to SU and depression that affected CHWs interactions with patients, and self-care skill practice. Each supervision group was comprised of CHWs from the same cluster.

2.4 Measures

2.4.1. Demographic and Job Characteristics—All participants answered questions about their age, gender, race, education, time in their current position and occupation, caseload size, prior training on SU and mental health conditions (with follow up questions to determine if training included content related to SU, depression, or other conditions), prior experience working with patients with SU or mental health concerns (not limited to depression), personal experience (self, friend, and/or family member) with SU and/or mental health concerns, the most important part of their background/identity, and components of their identity shared with their patients.

2.4.2. Effectiveness Outcomes—The Social Distance Scale (SDS) measured SU and depression stigma at three- and six-month follow-up. The SDS assesses discriminatory attitudes and behavioral intentions that underlie enacted stigma towards people with a stigmatized identity (Spata et al., 2024). We chose this measure as (i) *Siyakhana* aims to reduce CHWs' enacted stigma towards people with SU and depression and (ii) the SDS

has been widely used to measure both depression and SU stigma (Abayomi et al., 2013; Adewuya & Makanjuola, 2005; Moxham et al., 2024; Spata et al., 2024; Swed et al., 2022), including among healthcare workers in LMICs (Kohrt et al., 2018). The SDS has been validated across multiple populations, cultures, and settings, unlike other measures of enacted stigma (Spata et al., 2024; Van Brakel et al., 2019).

Vignettes can also be used to help anchor participants responses to the SDS items. In this study, CHWs were presented with two vignettes about patients struggling with HIV care. One of these vignettes described a patient with HIV and SU, and the other described a patient with HIV and depression. After each vignette, CHWs completed a six-item SDS, rating their willingness to have different social contacts with a person like the patient described in the vignette on a 4-point scale (1 = *"definitely"*, 4 = *"definitely not"*). These social contacts included acquaintances, housemates, work colleagues, friends, family members, and romantic partners. Scores were summed to create total SU and depression stigma scores (ranging from 6 to 24), with higher scores indicating greater stigma. While the SDS does not have validated cut-offs, scores of 6 to 10, 11–16, and ≥17 typically reflect low, moderate and high levels of stigma respectively (Kohrt et al., 2018).

2.4.3. Implementation Outcomes—Implementation outcomes were defined and selected based on Proctor's model (Proctor et al., 2011) and included CHW fidelity, acceptability, appropriateness, and feasibility of the training, assessed using implementation outcome measures developed and validated for use in LMICs.

CHW fidelity.: CHW fidelity was assessed at three- and six-months using the ENhancing Assessment of Common Therapeutic factors (ENACT) tool, a 15-item validated measure of fidelity and clinical competence among non-specialist workers, such as CHWs (Kohrt et al., 2015). At each assessment, 20% of the roleplays were randomly selected and independently rated by two bilingual assessors (NC, SN) for 15 clinical competencies, giving scores of 1 (*harmful*), 2 (*some basic skills*), 3 (*all basic skills*), or 4 (*advanced skills*). Any disagreements were discussed and resolved with an arbitrator familiar with the ENACT (ALR, IB). To receive a '2', a participant could perform poorly (but not harmfully) in any of the sub-criteria, not use the skill (where the absence was not harmful), or perform exceptionally in two of three sub-criteria while excluding the other. To receive a '3', participants had to perform well in all sub-criteria for a competency. Subscale items that were missing (not in a harmful way), were recoded as 2, like previous analyses (Regenauer et al, 2024). CHW fidelity scores were calculated based on the proportion of ENACT items delivered with competence. As *Siyakhana* focused on training CHWs to recognize SU or depression and refer patients to treatment (rather than on treatment delivery), a cut-off of ≥2 (some basic skills) was used to define fidelity.

Acceptability, appropriateness, and feasibility.: Acceptability, appropriateness, and feasibility subscales adapted from a validated measure of Dissemination and Implementation (Haroz et al., 2019) were completed at the three- and six-month assessments. Items on each subscale (feasibility – 13 items; acceptability – 12 items; appropriateness – 11 items) were rated on a four-point scale (0 = *"not at all"*, 3 = *"a lot"*) and averaged for a final subscale score (range 0–3). Example items include *"Do you think you would have the necessary time*

to attend this 3-day training again in the future?" (feasibility), *"Do you feel the components* (*i.e., skills you learned*) *make sense?"* (acceptability), and *"Do you think this training is a good way to address problems you may have with some patients?"* (appropriateness). Feasibility was additionally defined as CHW attendance at ≥75% of all training days.

2.5. Data Analytic Plan

2.5.1. Effectiveness Outcomes—Analyses followed intent-to-treat principles. Stigma scores were treated continuously. We fit separate linear mixed effect models to evaluate the training effect on the primary outcomes of SU and depression stigma, adjusting for the fixed effect of time (Hemming et al., 2015). As recommended for stepped wedge trials (Hooper & Copas, 2019), time captured since baseline was treated as a continuous variable (Hemming et al., 2015). Clinic and CHW were included as random effects in both models. Baseline and pre-treatment depression and SU stigma scores were averaged and used to account for the TAU period.

2.5.2. Implementation Outcomes—CHW fidelity scores were calculated as a proportion of the ENACT items delivered with competence. Feasibility, acceptability, and appropriateness data were analyzed using descriptive statistics; means and standard deviations were calculated for each subscale. For feasibility, we calculated the percentage of training sessions attended across all CHWs.

3. Results

3.1. Participant flow and characteristics

This study enrolled N=82 participants representing more than 95% of CHWs at participating clinics (see Figure 2 for the CONSORT diagram). As Table 2 shows, all participants were Black African and spoke isiXhosa as their primary language, and all but one identified as female (n = 81; 98.8%), matching the demographic profile of the CHW workforce (Brooke-Sumner et al., 2019). On average, participants were 46.9 years old (SD = 8.9), with a mean weekly caseload of 47.1 patients (SD = 13.7). While all participants had worked as a CHW for at least six months, and 91.5% had worked in the field for over five years, only n = 4 (4.9%) reported ever attending a training on SU or depression (n = 1 participant was unsure). CHWs reported sharing various aspects of their identity with patients, including community of origin, gender, race/ethnicity, sexuality, and religion. Over 70% of CHWs reported either their own lived experience of depression or SU or that of a friend or family member. At baseline, CHW stigma towards SU (M = 12.53; SD = 3.44) was significantly higher than stigma towards depression (M = 8.33; SD = 2.17; $t(79) = -10.87$, $p < 0.001$), where possible stigma scores ranged from 6 to 24.

After clinic randomization, n = 29 participants were in Cluster 1 (35.4%), n = 25 participants were in Cluster 2 (30.5%), and n = 28 participants were in Cluster 3 (34.1%). Of the 82 CHWs who completed baseline measures, 96.3% (n = 79) participated in training. Each cluster received at least one supervision session before three-month follow-up (Cluster 1 received two sessions due to staffing and scheduling availability), and one supervision session between three- and six-month follow-up. Supervision attendance was good, with

86% (Cluster 1), 100% (Cluster 2), and 89% (Cluster 3) of CHWs attending the first supervision session and 76% (Cluster 1), 92% (Cluster 2), and 89% (Cluster 3) attending supervision after three-month follow-up. Overall, 93.9% ($n = 77$) and 89.0% ($n = 73$) of CHWs were retained for three- and six-month follow-ups respectively.

3.2. Effectiveness Outcomes

As reflected in Table 3, *Siyakhana* had a significant effect on SU stigma after adjusting for time ($\beta = -1.46$; $SE = 0.67$; 95% CI = −2.76, −0.15; $p = 0.03$). The SU stigma score decreased by 1.22 from baseline to three months ($\beta = -1.22$; $SE = 0.35$; 95% CI = −1.91, −0.52; $p = 0.001$) and by 0.88 at the six-month follow-up ($\beta = -0.88$; $SE = 0.39$; 95% CI = −1.64, −0.11; $p = 0.03$). *Siyakhana* had no significant effect on depression stigma after adjusting for time (β = −0.20; $SE = 0.57$; 95% CI = −1.31, 0.914; $p = 0.73$). There was a non-significant increase in depression stigma from baseline to three months ($\beta = 0.51$; $SE = 1.17$; 95% CI = −1.80, 2.81; $p = 0.667$) and at the six-month follow-up ($\beta = 0.15$; $SE = 0.73$; 95% CI = −1.28, 1.59; $p = 0.834$).

3.3. Implementation Outcome Results

CHW Fidelity.—At the three-month follow-up assessment, on average participants met competency on 85.1% ($SD = 9.9\%$) of the 15 ENACT items. At the six-month follow-up, participants met competency on 89.4% ($SD = 11.3\%$) of the 15 ENACT items.

Acceptability, Appropriateness, and Feasibility.—On average at the three-month follow-up, the *Siyakhana* training was rated 2.85 ($SD = 0.27$) for acceptability, 2.77 ($SD = 0.31$) for appropriateness, and 2.41 ($SD = 0.38$) for feasibility, with possible scores ranging from 0 to 3. At the six-month follow-up, the training was rated 2.83 ($SD = 0.27$) for acceptability, 2.76 ($SD = 0.31$) for appropriateness, and 2.41 ($SD = 0.34$) for feasibility. Of the 82 CHWs enrolled in this study, 95.1% attended all three training days, surpassing the pre-defined threshold for feasibility.

4. Discussion

Although CHW stigma towards patients with depression and SU is a barrier to HIV/TB engagement in LMICs, including South Africa (Magidson et al., 2019; Regenauer et al., 2020), few stigma reduction trainings have been developed and evaluated for CHWs in LMICs (Clay et al., 2020; Javed et al., 2021; Kemp et al., 2019; Livingston et al., 2012; Makhmud et al., 2022). Findings from this cluster randomized, stepped-wedge Type 2 hybrid effectiveness-implementation pilot trial demonstrate that the *Siyakhana* training was acceptable and appropriate, feasible to deliver, with CHWs demonstrating high fidelity towards the training principles.

Additionally, *Siyakhana* led to significant reductions in SU stigma among CHWs over six months. These results, together with those of our feasibility test (Regenauer et al., 2024) provide evidence that *Siyakhana* leads to immediate reductions in SU stigma that remain evident three- and six-months post-training. These findings contribute to the limited evidence that provider education combined with contact-based interventions can sustain

initial reductions in SU stigma (Bielenberg et al., 2021; Clay et al., 2020; Makhmud et al., 2022). Consistent with our prior work (Regenauer et al., 2024) and other literature (Schomerus et al., 2011; Yang et al., 2017), CHW stigma towards SU was significantly higher than stigma towards depression at pre-training.

In contrast and in keeping with our feasibility test (Regenauer et al., 2024), *Siyakhana* had no significant effects on depression stigma. Surprisingly, given findings from previous studies (Egbe et al., 2014; Moodley et al., 2024), depression stigma was low which limited the ability to detect changes on this variable. COVID-19 may have contributed to lower than anticipated depression stigma. Training occurred in August and September 2022, shortly after major COVID-19 restrictions were lifted. In South Africa, depression in the general population (Nguse & Wassenaar, 2021), and healthcare workers (Poole et al., 2024) worsened, increasing the likelihood of CHWs having their own lived experience of depression and having contact with patients with depression. This may have reduced depression stigma among CHWs prior to the study intervention. Additionally, Khayelitsha health district has recently been the focus of several health systems interventions to improve access to depression treatment (Sorsdahl et al., 2023). These interventions may have indirectly reduced CHW depression stigma among CHWs in Khayelitsha. Larger studies including CHWs from multiple health districts are needed to determine if these low depression stigma rates reflect broader trends in the CHW workforce. Despite this finding, future trainings should still address both SU and depression stigma due to their high co-occurrence (Myers et al., 2022).

Implementation results demonstrate high acceptability, appropriateness, and feasibility of *Siyakhana*. These findings are consistent with other work demonstrating that CHWs find SU and depression training highly acceptable (Keynejad et al., 2023; Schriger et al., 2024). Feasibility of training was enhanced by an extensive stakeholder engagement process and the formative work that preceded this trial (Magidson et al., 2022). Clinic managers were particularly concerned about service continuity if all CHWs from their clinic simultaneously attended training. We co-designed training procedures to address this concern, enhancing feasibility and stakeholder investment in *Siyakhana*.

The study found relatively high CHW fidelity to the training principles. However, this study defined competence in delivering skills as an ENACT score of ≥2 (some basic skills), rather than a score of 3 (all basic skills) due to concerns that this would be overly strict for the purposes of this evaluation. This is because the ENACT was designed to evaluate the competence of non-specialist providers health workers to deliver mental health interventions, while CHWs in this study were trained to recognize SU or depression symptoms and refer patients to treatment. While ENACT competencies are still important to these CHW interactions, we believe a lower threshold was sufficient for competence to recognize and refer patients to SU and depression services. In the future, we aim to explore different ways of coding the ENACT that are more sensitive to changes in micro-skills, as well as consider other fidelity measures of CHW interactions that are less focused on the delivery of specific interventions.

This trial has several strengths. As we recruited 95% of CHWs at participating clinics, we likely had a highly representative sample. Also, almost 94% of CHWs were retained at three months and nearly 90% at six months, despite CHW turnover being a common challenge (Malatji et al., 2023, 2024; Narayan et al., 2018). Second, this study leveraged an existing infrastructure of CHWs currently deployed throughout South Africa to trace patients who have disengaged from clinic-based HIV/TB care, enhancing future scalability. We also leveraged an emerging cohort of registered psychological counselors, individuals with a four-year degree who are being trained to address the country's shortage of psychologists and enhance access to basic counselling (Sorsdahl et al., 2021). Having less specialized providers deliver *Siyakhana* training and supervision reduces the intervention's resource requirements which may enhance the likelihood of future adoption and sustainment. Finally, the use of a rigorous cluster randomized, stepped wedge trial with high engagement and retention, increases confidence that the results warrant a future fully powered larger randomized trial.

4.1. Limitations and Future Directions

Findings should be interpreted in the context of study limitations. First, the relatively small sample size did not allow for the inclusion of covariates with adequate statistical power. Future work should consider exploring how CHWs' personal characteristics and experiences (i.e., personal experience with SU and mental health problems, education) may affect responses to the intervention. Second, levels of depression stigma were relatively low among CHWs, which did not allow for robust testing of *Siyakhana*'s effects on this type of stigma. Third, some CHWs were anxious about video-recording roleplays which may have influenced their performance and fidelity outcomes. Fourth, findings must be contextualized in the light of ongoing unpredictability of CHW contracts and role uncertainty (Malatji et al., 2024). At the time of this study, CHW contracts were being renegotiated. Fifth, scheduling group supervision sessions was challenging and limited the amount of supervision that each cluster of CHWs received. Yet, these CHWs expressed a desire for more opportunities to debrief with supervisors given high workloads and burnout associated with their role (Hines et al., 2024).

Future implementation studies should consider providing CHWs with more frequent supervision. Regular supervision could be used as a forum for providing refresher training on core skills and for additional contact-based interventions, as has been done in other studies (Myers et al., 2022). To support CHW participation in regular supervision, studies will need to consider how to integrate supervision into CHWs' workdays (Rahman et al., 2019; Triplett et al., 2023) and training CHW supervisors to deliver this supervision. Training CHW supervisors to provide CHWS with ongoing support for stigma reduction and non-judgmental communication may maximize the likelihood that these messages will be consistent throughout the organization and receive top-down support (Asher et al., 2021; Hill et al., 2014; Kok et al., 2018; Shahmalak et al., 2019). Further, expanding in-person supervision to include remote or digital supervision may be a useful implementation strategy to explore in future work (Rahman et al., 2019; Triplett et al., 2023). Next steps from this work are to conduct a larger cluster randomized trial including more CHWs across several health districts and longer-term follow up to assess whether SU stigma reduction among

health providers enhances patient engagement in HIV/TB care and test the hypothesized mechanisms of *Siyakhana*. We are also evaluating how to feasibly integrate interventions for depression and SU into existing CHW roles, particularly in home-based services, and considering best practices for training CHW supervisors.

5. Conclusions

This trial demonstrates the preliminary effectiveness and implementation of the *Siyakhana* training, including the feasibility and acceptability of the training and its effectiveness for reducing SU stigma among CHWs. As lack of evidence of the effectiveness and implementation of stigma reduction interventions has affected their adoption and sustainment (Kaur et al., 2021; Kemp et al., 2019), we hope that the findings from this trial will enhance the South African Department of Health's willingness to adopt and implement this training as part of their CHW accreditation processes. Further work with larger samples is needed to understand the prevalence of depression stigma, and the personal, occupational, and contextual factors that predict higher levels of depression and SU stigma among CHWs to allow for more targeted interventions. Overall, this line of work aims to develop and scale a sustainable CHW training program that can reduce stigma towards behavioral health concerns and improve CHW interactions with patients struggling with HIV/TB care engagement.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Highlights

- *Siyakhana* is a novel stigma reduction training for community health workers (CHWs)
- It includes psychoeducation, communication skills and lived experience narratives
- A stepped-wedge hybrid Type 2 effectiveness-implementation trial tested *Siyakhana*
- There were significant reductions in SU but not depression stigma over six months
- CHWs demonstrated high fidelity, acceptability, appropriateness, and feasibility

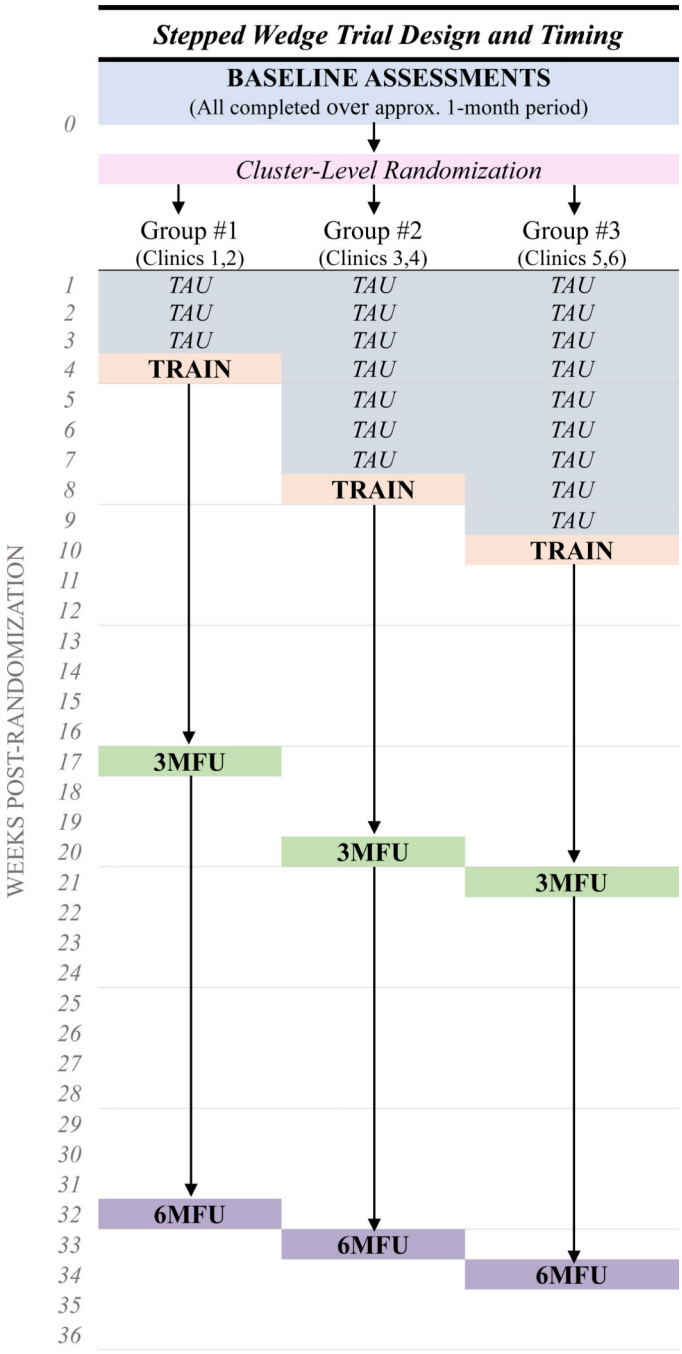

Figure 1. Stepped-Wedge Trial Design and Timing

NOTE. TAU = 'Treatment As Usual'. TRAIN = 'Pre-Training Assessment + 3-Day *Siyakhana* Training'. 3MFU = 'Three-Month Follow-Up Assessment'. 6MFU = 'Six-Month Follow-Up Assessment'.

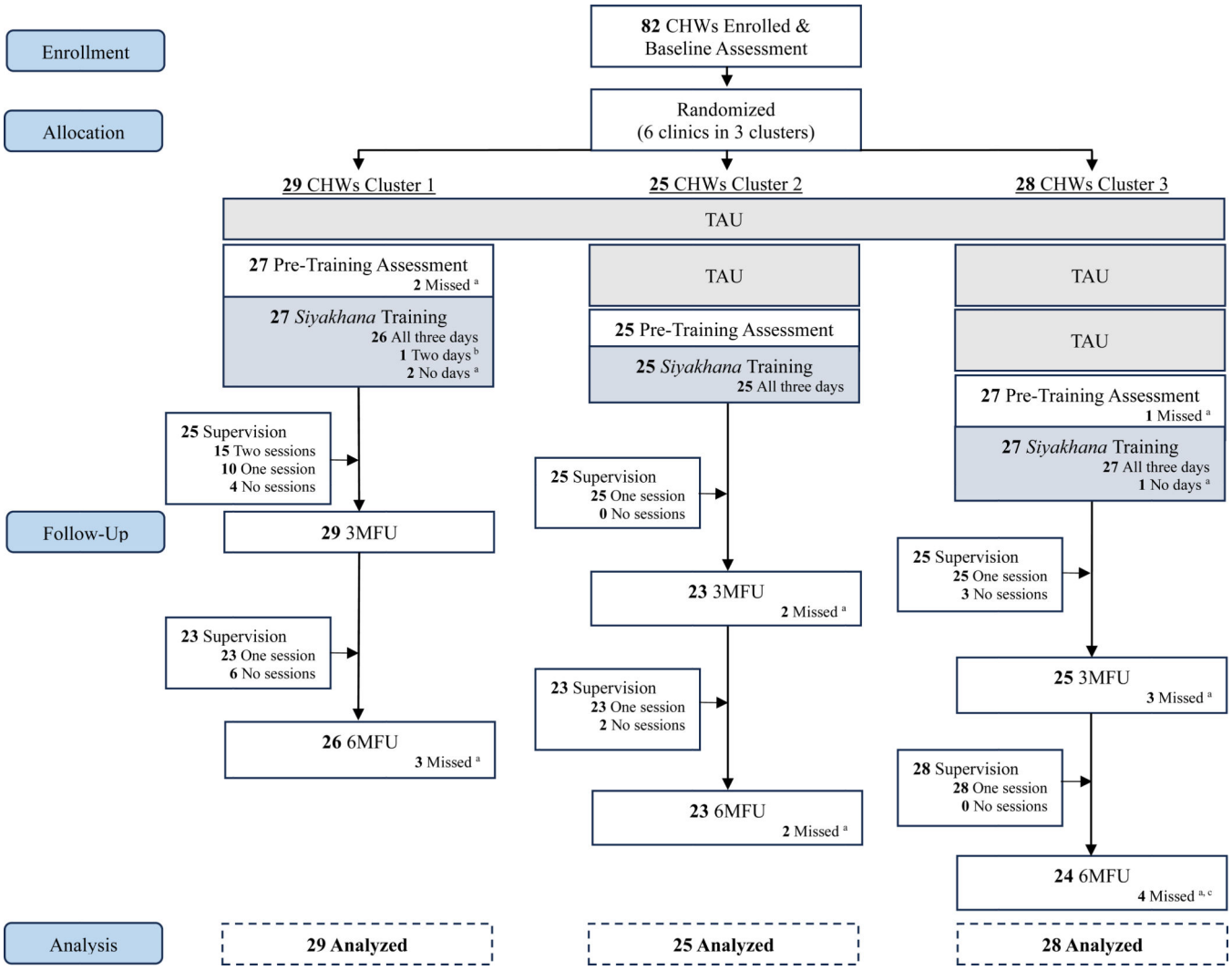

Figure 2. CONSORT Diagram

NOTES:

[a] Missed because on leave from work and attended other study visits; same pts missed pre-training and training

[b] Missed because had pre-scheduled medical appointment during one day of training

[c] Missed because unable to miss other work responsibilities

Table 1.

Description of Siyakhana Training Procedures and Content

Theoretical Framework	•	Link and Phelan's (2001) stigma framework informed the design of the stigma reduction component. The Situated Information Motivation Behavioral Skills Model of Care Initiation and Maintenance framework (Amico et al., 2001) informed training components focused on working effectively with patients with SU/depression to support their re-engagement in HIV/TB care
Trainers	•	All training was delivered by the same South African team that shared similar backgrounds to CHWs
	•	Trainers included:
	–	A psychological counsellor, registered with the Health Professions Council of South Africa with experience in motivational interviewing and problem-solving therapy and training CHWs and lived experience of depression
	–	A peer interventionist with experience delivering SU interventions with lived experience of SU and depression
Training Overview	•	3 days of training covering psychoeducation on depression, SU, stigma, HIV, TB that challenged misconceptions about these conditions and the impact of stigma on recovery and care engagement; self-care strategies for CHWs; evidence-based strategies for working with patients who may have depression or SU and patient videos of lived experience with mental health and SU challenges
	•	Mixture of didactic teaching and experiential group activities including skills rehearsal exercises and role plays
Training Content		
Day #1 (7 hours of training)	•	Welcome to training, discussion of training expectations
	•	Psychoeducation
	•	The role of a CHW
	–	Information to increase literacy about depression, substance use, in the context of HIV & TB, SU and depression treatment and recovery and referrals and resources in the community
	–	Information to increase awareness about SU and deporession stigma and how depression and SU stigma can be harmful and impacts on treatment -seeking and engagement in HIV/TB care
	•	Contact-based component
	–	Video shown: South African patient with HIV talking about lived depression experience, the impact of stigma and on their recovery process
	–	Video shown: South African patient talking about lived substance use experience, the impact of stigma on their SU treatment and their SU recovery journey
	–	Group discussion led by peer about group's preconceptions about patients with SU or depression, and the potential impacts of these preconceptions.
	–	Peer-led exercise: asked to reflect on similarities between themselves and their patients to decrease stigma.
	•	Self-Care Skill: Mindfulness exercise
	•	Evidence-Based Skill to support patient engagement in care: Problem-Solving Skills
Day #2 (7 hours of training)	•	Welcome, reflection on previous day, reflection on mindfulness
	•	Evidence-Based Skill to facilitate non-stigmatizing interactions: Trainers teach Confidentiality, Motivational Interviewing, Nonjudgmental Communication skills. This is followed by skills rehearsal facilitated by peer trainer.
	•	Self-Care Skill: Identifying Values
	•	Contact-based component: Peer-led discussions: brainstorming difficult situations that may arise with patients and/or colleagues with SU and depression. This is a group discussion.
Day #3 (4.5 hours of training)	•	Welcome and reflection
	•	Challenging situation: Roleplaying with case vignettes

- Self-Care Skill: Balancing Values in Life
- The value of supervision (information and discussion)
- Contact-based component: Roleplay and rehearsal using case vignettes, with feedback from both trainers. Roleplays used vignettes of patients with multiple and intersecting stigmatized identities.
- Summary and reflection

Table 2.

Descriptive Characteristics for CHWs in the Full Sample and by Training Group Cluster

Characteristic	Full Sample		Cluster 1: Clinics 1 & 2		Cluster 2: Clinics 2 & 3		Cluster 3: Clinics 4 & 5		Chi Square
	N = 82		*n* = 29		*n* = 25		*n* = 28		
	n	%	*n*	%	*n*	%	*n*	%	p-value*
Gender									
Female	81	98.8%	29	100.0%	24	96.0%	28	100.0%	0.301
Male	1	1.2%	0	0.0%	1	4.0%	0	0.0%	
Race									
Black African	82	100.0%	29	100.0%	25	100.0%	28	100.0%	
Primary Language									
Xhosa	82	100.0%	29	100.0%	25	100.0%	28	100.0%	
Highest Education									
Did not complete high school	60	73.2%	22	75.9%	21	84.0%	17	60.7%	0.069
Completed high school	16	19.5%	6	20.7%	4	16.0%	6	21.4%	
Any education post high school	6	7.3%	1	3.4%	0	0.0%	5	17.9%	
Most Important Aspects of Background/Identity [a]									
Religion	77	93.9%	27	93.1%	24	96.0%	26	92.9%	0.86
Community of Origin	63	76.8%	26	89.7%	14	56.0%	23	82.1%	**0.01**
Gender	56	68.3%	23	79.3%	11	44.0%	22	78.6%	**0.01**
Ethnic Group	54	65.9%	21	72.4%	13	52.0%	20	71.4%	0.22
Race	50	61.0%	18	62.1%	13	52.0%	19	67.9%	0.49
Sexuality	47	57.3%	19	65.5%	14	56.0%	14	50.0%	0.49
Background/Identity Shared with Patients [b]									
Religion	71	97.3%	23	92.0%	23	100.0%	25	100.0%	0.11
Community of Origin	53	85.5%	21	80.8%	11	78.6%	21	95.5%	0.20
Gender	56	100.0%	23	100.0%	11	100.0%	22	100.0%	
Ethnic Group	53	98.1%	20	95.2%	13	100.0%	20	100.0%	0.38
Race	49	98.0%	18	100.0%	12	92.3%	19	100.0%	0.25
Sexuality	46	97.9%	18	94.7%	14	100.0%	14	100.0%	0.40
Working in Community of Origin									
Yes	49	59.8%	21	72.4%	12	48.0%	16	57.1%	0.17
Years Working as a CHW									
0 – 6 months	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0.26
7 months – 5 years	7	8.5%	2	6.9%	4	16.0%	1	3.6%	

Characteristic	Full Sample		Cluster 1: Clinics 1 & 2		Cluster 2: Clinics 2 & 3		Cluster 3: Clinics 4 & 5		Chi Square
	N = 82		*n* = 29		*n* = 25		*n* = 28		
	n	%	*n*	%	*n*	%	*n*	%	p-value*
>5 Years	75	91.5%	27	93.1%	21	84.0%	27	96.4%	
Years in Current Role									
0 – 6 months	20	24.4%	0	0.0%	0	0.0%	20	71.4%	**0.00**
7 months – 5 years	37	45.1%	17	58.6%	14	56.0%	6	21.4%	
>5 Years	25	30.5%	12	41.4%	11	44.0%	2	7.1%	
Friend/Family/Self Ever Experienced Mental Health or SU Problem	58	70.7%	17	58.6%	16	64.0%	25	89.3%	**0.01**
Experience Working with Patients with Depression	74	90.2%	25	86.2%	25	100.0%	24	85.7%	**0.045**
Experience Working with Patients with SU Problem	59	72.0%	17	58.6%	20	80.0%	22	78.6%	0.15
Previous SU or Mental Health Training	4	4.9%	3	10.3%	0	0.0%	1	3.6%	0.27
	M	SD	*M*	SD	*M*	SD	*M*	SD	ANOVA p-value
Age	46.83	8.87	46.03	8.66	48.6	8.41	46.07	9.55	0.49**
Weekly Caseload	47.14	13.65	46.64	16.48	50.8	11.96	44.39	11.38	0.23***

*Chi-Square Likelihood Ratio 2-sided Asymptotic Significance; bolded denote statistical significant at $p < 0.05$

**Age: ANOVA (Between Groups df=2; F=.712, Sig=.494)

***Weekly Caseload (Between Groups df=2; F=1.504, Sig=.229)

[a]Could select more than one option.

[b]Of those who reported each characteristic as important, what % had patients who shared the characteristic.

Table 3.

Models of Change in SU and Depression Stigma Scores

	β	Standard error	95% CI	p-value
Effect of Siyakhana on Substance Use Stigma over six months adjusted for time				
Intercept	11.25	0.79	(9.70,12.81)	0.000
Treatment	-1.46	0.67	(−2.76, −0.15)	0.03
Time	0.16	0.24	(−0.31,0.63)	0.50
Effect of Siyakhana on Substance Use Stigma at three and six months				
Treatment at 3 months	-1.22	0.35	(−1.91, −0.52)	0.001
Treatment at 6 months	-0.88	0.39	(−1.64, −0.11)	0.03
Effect of Siyakhana on Depression Stigma over six months adjusted for time				
Intercept	6.96	0.68	(5.63,8.28)	0.000
Treatment	-0.20	0.57	(−1.31, 0.91)	0.73
Time	0.40	0.20	(−0.002,0.80)	0.05
Effect of Siyakhana on Depression Stigma at three and six months				
Treatment at 3 months	0.51	1.17	(−1.80, 2.81)	0.667
Treatment at 6 months	0.15	0.73	(−1.28, 1.59)	0.834