


The effectiveness and sustainability of peer support interventions for persons living with HIV: a realist synthesis

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ABSTRACT

Background Peer support is an important supplement to medical resources for persons living with HIV (PLHIV). However, previous studies have shown mixed results about intervention effects. It is necessary to explain the mechanism of peer support interventions' effectiveness and sustainability to help design more valid peer support interventions.

Objective To identify and explain the mechanisms that drive the effectiveness and maintain the sustainability of peer support interventions.

Methods A preliminary theoretical framework was developed through a scoping review of the grey literature and international project frameworks in five professional websites. We then refined the framework by systematically searching evidence in databases including PubMed, EMBASE, Web of Science, ProQuest, CINAHL, CNKI and Wanfang. Qualitative methods were used to generate codes and themes relating to the studies' context, mechanisms and outcomes. We checked chains of inference (connections) across extracted data and themes through an iterative process.

Results A total of 6345 articles were identified, and 52 articles were retained for final synthesis. The refined theoretical framework presents five areas of peer support, including informational support, instrumental support, emotional support, affiliational support and appraisal support; five types of outcomes that peer support can improve for PLHIV, including physiological outcomes, psychological outcomes, behavioural outcomes, cognitive outcomes and social outcomes; the effectiveness mechanism coding system from peer volunteers and the relationship between peer volunteers and PLHIV; and the sustainability mechanism coding system in terms of peer volunteers, PLHIV and study context.

Conclusions Given that peer support has huge potential human resources, that is, all the qualified PLHIV, irreplaceable advantages in dealing with barriers to HIV-related discrimination and potential comprehensive benefits for PLHIV, it is necessary to develop and organise more peer support projects for PLHIV. Our study highlights that the expansion of peer support projects should be based on their effectiveness and sustainability.

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WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ Peer support is an important supplement to medical resources and a common strategy for preventing HIV and promoting health worldwide. However, the intervention effects of peer support are greatly influenced by the study context and have shown mixed results in previous studies. Many HIV peer support studies have only shown short-term intervention effects.

WHAT THIS STUDY ADDS

⇒ This realist synthesis provides a theoretical framework that explains the mechanisms driving the effectiveness and sustainability of peer support interventions. The effectiveness mechanisms include coding system from peer volunteers and the relationship between peer volunteers and persons living with HIV (PLHIV). The sustainability mechanisms include a coding system in terms of peer volunteers, PLHIV and study context.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ This framework helps contribute to designing effective and sustainable peer support interventions for PLHIV, thus improving PLHIV's health outcomes and saving medical resources.

INTRODUCTION

With the advent of antiretroviral therapy (ART), HIV infection has become a chronic disease.¹ The goals of HIV treatment and care are no longer just about prolonging the lives of people living with HIV (PLHIV), but more about improving their quality of life.² Medical resources need to cover all the PLHIV with a diagnosis of HIV infection regardless of any stages. This transition poses additional challenges to the healthcare system to meet PLHIV's various medical care needs, especially in environments where medical resources are in short supply.³ Previous studies indicate that PLHIV commonly confronts various distress and unmet medical care needs.^{4 5} Moreover, the issue of HIV-related discrimination also

acts as a barrier to PLHIV seeking medical and psychosocial support.^{6,7} Therefore, more medical care resources, especially those that can lower PLHIV's psychological defences, are needed to improve PLHIV's quality of life, thus promoting the achievement of the '95-95-95' goal (95% of PLHIV know their HIV infection, 95% of PLHIV with HIV-positive diagnosis receive ART, 95% of PLHIV on ART achieve viral load suppression)⁸ and improving health-related quality of life for PLHIV at any stage.⁹

Peer support is defined as 'the giving of assistance and encouragement by an individual considered equal'.¹⁰ It is an important supplement to medical resources and a common strategy for preventing HIV and promoting health worldwide.¹¹ Common peer support forms in the field of HIV care include but are not limited to peer education and peer counselling by other PLHIV.¹²⁻¹⁴ Compared with medical professionals, peer volunteers can generate more interpersonal interactions with PLHIV and offer them more authentic empathy and validation because of their similar experiences, which have irreplaceable advantages in the context of HIV-related discrimination.¹⁵ They can even offer practical advice and suggestions that professionals may not offer or even know about.¹⁶ By drawing on their own lived experience, peer volunteers can offer practical advice on the day-to-day aspects of living with HIV, advice that extends beyond the expertise of clinically-based medical professionals. Furthermore, peer support is more cost-effective and provides potentially more access than traditional services from medical care providers.^{17,18} Therefore, many countries, such as the UK,¹⁹ Australia²⁰ and Canada,²¹ have published national standards or practice guidelines for peer support for HIV. The United Nations Programme on HIV/AIDS (UNAIDS) also proposed the Greater Involvement of People Living with HIV (GIPA) principle to advocate for more participation and contribution of peer volunteers.²²

Previous studies have validated the effects of peer support on many outcomes, such as helping PLHIV improve mental health, social support, medication adherence, HIV care visit adherence and viral suppression.²³⁻²⁶ The intervention effects of peer support have also been verified among different specific characteristics, such as adolescents living with HIV,^{27,28} mothers living with HIV^{29,30} and PLHIV in prison or jail.³¹ However, the intervention effects of peer support are greatly influenced by the study context.³² Moreover, many HIV peer support studies have only shown short-term intervention effects.^{32,33} PLHIV may not continue to benefit after the completion of the peer support project. Consequently, it is necessary to explain significant components and factors of peer support interventions' effectiveness and sustainability, that is, the mechanisms, to help design more valid peer support interventions. This study aims to conduct a realist synthesis to propose a theoretical framework with context-mechanism-outcome (CMO) configurations³⁴ to explain the effectiveness and sustainability of HIV peer support interventions. Our attempt provides important

insights to help activate and realise potential great contributions to promoting PLHIV's health.

METHODS

This realist synthesis is reported according to the Realist and Meta-narrative Evidence Syntheses: Evolving Standards quality and publication standards (RAMESES).³⁵ We prospectively registered the current review in the PROSPERO database.³⁶ The realist synthesis method with five steps was applied for this review.³⁷

Step 1: formulating a preliminary theoretical framework

The preliminary theoretical framework was developed through a scoping review of the grey literature and international project frameworks from five websites, including Canada's Source for HIV and Hepatitis C Information (CATIE),³⁸ British HIV Association (BHIVA),³⁹ National Association of People with HIV Australia (NAPWHA),⁴⁰ National HIV Nurse Association (NHIVNA)⁴¹ and UNAIDS.⁴² Considering that these websites lack advanced search functions, we only applied basic and sample search strategies. Free terms including 'HIV' and 'peer' were used to perform the search in May 2022. One researcher (SH) screened all the records, included records according to the relevance of the study objectives and extracted supportive information for the preliminary theoretical framework in terms of, areas of peer support interventions, types of outcomes, effectiveness mechanisms and sustainability mechanisms. A record was included if it was relevant to at least one aspect of the extracted information.

Step 2: search strategy

Our search strategy can be divided into three stages. First, we conducted a preliminary search in PubMed to develop search strategies tailored to each database. The expanded search strategies were discussed with the research team before conducting systematic searches in each database. Second, we implemented the search strategies in PubMed, EMBASE, Web of Science, ProQuest, CINAHL, CNKI and Wanfang. Both free terms and Medical Subject Headings were used in each database if applicable. We limited the publication date to after 1 January 1996 because ART was broadly introduced after 1996.¹ The detailed search strategies for each database are available in online supplemental appendix I. Third, the references of all the included articles were reviewed to identify eligible literature not found in the systematic search strategies. During the framework refinement process, the necessary purposive iterative searching was conducted to identify additional articles that might support any element in the framework. The search stopped when there was sufficient evidence to reasonably claim that the final theoretical framework was plausible.

Step 3: study selection criteria

All the records searched from the database were imported, and duplicates were removed in NoteExpress.

Two researchers (SH and KL) who had been trained in evidence-based methodologies independently filtered the records by reading titles and abstracts to initially exclude literature that was not relevant to the theoretical framework. A third researcher (ZW) resolved disagreements in the preliminary study selection process.

The inclusion criteria were as follows: (1) Population: PLHIV aged 18 years and older in any country or setting regardless of any stage of HIV. We excluded PLHIV who were in special situations, including pregnancy, in prison and with severe mental health diseases. (2) Intervention: Any intervention provided by HIV-positive peer volunteers was eligible for this review. We did not limit the types of peer support interventions available. However, to clarify the intervention effectiveness of peer support, we only included clinical trials in which peer volunteers were the unique intervention providers. Clinical trials with multiple types of intervention providers (such as medical professionals and psychologists) that did not report clear intervention doses were excluded. (3) Language: We only included articles that were published in English or Chinese. There were no exclusions based on the outcomes of HIV peer support projects, study design or study quality of the involved articles. Study designs other than clinical trials were not restricted as seriously as clinical trials in terms of intervention. For instance, the background of a qualitative study might be an HIV peer support project delivered by both peer volunteers and medical professionals. However, the results of the qualitative study were only focused on peer support. Under these circumstances, this qualitative study was eligible for the current study. Every excluded study was recorded along with the reason for its exclusion.

The full-text screening was completed by the whole research team with members working in pairs and the papers divided among the team. Each article that was involved in the preliminary screening process was assessed for its relevance to the content in framework refinement. Generally, it is likely that only a fragment rather than the entire study will inform the theoretical framework in a realist synthesis. Therefore, consistent with the development process of the preliminary theoretical framework, a record was included if it was relevant to at least one element in the framework according to the CMO configurations. Any exclusion in this process was recorded and reasons why were noted.

Step 4: data extraction

A standardised Excel spreadsheet was used to record the extracted characteristics of the original studies involved. The characteristics of the involved original studies include author (year), setting, objectives, study design, participants, interview method, intervention and results. The data extraction process was performed by two researchers (SH and KL) independently and checked by a third researcher (ZW).

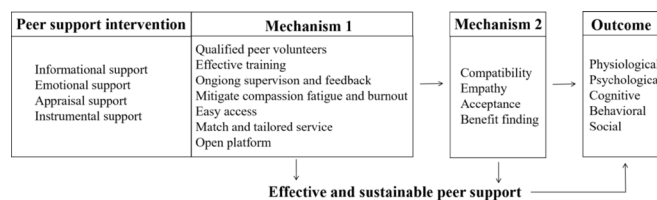


Figure 1 The preliminary theoretical framework.

Step 5: data analysis and synthesis

Five steps for data analysis and synthesis were followed.⁴³ First, the extracted data and their references were summarised and organised into draft evidence tables. Second, qualitative methods were used to generate codes and themes relating to the CMOs. Third, we checked chains of inference (connections) across extracted data and themes through an iterative process. Fourth, new COM configurations arose according to the chains of inference. Fifth, the preliminary theoretical framework was refined by all the supportive evidence. This process was conducted by one researcher (SH), reviewed by another researcher (KL) and discussed with the research team.

RESULTS

Preliminary theoretical framework

A total of 1111 records were identified from the five professional websites. After reviewing and screening these records, we finally included 21 records, including six videos, to develop the preliminary theoretical framework. The links to these 21 records are available in online supplemental appendix II.

As shown in [figure 1](#), we initially identified four types of peer support interventions^{44 45}: (1) informational support: peer volunteers provide knowledge and personal experience with PLHIV; (2) emotional support: peer volunteers help PLHIV vent their emotions, express love and care and convey positive beliefs; (3) appraisal support: peer volunteers encourage PLHIV decision-making by providing information, and weighing the pros and cons; and (4) instrumental support: peer volunteers provide material or monetary support to PLHIV. To develop effective and sustainable peer support, researchers need to pay attention to the following key points^{20 21 45-47}: choosing qualified peer volunteers, providing effective training with peer volunteers, ensuring ongoing supervision and feedback, mitigating peer volunteers' compassion fatigue and burnout, providing easy access to peer support with PLHIV, matching peer volunteers with PLHIV and providing PLHIV with tailored services and attaching peer support projects with open platforms.

When PLHIV receive effective peer support interventions, they may feel a sense of compatibility, empathy, acceptance and benefit.²⁰ These are the mechanisms by which peer support improves PLHIV's outcomes. By reviewing peer support interventions in the scoping review, we summarised that peer support interventions could improve PLHIV's five types of outcomes^{20 21}: (1) physiological outcomes, such as an increase in CD4 cell

counts and decrease in viral load; (2) psychological outcomes, such as relieving depression and anxiety; (3) cognitive outcomes, such as increasing confidence and supporting feelings of being in control of their own health; (4) behavioural outcomes, such as improving medication adherence and retention in care; and (5) social outcomes, such as creating social connections and enabling PLHIV to go back to work.

Literature search

As shown in figure 2, a total of 6345 articles were identified after searching seven databases. We removed 1109 records through NoteExpress and retained 5236 articles for screening. During the preliminary screening stage, we excluded 4604 records by reviewing the titles and abstracts. We finally included 52 articles after reviewing 632 full texts and conducting snowballing. Of the 52 included articles, the relevance of 46 articles was agreed between two researchers and included directly. The inter-rater reliability was 0.885. Other six included articles were discussed in the research group before their inclusion.

Study description

Table 1 presents the research details of each included article. Of the 52 included studies, 49 were published in English and 3 were published in Chinese. The year of publication ranged from 2005 to 2022. Study settings involved 17 countries, including 19 studies in the USA, 6 studies in South Africa, 5 studies each in China and Uganda, 3 studies in Canada, 3 studies each in Vietnam and Mozambique and 1 study each in Spain, Norway, Australia, Zimbabwe, South Korea, India, Dominican Republic, UK, Myanmar and Nigeria. Of these studies, 21 were clinical trials, 20 were qualitative studies, 7 were mixed-method studies, 3 were cross-sectional studies and 1 was a cohort study.

The refined theoretical framework

What can peer volunteers provide for PLHIV?

As shown in figure 3, the refined theoretical framework identifies peer support into five areas in terms of intervention contents: informational support, instrumental support, emotional support, affiliational support and appraisal support.⁴⁸⁻⁵¹ Informational support requires peer volunteers to educate PLHIV about a variety of topics and help them better comprehend medical information from their healthcare providers.^{49 52} Instrumental support can be divided into medical instrumental support, such as referring and transporting PLHIV to medical professionals, scheduling appointments and making calls to remind PLHIV of appointments^{48 51}; and daily life instrumental support, such as substance abuse treatment support and food and housing security support.⁴⁸ Emotional support is an important component of peer support. PLHIV also show huge unmet needs for emotional support.⁵¹ To provide emotional support to PLHIV, peer volunteers sometimes may not need to have complex professional psychological skills. It truly

does work if peer volunteers just listen to PLHIV to help them alleviate their negative emotions. Other emotional support may include using listening and reflective techniques to help PLHIV gain confidence in their ability to change health-related behaviours⁴⁸; appealing to PLHIV's emotions to reinforce or change behaviours⁵³; and demonstrating caring, empathy and comfort to help PLHIV begin to engage in HIV care and treatment.⁵⁴ Affiliational support aims to help PLHIV reduce isolation and connect to social networks.^{48 55} Appraisal support aims to help PLHIV make decisions about their treatment, self-care and daily life conflicts by providing information, weighing the pros and cons and conducting motivational interviews.⁵⁰

What outcomes can peer support improve?

We summarised the following types of outcomes that peer support can improve according to the involved clinical trials: physiological outcomes (viral load suppression⁵⁶⁻⁵⁸ and pain⁵⁹), psychological outcomes (quality of life⁶⁰), behavioural outcomes (risky behaviours,^{12 14} medical care compliance^{56 57 61 62} and medication adherence^{56 63-65}) and cognitive outcomes (HIV knowledge, self-awareness of behaviour problems⁶⁸ and enacted and internalised stigma^{56 66}). Although there was limited evidence of effectiveness on psychological outcomes and social outcomes among clinical trials, in qualitative studies, PLHIV reflected that they acquired these benefits. PLHIV reported that peer support can help them reduce loneliness and increase their sense of attachment, sense of belonging, sense of worth, disease acceptance, confidence and hope.^{51 53-55 69} Social activity engagement was also improved after attending the peer support project.⁶⁷

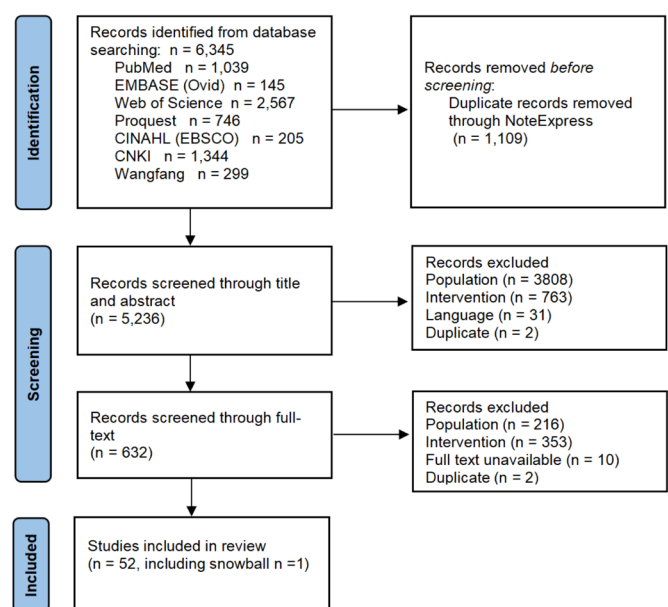


Figure 2 Flowchart of the identification and selection of studies.

Table 1 Study characteristics

Author (year)	Setting	Objectives	Study design	Participants	Intervention method	Intervention	Results
Jackson <i>et al</i> (2021) ⁵⁷	South Africa	Test the intervention effectiveness for pain severity and interference, depressive symptoms, HRQoL and self-efficacy.	Non-randomised controlled trial	49 female PLHIV (intervention group n=26, control group n=23)	NA	Intervention group: the peer support and the therapeutic relationship; control group: therapeutic relationship alone. Peer support: 6 weekly 2-hour group sessions.	Both intervention groups were similarly effective in significantly reducing pain severity and interference, depressive symptoms, increasing self-efficacy and HRQoL over the 48 weeks.
Hart <i>et al</i> (2021) ¹²	Canada	Test the intervention effectiveness for safe sexual behaviours, loneliness, sexual compulsivity and condom self-efficacy.	Randomised controlled trial	183 HIV+gay, bisexual and other men who have sex with men (intervention group n=89, control group n=94)	NA	Eight weekly 2-hour group sessions.	The intervention resulted in 43% relative reduction at 3-month follow-up in condomless anal sex with serodiscordant partners and significant reductions in sexual compulsivity, which indicated the intervention could promote the sexual health of higher risk populations.
Enriquez <i>et al</i> (2019) ⁵⁸	USA	Test the intervention effectiveness for HIV viral load suppression and engagement in HIV care.	Randomised controlled trial	30 PLHIV (intervention group n=20, control group n=10)	NA	Seven individual sessions: one session per week for 6 consecutive weeks with a booster session 6 weeks later.	65% of the participants in the intervention group had viral load suppression and 100% remained in care at 12 months postintervention. Impact on viral load was significant, suggesting that peers are effective change agents who positively impacted outcomes for individuals struggling with adherence to HIV treatment.
Knudson <i>et al</i> (2019) ¹³	China	Explore the implementation of the interactive, texted, check-in messages and the kinds of issues MSM brought up with peer counsellors during follow-up discussions.	Randomised controlled trial	367 HIV-infected MSM (intervention group n=184, control group n=183)	NA	Five patient-focused, face-to-face peer-counselling (PC) sessions delivered over the first 9 months of participation, and a short message service (SMS) sent weekly for the first 6 months and every 2 weeks for the last 6 months.	A wide variety of topics were discussed with PCs. Sending regular check-ins may offer unique opportunities for newly diagnosed MSM to ask questions or gather support between face-to-face visits.

Continued

Table 1 Continued

Author (year)	Setting	Objectives	Study design	Participants	Interview method	Intervention	Results
Cabral <i>et al</i> (2018) ⁶¹	USA	Test the intervention effectiveness for retention in care and viral suppression at 12 months, HIV knowledge, self-efficacy, physical and mental health quality of life.	Randomised controlled trial	348 PLHIV (intervention group n=174, control group n=174)	NA	Seven one-on-one educational sessions for 60 min every 1–3 weeks. The peer also conducted weekly check-ins by phone or in person which ranged from 30 to 60 min or every 2 weeks for up to 4 months.	Peer interventions may improve retention in primary care among subgroups of people living with HIV from racial/ethnic minority communities, although such improved retention may not increase viral load suppression.
Liu <i>et al</i> (2018) ¹⁴	China	Test the intervention effectiveness for ART initiation/adherence, high-risk behaviours change, quality of life, HIV stigma, self-efficacy, hospital anxiety and depression.	Randomised controlled trial	367 newly diagnosed HIV-positive men (intervention group n=184, control group n=183)	NA	The PC session involved a one-on-one 60-min discussion focusing on topics regarding specific high-risk behaviours modification.	PC was helpful to reduce inserted anal sex, condomless anal sex and illicit drug use.
Senn <i>et al</i> (2017) ⁹²	USA	Evaluate the feasibility of a peer support text messaging intervention designed to increase retention in HIV care and HIV medication adherence among HIV-infected black MSM.	One arm pilot study	8 HIV-infected black MSM	NA	Peer mentors were asked to respond within 12 hours when a PLHIV sent a text in a developed application, and were asked to reach out to them if they had not heard from them in 3 days.	The peer mentor text messaging intervention was feasible. Some PLHIV desired more frequent contact with peers, and peers reported that other commitments made it difficult at times to be fully engaged. Both peers and PLHIV desired more personalised contact.
Giordano <i>et al</i> (2016) ⁸⁰	USA	Test the intervention effectiveness for retention in care and viral load improvement 6 months after discharge.	Randomised controlled trial	417 PLHIV (intervention group n=202, control group n=215)	NA	The intervention included two in-person sessions with a volunteer peer mentor while hospitalised, followed by five phone calls in the 10 weeks after discharge.	There were no significant differences for all the outcomes.

Continued

Table 1 Continued

Author (year)	Setting	Objectives	Study design	Participants	Interview method	Intervention	Results
Cuong (2016)	Vietnam	Test the intervention effectiveness for virological failure and CD4 trends.	Cluster randomised controlled trial	640 PLHIV (intervention group n=332, control group n=308)	NA	The intervention performed by peer-supporters were home-based visits that provided twice a week in the first 2 months, then once a week when patients' adherence passed assessments. Additional visits were provided if patients were sick or had a serious ADR or a history of poor adherence.	Peer support did not show any impact on virological and immunological outcomes after 2 years of follow-up.
Parker <i>et al</i> (2016) ⁵⁹	South Africa	Test the intervention effectiveness for pain severity and interference, depression, HRQoL and self-efficacy.	Randomised controlled trial	27 female PLHIV (intervention group n=12, control group n=15)	NA	The intervention included a workbook in which problem solving and goal setting worksheets were presented specifically relating to different weekly topics and a 20-min aerobic and strengthening exercise circuit which was increased by 2 min each week. Each session of the intervention concluded with guided relaxation. The intervention was delivered over 2 hours in a peer-led format on a weekly basis for 6 weeks, a total of 12 hours.	Provision of a workbook and participating in a 6-week peer-led exercise and education intervention are efficacious methods to treat pain for women living with HIV/AIDS.

Continued

Table 1 Continued

Author (year)	Setting	Objectives	Study design	Participants	Interview method	Intervention	Results
Chang <i>et al</i> (2015) ⁶²	Uganda	Test the intervention effectiveness for sexual behaviours, HIV clinic attendance and HIV preventive care intervention usage.	Randomised controlled trial	442 PLHIV (intervention group n=221, control group n=221)	NA	Peers performed three categories of activities: (1) Assessment-Peers assessed participants' clinical status, clinic attendance, BCP adherence and sexual behaviours using a structured interview form; (2) Support-Peers provided psychosocial support, encouragement, information on and reminders of clinic appointments and the BCP and counselling on reducing risky sexual behaviours; (3) Access-Peers provided triage to higher level care if necessary.	After 1 year, intervention participants were more likely to report being in care, on cotrimoxazole, and safe water vessel adherence, indicated that peer support may be an effective intervention to facilitate pre-ART care compliance.
Enriquez <i>et al</i> (2015) ⁶³	USA	Test the intervention effectiveness for medication adherence, viral load and readiness for healthy behaviour change.	Randomised controlled trial	20 PLHIV (intervention group n=10, control group n=10)	NA	Six individual sessions, lasting approximately 1 hour, which occurred once weekly for 6 consecutive weeks. A booster intervention session was delivered 1 month after the initial 6 weekly intervention sessions.	Treatment group had significantly improved adherence. MEMS (Medication Event Monitoring System) and pharmacy refill data correlated with viral load log drop. Higher readiness for healthy behaviour change correlated with viral load drop and approached significance.
Masquillier <i>et al</i> (2014) ⁸⁸	South Africa	Analyse the impact of peer adherence support (PAS) intervention on the state of hope; investigate the inter-relationship between this type of intervention and the immediate social context in which a patient life.	Randomised controlled trial	498 PLHIV	NA	A group receiving additional biweekly PAS for a period of 18 months. Peer adherence supporters provided support with adherence and discussed matters that can make adherence more difficult (eg, stigma). They identified possible side effects of ART and acted appropriately.	Neither PAS nor the family environment has a direct effect on the level of hope in PLHIV. There was a positive significant interaction between family functioning and PAS, indicating that better family functioning increases the positive effect of PAS on the state of hope.

Continued

Table 1 Continued

Author (year)	Setting	Objectives	Study design	Participants	Interview method	Intervention	Results
Van Tam <i>et al</i> (2012) ⁶⁰	Vietnam	Assess the effect of peer support on QOL and internal stigma during the first year after initiating ART.	Cluster randomised controlled trial	228 PLHIV (intervention group n=119, control group n=109)	NA	Biweekly visits during the initial 2 months of ART. After 2 months, the visits were reduced to once per week or intensified to become more frequent.	The peer support intervention improved QOL after 12 months among ART patients presenting at clinical stages 3 and 4 at baseline, but it had no impact on QOL among ART patients enrolled at clinical stages 1 and 2. The intervention did not have an effect on internal stigma.
Chang <i>et al</i> (2010) ⁵⁷	Uganda	Assess the effect of community-based peer health workers (PHW) on adherence and cumulative risk of virological failure, virological failure at each 24-week time point up to 192 weeks of antiretroviral therapy, mortality, lost to follow-up and CD4 change at 24 and 48 weeks of ART.	Cluster randomised controlled trial	1336 PLHIV	NA	PHW tasks included providing ART counselling and support in group and individual sessions. For their home visit tasks, PHWs were initially assigned about 15 patients each who were visited biweekly.	A PHW intervention was associated with decreased virological failure rates occurring 96 weeks and longer into ART, but did not affect cumulative risk of virological failure, adherence measures or shorter-term virological outcomes. PHWs may be an effective intervention to sustain long-term ART in low-resource settings.
Ruiz <i>et al</i> (2010) ⁹¹	Spain	Compare the efficacy of two interventions to improve treatment adherence: one conducted by a health professional and the other by a 'peer'.	Randomised controlled trial	198 PLHIV (peer group n=98, health professional group n=100)	NA	The first intervention lasted approximately 1 hour, the follow-up visits lasted 30 min.	As the visits progressed, the probability of adhering to treatment increased. Although differences were not significant, the group treated by a peer showed better results than the group treated by a health professional.

Continued

Table 1 Continued

Author (year)	Setting	Objectives	Study design	Participants	Intervention method	Intervention	Results
Simoni <i>et al</i> (2009) ⁶⁵	USA	Test the intervention effectiveness for adherence according to self-report and electronic drug monitoring, CD4 count and HIV-1 RNA viral load.	2x2 factorial randomised controlled trial	226 PLHIV (peer support n=57, pager n=56, peer and pager support n=56, usual care n=57)	NA	The 3-month peer support intervention consisted of 6 twice monthly 1 hour gatherings and weekly phone calls from peers to participants. The pager intervention included a message schedule to the participant's daily medication regimen, which was confirmed by the clinical pharmacist. In addition to dose reminders, three other types of text messages were sent: educational, entertainment and adherence assessments.	The peer intervention was associated with greater self-reported adherence at immediate postintervention. However, these effects were not maintained at follow-up assessment; nor were the significant differences in biological outcomes. The pager intervention was not associated with greater adherence but was associated with improved biological outcomes at postintervention that were sustained at follow-up.
Yard <i>et al</i> (2011) ⁷⁵	USA	Assess whether patient factors moderated the impact of peer support and pager reminders on ART adherence and biological markers of HIV.	2x2 factorial randomised controlled trial	226 PLHIV (peer support n=57, pager n=56, peer and pager support n=56, usual care n=57)	NA	The 3-month peer support intervention consisted of 6 twice monthly 1 hour gatherings and weekly phone calls from peers to participants. The pager intervention included a message schedule to the participant's daily medication regimen, which was confirmed by the clinical pharmacist. In addition to dose reminders, three other types of text messages were sent: educational, entertainment and adherence assessments.	None of 34 patient characteristics significantly moderated either intervention, suggest that intervention research might more profitably focus on other ways of improving effects, like individual patient needs, rather than target subgroups.

Continued

Table 1 Continued

Author (year)	Setting	Objectives	Study design	Participants	Intervention method	Intervention	Results
Simoni <i>et al</i> (2007) ⁸⁹	USA	Test the intervention effectiveness for viral load, adherence, social support and depressive symptomatology.	Randomised controlled trial	136 PLHIV (intervention group n=71, control group n=65)	NA	The 3-month peer support intervention consisted of six twice-monthly 1 hour group meetings at the clinic of all peers and actively enrolled participants in addition to weekly phone calls from peers to participants who were assigned to them individually by research staff on the basis of availability and presumed compatibility.	No between-conditions intervention effects on the primary outcome of HIV-1 RNA viral load or any of the secondary outcomes at immediate postintervention or follow-up.
Pearson <i>et al</i> (2007) ⁶⁴	Mozambique	Assess the efficacy of a peer-delivered intervention to promote short-term (6-month) and long-term (12-month) adherence to HAART.	Randomised controlled trial	350 PLHIV (intervention group n=175, control group n=175)	NA	Peers provided social support, information about the benefits and side effects of HAART, how to address stigma's effect on adherence, and encouragement to participate in community support groups. The peers also provided an important link between the individual and other members of the HIV clinic team and the community.	Intervention participants, compared with those in standard care, showed significantly higher mean medication adherence at 6 months and 12 months. There were no between-arm differences in CD4 counts.
Boyd <i>et al</i> (2005) ⁶⁸	USA	Assess the effectiveness of the PC intervention for substance abusing (SA) rural women on adaptational outcomes important to HIV and AOD abuse: drug of abuse, consequences of AOD use, motivation to change AOD use, perceived control of AOD use and ability to access AOD information/treatment (self-advocacy).	One arm pilot study	13 HIV+rural women	NA	The intervention was implemented in four counselling sessions over an 8-week to 12-week period. Each session lasted approximately 30–60 min.	Although limited by sample size, results suggest that this intervention was effective in helping women to acknowledge problems with their alcohol and drug abuse and to begin taking steps to achieve sobriety.

Continued



Table 1 Continued

Author (year)	Setting	Objectives	Study design	Participants	Intervention method	Intervention	Results
Øgård-Repål et al (2022) ⁵³	Norway	Explore how PLHIV experience the support provided by peers in outpatient clinics.	Qualitative study	16 PLHIV who aged 18 or older and had attended at least one peer support meeting	Face-to face individual interview	NA	The pre-determined categories constituted attachment, social integration, an opportunity for nurturance, reassurance of worth, guidance and safe place for peer support.
BHlthSc (2021)	Australia	Explore peer navigation from the perspective of practitioners with experience in treating PLHIV to understand the role they see for peer navigators in supporting PLHIV.	Qualitative study	6 medical practitioners	Telephone and face-to face individual interview	NA	HIV care was complex and need for additional resources for psychosocial care. They valued peer navigation as part of a patient support network and bridge to health and social care systems. HIV peers normalised HIV, alleviating fear and stigma, educating and translating clinical information for patients. However, the lack of awareness among clinicians, patient confidentiality and the absence of direct communication pathways with peer navigators were key challenges.
Sun et al (2020) ⁵¹	China	Explore the experience of receiving peer support for treatment naïve PLHIV.	Qualitative study	17 PLHIV who participated in a peer support programme and showed good attendance adherence	Face-to face individual interview	NA	PLHIV acquired social support from peers including informational support, emotional support and instrumental support. PLHIV want diverse forms of peer support. PLHIV worry about exposing privacy during the project.

Continued

Table 1 Continued

Author (year)	Setting	Objectives	Study design	Participants	Interview method	Intervention	Results
Sun <i>et al</i> (2019) ⁷⁴	China	Explore the experience of HIV peer supporters during a HIV peer support project.	Qualitative study	6 HIV peer supporters	Face-to face individual interview	NA	HIV peer supporters had advantages of providing support for PLHIV in terms of individual information support, emotional support and convenience. HIV peer supporters had benefits including improving self-management, psychological adjustment, acquiring a sense of self-worth and financial support. Negative impacts included risks of exposing privacy and emotional burnout.
Mantell <i>et al</i> (2019) ⁵⁵	Zimbabwe	Identify facilitators and barriers to peer-led community antiretroviral refill groups (CARGs) participation by HIV-positive men, with inputs from recipients of HIV care, community members, healthcare workers, donors and policymakers.	Qualitative study	147 PLHIV and 46 other stakeholders including community members, healthcare workers, donors and policymakers	20 focus group discussions and 46 key informant interviews	NA	Benefits of CARGs; challenges of CARGs; barriers to participation in CARGs: fear of stigma/confidentiality concerns, information gap, few perceived benefits; facilitators to participation in CARGs: better marketing of CARGs, provision of incentives (monetary and non-monetary), more flexibility in CARG design and implementation.
Monroe <i>et al</i> (2017) ⁷⁸	Uganda	Better understand the implementation, processes and results of a HIV peer support trial	Qualitative study	75 stakeholders including PLHIV, peer supporters and project staff	6 focus group discussions and 41 in-depth interviews	NA	Peer support improved information, motivation and behavioural skills, leading to increased engagement in pre-ART care. Situated factors included structural, clinical and environmental factors.
Li <i>et al</i> (2017) ⁸¹	China	Understand the working experience of HIV peer educators.	Qualitative study	10 HIV peer educators	Face-to face individual interview	NA	Positive working experience: sense of achievement, sense of belonging and satisfaction from proved HIV/AIDS knowledge. Negative working experience: heavy workload and huge pressure, concern about exposing privacy, limited career development space and low salary.

Continued

Table 1 Continued

Author (year)	Setting	Objectives	Study design	Participants	Intervention method	Intervention	Results
Houston <i>et al</i> (2015) ⁴⁹	USA	Understand how participants perceive the role performed by peer facilitators.	Qualitative study	11 PLHIV who completed a peer-facilitated intervention	Face-to face individual interview	NA	Of the four types of social support (instrumental, informational, emotional and affiliational), most participants perceived informational and emotional support from their peer facilitators, followed by instrumental support. Affiliational support was the least frequently perceived type of social support.
Lee <i>et al</i> (2015) ⁸²	South Korea	Explore the experiences of peer supporters regarding their work in a home visit programme for people with HIV infection.	Qualitative study	12 HIV-positive peer supporters conducting home visits with PLHIV	Face-to face individual interview	NA	Six major themes emerged: feeling a sense of belonging; concern about financial support; facing HIV-related stigma and fear of disclosure; reaching out and acting as a bridge of hope; feeling burnout; and need for quality education.
de Souza <i>et al</i> (2014) ⁸⁰	Indian	Examine the various roles peer workers played in the context of HIV.	Qualitative study	31 HIV-infected peer workers engaged in providing counselling, outreach and health education to other people living with HIV	Face-to face individual interview	NA	Grounded analysis revealed five roles: role model, persuader, maven, going the extra mile and micro level advocacy.
Hallum-Montes <i>et al</i> (2013) ⁸³	USA	Investigate the barriers, challenges and facilitators to implementation of a peer integration programme.	Qualitative study	11 medical providers, 10 peers and 9 PLHIV	Individual semi-structured interviews	NA	HIV peers facilitate information exchange between patients and providers, and support patient retention and adherence. However, there is a lack of communication between peers and clinicians; HIV peers may also experience risk of emotional burnout for peers.

Continued

Table 1 Continued

Author (year)	Setting	Objectives	Study design	Participants	Interview method	Intervention	Results
Mackenzie <i>et al</i> (2012) ⁶⁹	USA	Explores how HIV-positive injection drug users (IDUs) in a peer mentoring intervention articulated the effects of peer mentoring as a vehicle for change in their lives.	Qualitative study	68 HIV-positive heterosexually active IDUs who participated in the INSPIRE (Intervention for Seropositive Injectors - Research and Evaluation) study	Individual in-depth semi-structured interviews	NA	Five key themes are: construction of the peer mentoring identity; individual change; interpersonal or relationship change; community change; and challenges with the peer mentoring identity.
Dutcher <i>et al</i> (2011) ⁴⁸	USA	Examine from the perspective of peers the factors and activities that influence peer success with clients.	Qualitative study	23 HIV-positive peers	Individual in-depth interviews	NA	Peers reported that peer characteristics (HIV-status, common experiences and self-care) enable them to engage clients. Peers also required flexibility to respond to client needs, and their activities spanned four types of social support: informational, emotional, instrumental and affiliational.
Gusdal <i>et al</i> (2011) ⁷⁶	Ethiopia and Uganda	Exploring peer counsellors' work and role in supporting patients' adherence as viewed by the patients, the providers and the peer counsellors themselves.	Qualitative study	79 patients, 17 peer counsellors and 22 providers	Individual semi-structured interviews	NA	The first main category describes how peer counsellors played an important role by acting as role models, raising awareness and being visible in the community. They were also recognised for being close to the patients while acting as a bridge to the health system. The second main category deals with how peer counsellors found reward in helping others while at the same time acknowledging their limitations and need of support and remuneration.

Continued

Table 1 Continued

Author (year)	Setting	Objectives	Study design	Participants	Interview method	Intervention	Results
Greene <i>et al</i> (2009) ³⁴	Canada	Highlight important methodological considerations for working with and supporting peer research assistants (PRAs) who are involved in doing community-based research.	Qualitative study	7 HIV-positive PRAs	Two in-depth focus groups	NA	Two important factors that need to be considered when developing research training; challenges and opportunities; safety and confidentiality; the benefits of peer research assistantships; revisiting the journey from scepticism to empowerment.
Hilfinger-Messias <i>et al</i> (2009) ⁷²	USA	Explore HIV/AIDS PC from the perspective of women actively engaged in this work within the context of a community-based programme in rural areas of the southeastern USA.	Qualitative study	6 female PCs	Face-to face interviews	NA	Embodied work of HIV/AIDS peer counsellors is constructed around their personal identities and experiences. This work involves gaining entry to other HIV-positive women's lives, building relationships, drawing on personal experiences, facing issues of fear and stigma, tailoring PC for diversity, balancing risks, and benefits and terminating relationships. Peer counsellors recognise the personal and collective value of their work, which, like much of women's work within the context of family and community, lacks public visibility and acknowledgement.

Continued

Table 1 Continued

Author (year)	Setting	Objectives	Study design	Participants	Interview method	Intervention	Results
Dickinson and Kgatea (2008) ⁸⁵	South Africa	Examine the relationship between involvement in peer education and stress.	Qualitative study	29 stakeholders: 15 workplace peer educators; 3 community peer educators; 3 group/project coordinators of the peer educators; 3 VCT counsellors working in the company hospital; and 5 people involved in training and support for the company's new peer-educator programme	Individual semi-structured interviews	NA	Peer educators face many stresses in managing and supporting their own lives, thus their (voluntary) work as peer educators should not be taken out of context. Structural difficulties, skills deficiencies and other obstacles to effective communication with their peers can create stress.
Marino <i>et al</i> (2007) ⁴⁹	USA	Understand how HIV peers providing support may have affected PLHIV.	Qualitative study	6 HIV-positive peers	Individual interviews	NA	Four main themes: social acceptance, reciprocal support, personal growth and empowerment and resistance and other challenges.
Harris and Larsen (2007) ⁵⁴	Canada	Explore the benefits of peer support counselling from the perspective of PLHIV.	Qualitative study	12 PLHIV who have had experiences with PC	Individual interviews	NA	Participants identified several thematic benefits of PC for PLHIV and peer counsellors.

Continued

Table 1 Continued

Author (year)	Setting	Objectives	Study design	Participants	Interview method	Intervention	Results
Messias <i>et al</i> (2006) ⁷³	USA	Elicit HIV/AIDS peer counsellors' perspectives about delivery formats (face-to-face or telephone) for a counselling intervention.	Qualitative study	6 HIV peer counsellors	Individual in-depth interviews	NA	Peer counsellors identified personal contact as the major advantage of the face-to-face format. Personal contact afforded counsellors better opportunities to understand and assess clients' physical, emotional and environmental status and allowed them to connect with peers in more concrete and personal ways. Being physically present was also a very direct and effective way to role model for other HIV positive women. Peer counsellors identified a number of inherent barriers and challenges to telephone interventions but also recognised potential logistic and personal advantages.
Karver <i>et al</i> (2022) ⁷⁷	Dominican Republic	Describe the role of peer navigation and support on enhancing the quality of HIV treatment and care services experienced by female sex workers (FSWs).	Mix-method study	211 FSWs living with HIV (survey data); two rounds of in-depth interviews (n=20 per round)	Individual in-depth interviews	NA	Peer navigation and support was instrumental in assisting FSWs linkage to HIV care after diagnosis, elevating FSWs' ability to access more comprehensive clinical care facilities and promoting agency by improving FSWs' skills to more strategically and effectively engage with the clinical environment and healthcare providers. Peer navigation was positively associated with experiencing more respectful treatment by clinical staff and greater satisfaction with overall HIV care services.

Continued

Table 1 Continued

Author (year)	Setting	Objectives	Study design	Participants	Interview method	Intervention	Results
Steward <i>et al</i> (2018) ⁸⁶	South Africa	Assess acceptability and feasibility and characterise the mechanisms of action for a HIV peer support programme.	Mix-method study	25 PLHIV (survey data); 10 PLHIV, 4 navigators and 5 clinic providers for interviews	Individual in-depth interviews	NA	HIV stigma emerged as a primary driver of barriers to care. Navigators helped clients overcome feelings of shame through education and by modelling how to live successfully with HIV. They addressed discrimination fears by helping clients disclose to trusted individuals. These actions, in turn, facilitated clients' care engagement, ART adherence and HIV prevention efforts.
Kemp <i>et al</i> (2016) ⁶⁷	South Africa	Qualify and quantify the impact of the structured support group intervention known as Integrated Access to Care and Treatment (I ACT), as implemented by a small community-based organisation in rural South Africa, on clients' knowledge, attitudes and practice regarding HIV/AIDS, including their experiences of stigma, willingness to disclose and uptake of and adherence to treatment services.	Mix-method study	66 PLHIV (pre/post-test data); 17 PLHIV (interviews)	Individual in-depth interviews	NA	Paired t-tests did not detect significant changes in the main outcomes. Qualitative results suggested a psychosocial benefit as participants connected with their peers, expressed themselves openly and re-engaged with their communities.
Peterson <i>et al</i> (2012) ³⁰	USA	Describe the various forms and functions of peer support for PLHIV; validate the Dennis ¹⁰ concept analysis of peer support within health contexts.	Mix-method study	81 PLHIV who had some experience with peer social support	One-on-one interviews	NA	Peer support is a potentially important adjunct to clinical care for enhancing coping skills, thereby improving the psychosocial functioning of PLHIV. It is important to assess patient access to peer support; provide opportunities for peer support in the clinical setting; and enhance disclosure and support-seeking skills to facilitate this benefit.

Continued

Table 1 Continued

Author (year)	Setting	Objectives	Study design	Participants	Intervention method	Intervention	Results
Saffren (2011)	UK	Evaluate the acceptability and feasibility of a peer-driven IMB (information-motivation-behavioural skills) intervention designed to reduce HIV sexual risk behaviours among MSM in primary care.	Mix-method study	195 PLHIV (survey data); 17 PLHIV (interviews)	Individual in-depth interviews	NA	Of those who entered the intervention and completed the initial intake, 62% completed all four of the intervention sessions and 93% completed at least one. While there was no overall change in transmission risk behaviour (TRB) for the whole sample, among those who reported HIV TRB at baseline (n=29), there were significant reductions in TRB over the next year. Themes that emerged in qualitative exit interviews conducted with a subset of participants centred on peer counsellor quality, intervention implications and intervention experience.
Arem <i>et al</i> (2011) ⁵⁶	Uganda	Better understand processes of a cluster-randomised trial on the effect of PHWs on AIDS care.	Mix-method study	Qualitative methods involved patients, PHWs and clinical staff and included 38 in-depth interviews, 8 focus group discussions and 11 direct observations. Quantitative methods included staff surveys, process and virological data analyses.	38 in-depth interviews, 8 focus group discussions and 11 direct observations	NA	Task shifting to PHWs positively affected structural and programmatic functions of care delivery – improving clinical organisation, medical care access, and patient-provider communication – with little evidence for problems with confidentiality and inadvertent disclosure.

Continued

Table 1 Continued

Author (year)	Setting	Objectives	Study design	Participants	Intervention method	Intervention	Results
Pearson <i>et al</i> (2006) ⁷⁰	Mozambique	Describe the experiences of creating and implementing a scaled-up version of a modified directly observed therapy (mDOT) programme for PLHIV starting HAART.	Mix-method study	350 PLHIV including 174 were randomised to mDOT	NA	NA	Key components of the intervention's success included using peers who were well accepted by clinical staff, adequate training and retention of peers, adapting daily visit requirements to participants' work schedules and physical conditions and reimbursing costs of transportation.
Aung <i>et al</i> (2021) ⁶⁶	Myanmar	Examine differences in HIV knowledge, stigma, ART adherence, barriers to care, social support satisfaction and attitudes related to counselling, among PLHIV who received peer counsellor compared with those who received standard counsellor.	Cross-sectional study	1006 PLHIV	NA	NA	Compared with standard counsellor, peer counsellor participants had lower enacted stigma, mean internalised stigma and risk of ART non-adherence, while reporting higher levels of barriers to care.
Chime (2019)	Nigeria	Compared the level of self-stigma among PLHIV in peer support and non-support groups.	Cross-sectional study	804 PLHIV	NA	NA	Though peer support groups may be a starting place for the development of social support interventions for PLHIV, it might not be sufficient to combat self-stigma. Interventions aimed at economic empowerment of PLHIV and public enlightenment are essential for effective mitigation against self-stigma.
Tobias <i>et al</i> (2010) ⁷¹	USA	Describes the results of a survey on peer roles and knowledge.	Cross-sectional study	186 HIV-positive peers	NA	NA	Peers perform a wide range of roles, including assistance with care and treatment, emotional support and service referrals. PLHIV for more than 5 years, in paid employment with more than a high school education had higher HIV knowledge scores than volunteers. Higher education, length of time living with HIV, age and speaking English as the primary language were associated with higher peer knowledge scores.

Continued

Table 1 Continued

Author (year)	Setting	Objectives	Study design	Participants	Intervention method	Intervention	Results
Campbell (2008)	USA	Determine if patients who are peer-mentored at their intake examination remain in care longer and attend more physicians' visits than those who were not mentored.	Cohort study	1639 PLHIV	NA	NA	Patients who had a mentor at intake were more likely to return for primary care HIV visits at 90 and 180 days. Mentored patients also were more likely to be prescribed ART within 180 days from intake. Other risk factors that impacted remaining in care included gender, previous care status, time from diagnosis to intake visit and intravenous drug use. Clinical health outcomes did not differ significantly between groups.

ADR, adverse drug reaction; AOD, alcohol and other drug; ART, antiretroviral therapy; BCP, basic care package; HAART, highly active antiretroviral therapy; HRQoL, health-related quality of life; MSM, men who have sex with men; PLHIV, persons living with HIV; VCT, voluntary counselling and testing.

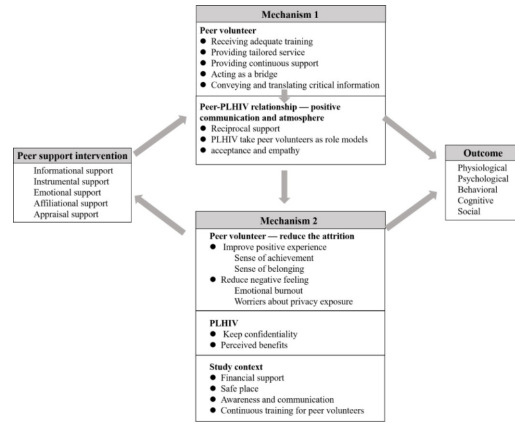


Figure 3 The refined theoretical framework. PLHIV, persons living with HIV.

What is the mechanism that improves the effectiveness of peer support?

Peer volunteers

Ensuring peer volunteers are appropriately qualified is an important aspect of effective peer support programmes. Qualified peer volunteers should: first, receive adequate training^{70 71}; second, provide tailored service to meet PLHIV's personal needs^{50 72–75}; third, provide continuous support beyond the clinical setting⁵²; fourth, act as a bridge between PLHIV and their social relationships, community and the health system^{52 76–78}; and fifth, convey and translate critical information.⁵²

Peer-PLHIV relationship

A positive communication and atmosphere between peer volunteers and PLHIV is essential to guarantee intervention effects.^{67 69} First, the reciprocal support makes peer volunteers and PLHIV satisfied by receiving and providing support.⁷⁹ Second, PLHIV take peer volunteers as role models and are encouraged by peer volunteers' experiences and positive attitudes.^{76 80} Third, PLHIV feel acceptance and empathy through free expression in a positive atmosphere.^{54 69}

What is the mechanism that maintains the sustainability of peer support?

Peer volunteers

To improve the sustainability of peer support interventions, it is important to reduce the attrition of peer volunteers.^{70 74 81} On the one hand, peer support projects should improve the positive experience of peer volunteers, including their sense of achievement^{74 81} and sense of belonging.^{81 82} The sense of achievement comes from helping others⁷⁶ and personal growth.^{54 74 79} Some peer volunteers reported that participating in peer support can help improve self-management skills, regulate their own mental health and is an important way to give back to society.⁷⁴ On the other hand, it is necessary to quickly identify and reduce peer volunteers' negative feelings during practice, including emotional burnout^{74 81–83} and worriers about privacy exposure.^{74 81 84} Emotional

burnout may come from negative feedback from PLHIV, repetitive work and work-related stress.^{69 74 81 82 85}

PLHIV

In terms of PLHIV, researchers should design effective measures to maintain PLHIV's confidentiality,^{52 55 86} and make them have perceived benefits.⁵⁵ Perceived benefits can include perceived improvement or belief in improving one or more outcomes of physiological outcomes, psychological outcomes, behavioural outcomes, cognitive outcomes and social outcomes.

Study context

The following components in the study context are related to the sustainability of the intervention project. First, the peer support project needs sufficient financial support to pay peer volunteers' salary and guarantee project operation.^{56 76 81 82} Second, access to a safe place reassures both PLHIV and peer volunteers of privacy exposure concerns.⁵³ Third, more communication between peer volunteers and medical staff is necessary to reduce the information gap and to better integrate volunteers into the clinical setting.^{52 55 70 83} Fourth, the context should provide continuous training for peer volunteers to meet their self-growth needs and be more effective in their role as peer supporters.⁸²

DISCUSSION

To our knowledge, this is the first realist synthesis about peer support for PLHIV. The theoretical framework summarises the type of interventions that peer volunteers can provide and the potential type of outcomes that peer support can help PLHIV improve. Specifically, this theoretical framework comprehensively explains the mechanisms for developing effective and sustainable peer support interventions. Our attempt may provide researchers with theoretical reference for peer support project design and practice and motivate peer volunteers in the health management of PLHIV.

Evidence indicates that peer volunteers can provide various areas of support, including informational support, instrumental support, emotional support, affiliational support and appraisal support. Interventions in included clinical trials also usually included at least one type of support. Therefore, peer volunteers are important resources for providing comprehensive support for PLHIV beyond medical professionals. Many qualitative studies have shown the great necessity of emotional support.^{51 53-55 69} However, we found only weak evidence that peer support has intervention effects on psychological outcomes. We estimate that it may be associated with the following factors. First, most of the clinical trials took emotional support as a secondary intervention component, and the intervention dose may not be enough to show an intervention effect.^{12 14 59-61 87-89} Second, measurement tools may not be sensitive to test the intervention effect.^{14 61 88} Third, small sample sizes may not have enough power to test the intervention

effect.^{59 63 87} We suggest that researchers pay more attention to peer volunteers' emotional support skill training and encourage more peer-led emotional support for PLHIV. They should not just evaluate the necessity of peer volunteers' emotional support through evidence of quantitative data.

We also summarised that peer support could help PLHIV improve various outcomes, including physiological, psychological, behavioural, cognitive and social outcomes. This evidence indicates the huge value of peer support for PLHIV's health management, and the necessity of the GIPA principle for promoting the '95-95-95' goal and improving health-related quality of life for PLHIV.^{8 9 22} Of these outcomes, behavioural outcomes, such as medical follow-up adherence, risky behaviour and medication adherence, were more frequently tested in clinical trials.^{12 14 57 58 61-65 68 89-92} Future studies could attempt to evaluate other types of outcome effects. Moreover, we could not clarify the specific mechanism of the peer support intervention effect on each kind of outcome. Our framework only presents the general chain of intervention (context) - mechanism - outcome. Future studies could focus on explaining the specific CMO chain, such as the mediating role between specific types of peer support interventions and specific outcomes.

The refined theoretical framework shows comprehensive mechanisms that explain the effectiveness and sustainability of peer support projects. Designing effective interventions should focus on the qualification of peer volunteers and the relationship between peer volunteers and PLHIV during the intervention operation. To ensure that peer volunteers are appropriately qualified, it is crucial to design adequate training. The type of peer support intervention can provide a framework reference for designing the training programme. Peer volunteers who receive adequate training can provide tailored service and continuous support beyond medical care service for PLHIV and play a bridging role in their social relationships. This is also a good continuation of and supplement to medical services. Peer volunteers effectively convey and translate critical information throughout the service, laying the foundation for establishing a positive connection and atmosphere with PLHIV. If PLHIV consider peer volunteers as their role models because of their positive attitudes and experiences, they may benefit from the peer-PLHIV relationship more easily. PLHIV feel accepted and empathetic in a positive relationship and atmosphere. They not only have the role of being helped but also benefit from helping others, that is, establishing reciprocal support with peer volunteers.

To improve the sustainability of peer support projects, researchers should consider factors in terms of peer volunteers, PLHIV and context. A sufficient reserve of peer volunteers is an important foundation for maintaining projects' sustainability. Therefore, researchers should take effective measures to reduce the attrition of peer volunteers. Evidence indicates that peer volunteers report mixed feelings during the process of

supporting PLHIV.^{54 69 74 76 79 81–85} Their positive feelings need to be reinforced, and their negative feelings need to be adjusted in time. Emotional support is also necessary for peer volunteers in projects.^{74 85} Project administrators can arrange psychologists or peer volunteers to provide support for them. If PLHIV feel little risk of privacy exposure and may acquire anticipated benefits, it will contribute greatly to the sustainability of the peer support programme.^{51 55} PLHIV's positive attitudes toward and impressions of peer support projects are closely associated with the success of previous projects, that is, the mechanism 1 may affect the mechanism 2. For the context, researchers should provide a safe environment where both peer volunteers and PLHIV feel little risk of privacy exposure. Policymakers or hospital managers should also fully evaluate the cost-effectiveness of peer support projects, provide continuous and stable financial support for peer volunteers as compensation for their time, consider integrating peer support projects into medical care routines and raise peer volunteers as essential members of the medical team.^{55 81}

Peer support is an important continuation of and supplement to medical services. It not only helps save medical resources and reduce medical healthcare workers' workload, but also can provide crucial support for PLHIV that is beyond the expertise of medical professionals. To maximise the role of peer support, peer volunteers should not be independent and separated in the medical context. More awareness and communication between peer volunteers and medical professionals are necessary to help peer volunteers better integrate into the medical context.^{52 83} The process of communication also provides good opportunities for project feedback and communication. The medical context also needs to provide continuous training for peer volunteers, which meets PLHIV's need for knowledge updates and self-management; it also helps peer volunteers better service PLHIV and promote the sustainability of peer support projects.⁸¹

Several limitations of this study should be noted. First, we only included articles published in English and Chinese, which may affect the results of this study due to language restrictions. Second, we only conducted qualitative data analysis and synthesis. Therefore, we cannot identify and compare effect sizes between different types of interventions and cannot define which components of the interventions are more effective. Third, although the theoretical framework summarised and synthesised from this review provides a comprehensive mechanism of peer support projects' effectiveness and sustainability, we did not assess the risk of bias of the included original studies.

CONCLUSION

This realist synthesis summarises and presents a theoretical framework that explains the mechanisms of peer support interventions' effectiveness and sustainability. Evidence indicates that the effectiveness mechanisms

include coding system from peer volunteers and the relationship between peer volunteers and PLHIV. Mechanisms for sustainability include a coding system in terms of peer volunteers, PLHIV and study context. We suggest that researchers and practitioners comprehensively consider these mechanisms when designing and conducting peer support projects. It may help activate and realise more contributions of peer support for promoting PLHIV's health.

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Appendix I**PubMed**

Search time: 2022-5-29

Search	Query	Items found
#1	("HIV"[Mesh]) OR "HIV Infections"[Mesh] OR "Acquired Immunodeficiency Syndrome"[Mesh]	339,952
#2	HIV[Title/Abstract] OR AIDS[Title/Abstract] OR PLWHA[Title/Abstract] OR PLWH[Title/Abstract] OR human immunodeficiency virus[Title/Abstract] OR acquired immunodeficiency syndrome[Title/Abstract] OR human immunodeficiency virus[Title/Abstract] OR acquired immunodeficiency syndrome[Title/Abstract]	441,361
#3	#1 OR #2	479,314
#4	"Peer Group"[Mesh]	23,730
#5	peer?[Title/Abstract]	85,549
#6	support[Title/Abstract] OR navigator?[Title/Abstract] OR counselor?[Title/Abstract] OR educator?[Title/Abstract] OR health worker?[Title/Abstract] OR volunteer?[Title/Abstract]	1,196,013
#7	#5 AND #6	19,127
#8	#4 OR #7	38,640
#9	#3 AND #8 Filters applied: Full text, Humans, English, Aged: 19+ years, from 1996/1/1 - 2022/5/29	1,039

EMBASE (Ovid)

Search time: 2022-5-29

Search	Query	Items found
#1	(HIV or AIDS or PLWHA or PLWH or human immunodeficiency virus or acquired immunodeficiency syndrome).ab.	458,704
#2	(HIV or AIDS or PLWHA or PLWH or human immunodeficiency virus or acquired immunodeficiency syndrome).ti.	356,362
#3	(HIV or AIDS or PLWHA or PLWH or human immunodeficiency virus or acquired immunodeficiency syndrome).sh.	128,319
#4	#1 or #2 or #3	10,607
#5	peer?.ab.	130,927
#6	peer?.ti.	22,345
#7	peer?.sh.	76
#8	#5 or #6 or #7	138,267
#9	(support or navigator? or counselor? or educator? or health worker? or volunteer?).ab.	1,741,245
#10	(support or navigator? or counselor? or educator? or health worker? or volunteer?).ti.	165,108
#11	(support or navigator? or counselor? or educator? or health worker? or volunteer?).sh.	63,016
#12	#9 or #10 or #11	1,807,592
#13	#4 and #8 and #12 Limit #13 to (full text and human and english language and yr="1996 -Current")	145

CINAHL (EBSCO)

Search time: 2022-5-29

Search	Query	Items found
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#1	TI (HIV OR AIDS OR PLWHA OR PLWH OR human immunodeficiency virus OR acquired immunodeficiency syndrome) OR AB (HIV OR AIDS OR PLWHA OR PLWH OR human immunodeficiency virus OR acquired immunodeficiency syndrome) OR SU (HIV OR AIDS OR PLWHA OR PLWH OR human immunodeficiency virus OR acquired immunodeficiency syndrome) Limiters - Full Text; Published Date: 19960101-20220531; English Language; Human; Age Groups: All Adult	15,438
#2	TI peer? OR AB peer? OR SU peer? Limiters - Full Text; Published Date: 19960101-20220531; English Language; Human; Age Groups: All Adult	4,111
#3	TI (support OR navigator? OR counselor? OR educator? OR health worker? OR volunteer?) OR AB (support OR navigator? OR counselor? OR educator? OR health worker? OR volunteer?) OR SU (support OR navigator? OR counselor? OR educator? OR health worker? OR volunteer?) Limiters - Full Text; Published Date: 19960101-20220531; English Language; Human; Age Groups: All Adult	47,814
#4	#1 AND #2 AND #3	205

Web of Science Core Collection

Search time: 2022-5-29

Search	Query	Items found
#1	TS=(HIV OR AIDS OR PLWHA OR PLWH OR human immunodeficiency virus OR acquired immunodeficiency syndrome)	1,018,629
#2	TS=(peer*)	255,555
#3	TS=(support OR navigator* OR counselor* OR educator* OR health worker* OR volunteer*)	3,798,916
#4	#2 AND #3	59,792
#5	(#1 AND #4) AND DOP=(1996-01-01/2022-05-29) Refined by: Languages: English; Research Areas: Infectious Diseases or Health Care Sciences Services or Psychology or Biomedical Social Sciences or Education Educational Research or Nursing or Social Sciences Other Topics or Social Work or Sociology or Public Environmental Occupational Health	2,567

ProQuest Dissertations and Theses Global

Search time: 2022-5-29

Search	Query	Items found
#1	ti(HIV OR AIDS OR PLWHA OR PLWH OR human immunodeficiency virus OR acquired immunodeficiency syndrome) OR ab(HIV OR AIDS OR PLWHA OR PLWH OR human immunodeficiency virus OR acquired immunodeficiency syndrome) OR su(HIV OR AIDS OR PLWHA OR PLWH OR human immunodeficiency virus OR acquired immunodeficiency syndrome) Refined by: Languages: English; Full text; From 1996-01-01 to 2022-05-29; Publication Types: Dissertation; Document Types: These.	62,283
#2	ti(peer?) OR ab(peer?) OR su(peer?) Refined by: Languages: English; Full text; From 1996-01-01 to 2022-05-29; Publication Types:	41,332

	Dissertation; Document Types: These.	
#3	ti(support OR navigator? OR counselor? OR educator? OR health worker? OR volunteer?) OR ab(support OR navigator? OR counselor? OR educator? OR health worker? OR volunteer?) OR su(support OR navigator? OR counselor? OR educator? OR health worker? OR volunteer?) Refined by: Languages: English; Full text; From 1996-01-01 to 2022-05-29; Publication Types: Dissertation; Document Types: These.	339,662
#5	#1 AND #2 AND #3	746

CNKI

Search time: 2022-5-29

Search	Query	Items found
#1	TKA="人类免疫缺陷病毒 + 获得性免疫缺陷综合征 + 艾滋病 + HIV + AIDS"	131,472
#2	TKA="同伴"	43,451
#3	TKA="支持 + 教育 + 志愿者"	7,666,443
#4	TKA="新生儿 + 幼儿 + 婴幼儿 + 儿童 + 青少年"	1,598,299
#5	(#1 AND #2 AND #3) NOT #4 Date: 1996-01-01 to 2022-05-29; Language:Chinese	1,344

WanFang

Search time: 2022-5-29

Search	Query	Items found
#1	摘要:"人类免疫缺陷病毒 or 获得性免疫缺陷综合征 or 艾滋病 or HIV or AIDS "	128,695
#2	摘要:"同伴"	34,454
#3	摘要:"支持 or 教育 or 志愿者"	6,863,479
#4	摘要:"新生儿 or 幼儿 or 婴幼儿 or 儿童 or 青少年"	1,320,416
#5	(#1 AND #2 AND #3) NOT #4 Date:2002-2022; Language:Chinese; Full text	299

Appendix II

Source	Link	Title
nhivna	https://www.nhivna.org/news-detail.php?news_id=50	Peer navigators improve linkage to HIV care and retention in care in South African study
	https://www.nhivna.org/news-detail.php?news_id=106	Peer workers improve drug users' engagement with HIV care in Ukraine
	https://www.nhivna.org/news-detail.php?news_id=262	Peer or community interventions improve outcomes for mothers with HIV
BHIVA	https://www.bhiva.org/news-detail.php?news_id=1568	Peer support and text reminders lead to only transient improvements in HIV treatment adherence
	https://www.bhiva.org/news-detail.php?news_id=3706	Peer support is crucial for many people living with HIV
napwha	https://napwha.org.au/the-future-of-peer-practice/	Webinar: The future of peer practice
	https://napwha.org.au/resource/australian-hiv-peer-support-standards/	Australian HIV Peer Support Standards
CATIE	https://www.catie.ca/programming-connection/peer-navigation-services	Peer Navigation Services
	https://www.catie.ca/practice-guidelines-in-peer-health-navigation-for-people-living-with-hiv	Practice Guidelines in Peer Health Navigation for People Living with HIV
	https://www.catie.ca/resource/building-blocks-to-peer-program-success-a-toolkit-for-developing-hiv-peer-programs	Building Blocks to Peer Program Success: A toolkit for developing HIV peer programs
	https://www.catie.ca/peer-health-navigation-gipa-mepa-and-your-organization	Peer Health Navigation: GIPA, MEPA and Your Organization

https://www.catie.ca/peer-health-navigation-scope-of-practice-roles-and-responsibilities	Peer health navigation: scope of practice, roles and responsibilities
https://www.catie.ca/peer-health-navigation-mental-health-implications-of-working-as-a-peer	Peer health navigation: mental health implications of working as a peer
https://www.catie.ca/hiv-peer-health-navigation-moving-programs-forward	HIV peer health navigation: Moving programs forward
https://www.catie.ca/resource/the-role-of-peers-in-linkage-engagement-and-retention-in-hiv-care	The role of peers in linkage, engagement, and retention in HIV care
https://www.catie.ca/prevention-in-focus/practice-guidelines-in-peer-health-navigation-for-people-living-with-hiv-a-new	Practice Guidelines in Peer Health Navigation for People Living with HIV: A new program development resource for community-based organizations (Part 2)
https://www.catie.ca/programming-connection/peer-to-peer-program	Peer-to-Peer Program
https://www.catie.ca/prevention-in-focus/practice-guidelines-for-peer-health-navigation-for-people-living-with-hiv-a-new	Practice Guidelines for Peer Health Navigation for People Living with HIV: A new program development resource for community-based organizations (Part 1)
https://www.interiorhealth.ca/sites/default/files/PDFS/getting-started-guide-to-develop-and-deliver-peer-support-services.pdf	Getting started: A guide to develop and deliver peer support services
https://www.catie.ca/resource/training-peer-mentors-facilitation-guide	Training peer mentors: Facilitation guide
https://www.catie.ca/resource/becoming-a-peer-mentor-participant-training-guide	Becoming a peer mentor: Participant training guide
