

SCOPING REVIEW

Strategies to improve antiretroviral therapy (ART) initiation and early engagement among men in sub-Saharan Africa: A scoping review of interventions in the era of universal treatment

Kathryn L. Dovel^{1,2} | Santhi Hariprasad³ | Julie Hubbard^{1,2} | Morna Cornell⁴ |
 Khumbo Phiri² | Augustine Choko⁵ | Rachel Abbott⁶ | Risa Hoffman¹ |
 Brooke Nichols³ | Sundeep Gupta¹ | Lawrence Long^{7,3}

¹Division of Infectious Diseases, David Geffen School of Medicine, University of California Los Angeles, Los Angeles, USA

²Partners in Hope Medical Center, Lilongwe, Malawi

³Department of Global Health, School of Public Health, Boston University, Boston, Massachusetts, USA

⁴Centre for Infectious Disease Epidemiology & Research, School of Public Health, University of Cape Town, Cape Town, South Africa

⁵University of Malawi, College of Medicine, Blantyre, Malawi

⁶Division of HIV, Infections Diseases & Global Medicine, University of California San Francisco, San Francisco, California, USA

⁷Health Economics and Epidemiology Research Office, Faculty of Health Sciences, University of Witwatersrand, Johannesburg, South Africa

Correspondence

Kathryn L. Dovel, Division of Infectious Diseases, David Geffen School of Medicine, 10833 Le Conte Ave, Los Angeles, CA 90095, USA.
 Email: kdovel@mednet.ucla.edu and kldovel@gmail.com

Funding information

Bill and Melinda Gates Foundation, Grant/Award Number: INV-001423; Fogarty International Center, Grant/Award Number: K01-TW011484-01; UCLA Global Short-Term Training Program; National Institutes of Health, Grant/Award Numbers: R01 MH122308-01A1, U01AI069924; National Institute of Mental Health, Grant/Award Numbers: K01MH119923, D43TW011308, R01-MH122308

Abstract

Objectives: Men in sub-Saharan Africa (SSA) have lower rates of antiretroviral therapy (ART) initiation and higher rates of early default than women. Little is known about effective interventions to improve men's outcomes. We conducted a scoping review of interventions aimed to increase ART initiation and/or early retention among men in SSA since universal treatment policies were implemented.

Methods: Three databases, HIV conference databases and grey literature were searched for studies published between January 2016 to May 2021 that reported on initiation and/or early retention among men. Eligibility criteria included: participants in SSA, data collected after universal treatment policies were implemented (2016–2021), quantitative data on ART initiation and/or early retention for males, general male population (not exclusively focused on key populations), intervention study (report outcomes for at least one non-standard service delivery strategy), and written in English.

Results: Of the 4351 sources retrieved, 15 (reporting on 16 interventions) met inclusion criteria. Of the 16 interventions, only two (2/16, 13%) exclusively focused on men. Five (5/16, 31%) were randomised control trials (RCT), one (1/16, 6%) was a retrospective cohort study, and 10 (10/16, 63%) did not have comparison groups. Thirteen (13/16, 81%) interventions measured ART initiation and six (6/16, 37%) measured early retention. Outcome definitions and time frames varied greatly, with seven (7/16, 44%) not specifying time frames at all. Five types of interventions were represented: optimising ART services at health facilities, community-based ART services, outreach support (such as reminders and facility escort), counselling and/or peer support, and conditional incentives. Across all intervention types, ART initiation rates ranged from 27% to 97% and early retention from 47% to 95%.

Conclusions: Despite years of data of men's suboptimal ART outcomes, there is little high-quality evidence on interventions to increase men's ART initiation or early retention in SSA. Additional randomised or quasi-experimental studies are urgently needed.

KEYWORDS

care continuum, evidence-based interventions, gender disparities, men, scoping review

INTRODUCTION

Men in sub-Saharan Africa (SSA) experience gender disparities across HIV outcomes compared to women. Men

Kathryn L. Dovel and Santhi Hariprasad contributed equally to this work.

Sustainable Development Goal: Good Health and Wellbeing.

This is an open access article under the terms of the [Creative Commons Attribution](https://creativecommons.org/licenses/by/4.0/) License, which permits use, distribution and reproduction in any medium, provided the original work is properly cited.

© 2023 The Authors Tropical Medicine & International Health Published by John Wiley & Sons Ltd.

living with HIV are at a greater risk of not starting antiretroviral therapy (ART) [1, 2] and greater risk of treatment interruption in the first 8 months after initiation [1, 3]. Improving men's ART initiation and retention is essential to decrease HIV mortality among men and reduce HIV transmission to men's sexual partners [4, 5]. As a result, there is an emerging programmatic focus on men's HIV care [6–8]. Yet, little is known about what types of interventions are effective for this population [9, 10]. It is critical that these resources be focused on proven, scalable interventions to promote ART initiation and early retention.

Recent innovations such as HIV self-testing (HIVST) and same-day ART initiation have reduced barriers to HIV services [11–15]. However, these interventions may simply delay disengagement to a later stage in the treatment cascade, from testing-related barriers to initiation, or from initiation-related barriers to retention. Early retention (largely recognised as the first three to 8 months after initiation) poses a significant challenge due to the frequent facility visits required during this period, and clients' need to develop resiliency strategies and build social support systems around their new HIV status [16–18]. Individuals may still be processing their diagnosis and not yet have disclosed their HIV status or have a support system [19]. Early retention may be particularly difficult for men as they often have fewer tools to navigate these challenges. Historically, men have less exposure to the healthcare system (HIV and non-HIV services) than women [20, 21], healthcare systems are often not 'male friendly', and work demands and related mobility may conflict with regular clinic attendance [22, 23]. Further, most ART counselling curricula are for general populations and do not include tailored messaging for men that is needed to relate to men's unique experiences and foster the internal motivation to engage in care [24–26].

Most research on ART initiation and early retention has focused on either women or the general population [27, 28]. Effective interventions include home- or community-based ART distribution to improve access to care [9, 29–31], intensive, peer-based counselling to help clients navigate intra- and inter-personal barriers to care [32, 33], and same-day ART initiation to streamline initiation [14, 34]. While this evidence is promising, it is not known whether these strategies are effective for men. Further, most of these studies were implemented prior to universal treatment policies, whereby clients are eligible for ART regardless of CD4 count or WHO staging. The majority of clients under universal treatment now feel healthy when being offered ART services and the immediate benefits of ART engagement may not be clear [35, 36]. Therefore, older findings may no longer be relevant under universal treatment policies.

We conducted a scoping review to identify and describe interventions to increase ART initiation and early retention (in the first 8 months after initiation) among men in SSA under universal treatment.

METHODS

We aimed to answer the following questions through a scoping review of current literature (2016–2021). The primary question was: What recent interventions aim to increase ART initiation and/or early retention among men in SSA under universal treatment? The secondary question was: What gaps in the current evidence base exist across (1) populations represented, (2) methodological approaches used and (3) outcome measurements?

We conducted a scoping review using the original framework of Arksey and O'Malley [37], which was subsequently extended by Levac and colleagues [38]. The review was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-analysis extension for scoping reviews (PRISMA-ScR) checklist as outlined below [39]. The full protocol is available elsewhere [40].

Eligibility criteria

We included studies of interventions that: (1) were conducted under universal treatment policies (which started for most countries in SSA in 2016); (2) included quantitative data on ART initiation or re-initiation and/or early retention for males (defined as retention outcomes within the first 8 months after initiation, to be as inclusive as possible); (3) reported findings for the general male population (not exclusively focused on key populations) and had a sample of at least 30 men; (4) had a study site located in SSA; and (5) had a manuscript or abstract available in English. We searched for sources published from 1 January 2016 to the date of our last review of the literature (9 May 2021). For sources where data were collected both pre- and post-universal treatment, we only included the source if data were disaggregated by pre-/post-universal treatment. We included interventions that specifically focused on men, as well as those for men and women that included sex-disaggregated results or noted there were no statistically significant differences in outcomes by sex. For sources that met all inclusion criteria except for sex-specific outcome data, we contacted authors to request sex-specific data or analyses.

Search strategy

We created a search string using Medical Subject Headings (MeSH), keywords, and filters as appropriate (Table 1). This string was used to search the PubMed database and then adapted for use in the Medline, Cochrane Central Register of Controlled Trials, and the CABI Global Health databases. Conference abstracts for the poster and oral presentations from the Conferences on Retroviruses and Opportunistic Infections (CROI) and the International AIDS Society (IAS) were reviewed from 2016 to 2021. We conducted supplemental searches using Google Scholar with similar keywords to identify additional grey literature.

TABLE 1 Search strings.

Concept	MeSH	Text keywords	Search strategy (Ovid MEDLINE)
ART	'Anti-Retroviral Agents'(1) 'Anti-Retroviral Agents' [Pharmacological Action] 'Antiretroviral Therapy, Highly Active'(1) 'Anti-HIV Agents'(1)	ART Antiretroviral retroviral HAART Retroviral	('Anti-Retroviral Agents'/ or 'Antiretroviral Therapy, Highly Active'/ or 'Anti-HIV Agents'/ or (art or haart or antiretroviral or retroviral). ti,ab,kw)
Initiation or early retention	'Sustained Virologic Response'	Initiat* Uptake Retention Retain* Linkage 'Viral suppression'	((initiat* or uptake or ((retention or retain*) adj2 (month* or early or care)) or linkage or linked or 'viral suppression') OR 'virological suppression').ti,ab,kw or 'Sustained Virological Response')
Sub-Saharan Africa	'Sub-Saharan Africa'	*Saharan Africa	(Angola, Benin, Botswana, Burkina Faso, Burundi, Cabo Verde, Cameroon, Central African Republic, Chad, Comoros, Congo, Democratic Republic of Congo, Republic of Cote d'Ivoire, Equatorial Guinea, Eritrea, Eswatini (Formerly Known as Swaziland), Ethiopia, Gabon, Gambia, The, Ghana, Guinea, Guinea-Bissau, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritania, Mauritius, Mozambique, Namibia, Niger, Nigeria, Rwanda, Sao Tome and Principe, Senegal, Seychelles, Sierra Leone, Somalia, South Africa, South Sudan, Sudan, Tanzania, Togo, Uganda, Zambia, Zimbabwe)
Intervention/facilitators	'Health Services Accessibility' 'Referral and Consultation' 'Continuity of patient care' 'Patient acceptance of health care' 'Study characteristics'	Intervention* Trial Random* Program* project Retrospective prospective Facilitat* Strateg*	((intervention* or trial or random* or program* or project* or retrospective or prospective or facilitat* or strateg*).ti,ab,kw)
Publication year limit			2016:2021.(sa_year)

Note: * 'Wildcard' characters used in literature search.

Selection of sources of evidence

We entered results from the search strategy into an Endnote [41] database and removed duplicates. Two reviewers conducted a title and abstract review and removed sources that did not meet study inclusion and exclusion criteria. The full text of the remaining sources was independently reviewed by three reviewers, with any conflicts resolved by KD.

Data charting process

We developed a data-charting form (Excel spreadsheet) based on the study objectives. Information included: study and participant characteristics (e.g., country, year of data collection, eligibility criteria), details of intervention and comparison models (e.g., location, frequency and services provided), initiation and early retention outcomes, and any concerns regarding quality (including potential bias in data collection, reporting, or analysis). Data were entered directly into the structured data-charting form independently by two authors.

After all data were entered into the data-charting form, lead authors reviewed and refined the form iteratively. Any inconsistencies were reconciled and KD performed spot-checks.

If ART initiation was not reported, a related outcome measure (e.g., linkage to care) was extracted as a proxy. For early retention, a range of time frames (4–9 months) and measure types (e.g., viral load taken, retention in care) were extracted.

Synthesis

We categorised interventions into types using Duncombe's framework for differentiating service delivery models [42]. The authors reviewed each intervention and considered how best to categorise it based on: (1) type of services delivered (e.g., counselling or support, direct ART distribution); (2) location of service delivery (e.g., facility, community); (3) provider of health services (e.g., peer, provider); and (4) frequency of health services [42]. We summarised interventions, outcome measures and study designs overall and by intervention type.

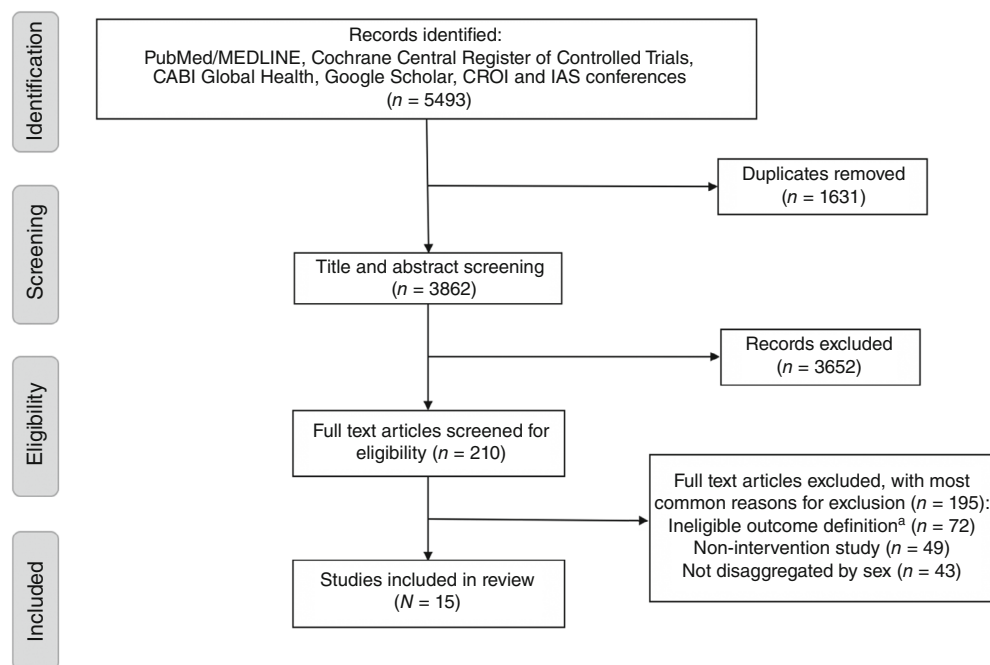


FIGURE 1 PRISMA flow diagram. ^a usually measuring retention >9 months after initiation.

TABLE 2 Description of included interventions.

Intervention type	Definition (examples)	n (%)
Facility-based services	Interventions that primarily focused on changes to protocols or services within facilities.	3 (19%)
Community-based services ^a	ART dispensed outside the health facility	4 (25%)
Outreach ^a	Community-based activities to identify those in need of ART services and/or to promote linkage to a health facility	4 (25%)
Counselling/peer support	Ongoing, intensive counselling to initiation and/or support early retention by identifying and resolving barriers to care	3 (19%)
Conditional incentives	At least one opportunity to receive monetary/non-monetary incentives conditional on one's engagement in ART services	2 (13%)

^aMwango et al. [43] included two interventions in one publication (community-based and outreach intervention types) and was therefore counted twice.

RESULTS

A total of 5493 data sources were identified. After removal of 1631 duplicates and review of 3862 titles, 210 data sources qualified for full review. Under full review we excluded 195 (Figure 1) for the following reasons: outcomes did not fit criteria ($n = 72$, 37%); not an intervention study ($n = 49$, 25%); and data not disaggregated by sex ($n = 43$, 22%). Overall, 15 data sources met all eligibility criteria; they were published between 2018 and 2021 (no sources from 2016 to 2017). One data source [43] reported on two different interventions that met the eligibility criteria, therefore we included 16 interventions in the data synthesis.

The 16 interventions fit into five overarching types: facility-based services ($n = 3$) [44–46]; community-based services ($n = 4$) [43, 47–49]; outreach ($n = 4$) [43, 50–52]; counselling/peer support ($n = 3$) [53–55]; and conditional incentives ($n = 2$) [56, 57] (Table 2).

Settings and populations of included interventions

All but one (15/16, 94%) of the interventions took place in southern or eastern Africa [43–47, 49–57] (Table 3) with one intervention in western Africa [48]. Almost half (7/16, 44%) of interventions were among rural populations [44, 47–49, 51, 52, 57], a quarter (4/16, 25%) among urban populations [45, 46, 55, 56] and nearly a third (5/16, 31%) included both urban and rural populations. [43, 50, 53, 54]

Only two interventions (13%) focused exclusively on men [56, 57], with most (14/16, 87%) including both men and women [43–54, 56]. The number of men participating in each intervention ranged from 33 to 3010. None of the studies specified sexual orientation or whether participants were cis- or transgender. Most interventions (14/16, 87%) enrolled individuals who were not on ART; while two [44, 56] (13%) enrolled clients who were actively on ART at the time of enrolment and focused only on early retention. Five

TABLE 3 All studies, stratified by intervention type.

Study	Study design	Study year	Country	Setting	Population	Comparison (C)	Intervention ^a
Facility-based services							
Ahmed, 2020	Retrospective cohort	2016–2018	Ethiopia	Rural	Men and women	Initiated ART >7 days after diagnosis	Same day ART initiation after diagnosis in facility
Rosen, 2019	RCT	2017–2018	South Africa, Kenya	Urban	Men and women	ART initiation within 2 weeks	Clinical algorithm for same-day ART initiation in facilities (excluding individuals with TB symptoms)
Maskew, 2020	RCT	2018	South Africa	Urban	Men and women	ART initiation within 2 weeks	Clinical algorithm for same-day ART initiation in facilities (including individuals with TB symptoms)
Community-based services							
Labhardt, 2018	RCT	2016–2017	Lesotho	Rural	Men and women	HBHCT and referral to nearest facility	C + Same-day home based initiation with 30-day supply of ART
Katbi, 2019	Non-controlled trial	2015	Nigeria	Rural	Men and women who previously declined ART	N/A	Individual and group adherence counselling, home based initiation with 30-day supply of ART, weekly phone calls from physicians
Mwango, 2020	Non-controlled trial	2018–2019	Zambia	Urban, Rural	Men and women	N/A	Male-specific community-based (e.g., school, worksite, home) HCT + on-site ART initiation or facility escort and ongoing peer-counselling
Maina, 2019	Non-controlled trial	2016	South Africa	Rural	Farmworkers, Men and women	N/A	Home and mobile HIV/TB testing + on-site ART initiation
Outreach							
Grasso, 2021	Non-controlled trial	2017	Namibia	Urban, Rural	Men and women	N/A	Home-based HCT + facility linkage by CHWs
Choi, 2020	Non-controlled trial	2018	South Africa	Rural	Men and women at local bars	N/A	Male CHWs stationed outside shebeens (alcohol venues) conducted HIV screening, rapid testing, counselling, and facilitated linkage and/or transportation to clinic or district hospital for ART initiation.
Mwango, 2020	Non-controlled trial	2018–2019	Zambia	Urban, Rural	Men and women	N/A	Home-based index case testing (ICT) services + facility escort. Follow-up home visit if individual did not initiate ART.
Baisley, 2019	Non-controlled trial	2017	South Africa	Rural	Men and women	N/A	Home-based + facility linkage, SMS after 2 weeks, and nurse call after two more weeks if not initiated.
Counselling/peer support							
MacKellar, 2018	Non-controlled trial	2014–2017	Tanzania	Urban, Rural	Men and women	N/A	Facility escort and treatment navigation, weekly telephone support and appointment reminder calls, five peer-delivered counselling sessions, and two in-person visits for HIV testing of partners and family members over a 90-day period.
MacKellar, 2021	Non-controlled trial	2015–2018	Eswatini	Urban, Rural	Men and women	N/A	Mobile HCT + facility escort and treatment navigation, weekly telephone support and appointment reminder calls, five peer-delivered counselling sessions, and two in-person visits for HIV testing of partners and family members over a 90-day period.

TABLE 3 (Continued)

Malone, 2021	2020	South Africa	Urban	Men	N/A	At least monthly individual HIV counselling sessions delivered by male peer counsellors. Tailored services could include facility escort and treatment navigation, case-management, and assisted disclosure to partners and family members over a 6-month period.
Incentives						
Fahey, 2020	RCT 2018	Tanzania	Urban	Men and women	C + 6 conditional monthly incentives of \$4.50 for clinic attendance	
Barnabas, 2020	RCT 2017–2018	South Africa	Rural	Men with phones	C + 6 conditional monthly incentives of \$10.00 for clinic attendance C + 3 conditional lottery incentives (phone, data, \$100 gift card) for clinic registration, ART initiation, and viral suppression at 1, 3 and 6 months	

^aC refers to all activities listed in the comparison row.

[43, 44, 49, 52] interventions only included newly diagnosed clients and 11 [45–48, 50, 51, 53–57] enrolled both newly diagnosed and re-initiating clients. No intervention disaggregated findings by ART status (initiating v. re-initiating treatment) at the time of enrolment. One intervention [48] targeted individuals who had previously declined ART when offered a lighter-touch intervention (community HIV counselling and testing with facility escort or a USD5 transport incentive).

Description of study designs

Of the 16 interventions, five (31%) were randomised clinical trials (RCTs) [45–47, 56, 57], one (6%) was a retrospective cohort study [44], and 10 (63%) did not have comparison groups (neither pre-intervention data nor separate control or comparison groups) [43, 48–55]. Study design varied by intervention type: all the facility-based service and conditional incentive interventions were RCTs or retrospective cohort studies, whereas generally the peer support, outreach and community-based services interventions did not have comparison groups.

ART initiation and early retention measures

Overall, 13/16 (81%) of the interventions measured ART initiation [43, 45–54, 57] and 6/16 (37%) measured early retention. [44–46, 55–57] Across all interventions, ART initiation rates ranged from 27% to 97% and early retention rates from 47% to 95% (Table 4).

Measurement of outcomes varied substantially across interventions. The most frequent measure was ART initiation (9/13, 69%) [45, 46, 49–54, 57], followed by linkage to care (3/13, 23%) [43, 47], and completion of a four-week refill appointment (1/13, 8%) [48]. The initiation measurement period ranged from same-day to 6 months. Early retention in care was mostly measured by clinic visit attendance (5/6, 84%) [44–46, 55, 56], with one study measuring viral suppression at 6 months (a common proxy for retention). The time period for early retention measures ranged from 5 to 8 months after initiation. Nearly half (7/16, 44%) of the interventions had unspecified time frames [43, 48–51, 55]. Most (13/16, 81%) interventions had verified outcomes and did not rely on self-report [43–46, 48, 49, 51–54, 56, 57].

Overall, the studies examining incentive- and facility-based interventions had higher quality measures. These all had verified outcomes with specified time frames and included an early retention outcome, unlike the studies examining outreach and community-based services.

Description of interventions

Facility-based interventions ($n = 3$) focused exclusively on same-day ART initiation [44–46]. One retrospective cohort

TABLE 4 Study results, stratified by intervention type.

Study	Participants living with HIV			Intervention	ART status	Verified (V) v. self-report (SR) outcomes	Initiation-related outcomes			Early retention-related outcomes				
	Male	Total	ART status				Outcome definition	Time frame	Intervention comparison	Outcome definition	Time frame	Intervention comparison		
Facility-based services														
Ahmed, 2020	468	988	Newly diagnosed,	Same-day ART initiation	V						<30 days late for clinic visit	6 months	77%	88%
Rosen, 2019	422	1077	Not on ART	Algorithm for same-day initiation (excl. TB symptoms)	V		ART initiation	1 month	85%*	74%	Clinic visit	5–8 months	51%	54%
Maskew, 2020	220	593	Not on ART	Algorithm for same-day initiation (allowing TB symptoms)	V		ART initiation	1 month	90%*	66%	Clinic visit	5–8 months	76%*	63%
Community-based services														
Labhardt, 2018	47	137	Not on ART	Home-based HCT + ART initiation	SR		Linkage-to-care	3 months	66%*	34%				
Katbi, 2019	239	302	Previously declined ART	Home-based ART initiation with ongoing support	V		ART initiation + 4-week facility visit	Unspecified	58%					
Mwango, 2020	2272	5714	Newly diagnosed	Community-based HCT + ART initiation + ongoing peer support	V		Linkage-to-care	Unspecified	97%					
Maina, 2019	2519	3415	Newly diagnosed	Home- and mobile-based HCT + ART initiation	V		ART initiation	Unspecified	92%					
Outreach														
Grasso, 2021	206	510	Not on ART	Home-based HCT + follow-up visits	SR		ART initiation	Unspecified	94%					
Choi, 2019	33	48 ^a	Not on ART	Community-based HCT + facility escort	V		ART initiation	Unspecified	45%					
Mwango, 2020	2186	5260	Newly diagnosed	Home-based ICT + facility escort + follow-up visit	V		Linkage-to-care	Unspecified	88%					
Baisley, 2019	120 ^a	427	Newly diagnosed	Home-based HCT + SMS + phone follow-up	V		ART initiation	6 months	27% ^b					
Counselling/peer support														
MacKellar, 2018 ^b	310	752	Not on ART	Peer-counselling + case management	V		ART initiation	3 months	85%					
MacKellar, 2021 ^b	438	824	Not on ART	Mobile HCT + peer-counselling + case management	V		ART initiation	1 month	96%					

TABLE 4 (Continued)

Study	Participants living with HIV			ART status	Intervention	Verified (V) v. self-report (SR) outcomes	Initiation-related outcomes			Early retention-related outcomes				
	Male	Total					Outcome definition	Time frame	Intervention	Comparison	Outcome definition	Time frame	Intervention	Comparison
Malone, 2021	3010	3010	Not on ART	Peer-counselling + case management	SR				Retained in care	Unspecified		95%		
Conditional incentives														
Fahy, 2020 ^c	200	330	Initiated or re-initiated ART in past 30 days	Conditional incentives of 4.50 USD (6 total)	V				Retained in care	6 months		88%	84%	
				Conditional incentives of 10.00 USD (6 total)	V				Retained in care	6 months		91%*	84%	
Barnabas, 2020	131	131	Not on ART	3 Conditional non-monetary lottery incentives	V				ART initiation	6 months	93%	76%	66%	59%

Note: The authors used associated documents (e.g., published study protocols, unpublished reports) relevant to these source documents if insufficient detail was provided in the publication itself.

^aCalculated by authors.

^bPost-universal treatment data only.

^cFindings are for both men and women, article methods or results stated that there were no significant differences in outcomes by sex.

* $p \leq 0.05$.

study examined early retention rates among individuals who initiated ART on the same day compared to those who did not, under the same care guidelines [44]. Two RCTs examined the impact of clinical algorithms (i.e., screening tools) to facilitate same-day ART initiation among clinically eligible clients [45, 46].

All community-based ART interventions ($n = 4$) provided immediate ART initiation and counselling in community, home, and/or work settings [43, 47–49]. Two of these interventions provided ongoing monitoring and counselling to encourage adherence after initiation [43, 48], while two provided a single counselling session at initiation [47, 49]. All outreach interventions ($n = 4$) offered in-person or phone-based reminders to attend facility [43, 50–52], escorted clients to the facility for initiation ($n = 2$) [43, 51], or provided transportation to facilities ($n = 1$) [51].

All peer-based support/counselling interventions ($n = 3$) included ongoing (ranging from 90 to 180 days) counselling from peers living with HIV, usually at clients' home or other private community-based locations [53–55]. Duration and location were dependent on client preferences and needs. One study was tailored for men, and delivered by male peers living with HIV [55].

Two RCTs assessed the impact of conditional incentives [56, 57]. One intervention [56] offered fixed monetary incentives (USD4.50 or USD10) for each monthly clinic visit to individuals who had initiated or re-initiated ART in the past 30 days; the other [57] offered lottery non-monetary incentives (mobile phone, data, or a USD100 gift card) for clinic registration, ART initiation, and/or viral suppression.

DISCUSSION

Despite years of evidence of men's suboptimal ART outcomes, research on effective interventions for men in SSA remains scarce. We identified only 16 eligible interventions that included sex-disaggregated data: of these, only two were designed specifically for heterosexual men. The lack of interventions specifically tailored to men may be a concern because men have unique needs that require specific responses [22, 58]. A plethora of interventions specifically target women [24, 59] because they also have unique needs—men are no different. Most interventions did not have a comparison group and had inconsistent outcome measures. We are not the first to bring attention to the lack of evidence for men's interventions. A recent systematic review on long-term ART retention for men in SSA identified only 14 studies with sex-disaggregated data published between 2005 and 2019, with *none* exclusively targeting heterosexual men [9]. These gaps require urgent attention so that programmatic interventions can be informed by rigorous evidence specific to men in the region (see Figure 2).

All future HIV research should disaggregate findings by sex. Many articles we screened did not include sex-disaggregated results or analyses. The lack of sex-disaggregated outcomes is especially challenging given that men in SSA are

1. Disaggregate study results by sex, and power future studies by sex (and key characteristics within each sex, where feasible).
2. Employ rigorous research designs with comparison groups (RCTs and quasi-experimental designs). Robust implementation studies can be nested within larger implementation programs in feasible and cost-effective ways.
3. Develop and disseminate standard definitions and time frames for ART initiation and early retention outcomes so findings can be compared across contexts.
4. Collect data on the early retention (within 8 months of initiation) period and prioritize research on interventions that encompass both ART initiation and early retention: a focus on initiation alone is no longer sufficient under universal treatment policies.
5. Evaluate a wide range of intervention types (e.g. health system changes, education and counseling, rapid multi-month dispensing, interfaces with traditional practitioners, community-based approaches, and technology-based approaches).

FIGURE 2 Research priorities for men's early engagement in HIV services.

often underrepresented in HIV studies. WHO highlights the critical importance of sex-disaggregated data [48], which allow health systems to 'identify and respond to gender inequalities in health, and allocate resources accordingly'. Unfortunately, such high-level commitment to sex disaggregation does not necessarily translate into practice. WHO only started reporting disaggregated global health statistics in 2019. High-impact journals in the field often encourage but do not require sex-disaggregated findings [60], and key publications often lack disaggregation [56, 61, 62]. We strongly recommend that journals and funders require sex-disaggregated results where relevant in future publications following the SAGER guidelines [63], as well as the PRISMA-, and CONSORT-Equity extensions [64, 65]. Ideally studies that include both men and women should be powered to identify statistically significant gender differences in HIV outcomes, given that outcomes and barriers to care differ substantially by sex.

Numerous studies had weak study designs and/or methods. Only five [45–47, 56, 57] of the 16 interventions were evaluated using randomised controlled trials and most studies did not have a comparison group. As a result, the majority of the evidence that we found cannot attribute causality to the intervention and conclusions are only suggestive. Increasingly implementation studies are embedded within routine HIV programs. This has extensive benefits in terms of studying intervention scalability and sustainability within real-world settings, instead of within highly-controlled research environments that may not be replicated. However, such studies must employ strong research designs to produce sound results. Experimental and quasi-experimental research methods (such as stepped wedge cluster randomised trials [66, 67] and regression discontinuity designs [68, 69] can be nested pragmatically within large implementation programs. Implementing partners may also contract external evaluation partners to rigorously assess the impact of interventions.

Consistent with prior reviews [70, 71], we find that definitions and timeframes for measuring ART initiation and

early retention varied greatly, with nearly half of interventions lacking any timeframe at all. Without standardised, well-defined metrics, outcomes cannot be compared across programs, contexts, and populations. Standard definitions for both ART initiation and early retention in the era of universal treatment should be developed and adopted.

Our study highlights the urgent need for additional research on interventions that improve early retention among men in SSA. Only six interventions measured early retention outcomes, and findings were largely inconclusive. Yet under universal treatment, early retention is emerging as one of the greatest barriers to epidemic control as those who interrupt treatment early are at increased risk of repeat treatment interruptions, long-term disengagement from care, and HIV-related morbidity and mortality [72, 73]. Clients in the period of early retention likely face some of the greatest challenges for ART engagement because this time period often requires navigating status disclosure, developing a lifestyle that facilitates long-term adherence, and attending frequent facility visits (usually monthly) that are time-consuming and may increase risk of unwanted disclosure [20]. Given the unique nature of early ART retention, studies focused on initiation or long-term retention should consider including early retention as a secondary outcome.

Despite these methodological limitations, our review provides some insight into what works for men. Studies with comparison groups provided evidence that same-day facility ART initiation increased men's ART initiation but was inconclusive for early retention [44–46], suggesting that same-day initiation alone does not sufficiently address the barriers that men face during the early retention period [44, 45]. Findings for other intervention types were inconclusive.

To improve men's ART outcomes, a wide variety of interventions should be evaluated. Innovative differentiated models of care during the first months of treatment are likely needed in order to meet the needs of men [22, 74],

such as male-specific counselling and mentorship [22], rapid multi-month dispensing [75], and community-based services [76]. Facility-based interventions such as integrated HIV services with non-HIV care, extended clinic hours, and male-friendly services may improve initiation and early retention outcomes [21]. Only two interventions in our review included any mHealth component [52, 57] though recent literature shows that access to smartphones and other technology is rapidly increasing among individuals in SSA [77] and mHealth may be key for young and mobile male populations who often cannot be reached through other approaches [78, 79]. Finally, none of the interventions included in this review employed community-level strategies to address HIV-related stigma or engagement with traditional health practitioners or religious leaders, groups who are key partners to engaging men in the region [80, 81].

Our study had a number of limitations. A thorough search of grey literature may have yielded more interventions. We only included articles that were published in English. However, we believe that our search strategy was comprehensive in reviewing the published literature on interventions to improving ART initiation and early retention among men in SSA.

CONCLUSIONS

Despite clear gaps in men's ART outcomes in SSA, men are largely missing from research on treatment initiation and early retention interventions. There is an urgent need to produce rigorous, sex-disaggregated research on a wide variety of strategies to improve ART initiation and early retention for men under universal treatment policies.

ACKNOWLEDGEMENTS

None.

FUNDING INFORMATION

This work was supported by the Bill and Melinda Gates Foundation (INV-001423) and the Fogarty International Center K01-TW011484-01. KD was supported by the National Institute of Mental Health RO1-MH122308. MC was supported by grant funding from the National Institute of Health (U01AI069924 & R01 MH122308-01A1) and from the Fogarty International Center and the National Institute of Mental Health (D43TW011308). LL was supported by the National Institute of Mental Health K01-MH119923. The content is solely the responsibility of the authors and does not necessarily represent the official views of the funders.

REFERENCES

1. AIDSinfo | UNAIDS [Internet]. 2022. [cited 2022 Jun 1]. Available from: <https://aidsinfo.unaids.org/>
2. Nardell MF, Adeoti O, Peters C, Kakuhiere B, Govathson-Mandimika C, Long L, et al. Men missing from the HIV care continuum in sub-Saharan Africa: a meta-analysis and meta-synthesis. *J Int AIDS Soc.* 2022;25(3):e25889.
3. Cornell M, Majola M, Johnson LF, Dubula-Majola V. HIV services in sub-Saharan Africa: the greatest gap is men. *The Lancet.* 2021; 397(10290):2130–2.
4. UNAIDS. Male engagement in HIV testing, treatment and prevention in eastern and southern Africa—A framework for action [Internet]. 2022 Available from: <https://www.unaids.org/en/resources/documents/2022/male-engagement-hiv-testing-treatment-prevention-eastern-southern-africa>
5. Tsai AC, Siedner MJ. The missing men: HIV treatment scale-up and life expectancy in sub-Saharan Africa. *PLoS Med.* 2015;12(11): e1001906.
6. MenStar coalition | Ending AIDS for all [Internet]. 2022 MenStar Coalition. [cited 2022 Jun 29]. Available from: <https://www.menstarcoalition.org/>
7. PEPFAR 2021 Country and Regional Operational Plan (COP/ROP) guidance for all PEPFAR countries [Internet]. [cited 2022 Jun 29]. Available from: <https://www.state.gov/wp-content/uploads/2020/12/PEPFAR-COP21-Guidance-Final.pdf>
8. UNAIDS. Male engagement in the HIV response—a platform for action. 2016.
9. Kusemererwa S, Akena D, Nakanjako D, Kigozi J, Nanyunja R, Nanfuka M, et al. Strategies for retention of heterosexual men in HIV care in sub-Saharan Africa: a systematic review. *PLoS ONE.* 2021 Feb 4;16(2):e0246471.
10. Robertson LM, Douglas F, Ludbrook A, Reid G, van Teijlingen E. What works with men? A systematic review of health promoting interventions targeting men. *BMC Health Serv Res.* 2008;3(8):141.
11. Mphande M, Campbell P, Hoffman RM, Phiri K, Nyirenda M, Gupta SK, et al. Barriers and facilitators to facility HIV self-testing in outpatient settings in Malawi: a qualitative study. *BMC Public Health.* 2021 Dec 2;21(1):2200.
12. Dovel K, Shaba F, Offorjebe OA, Balakasi K, Nyirenda M, Phiri K, et al. Effect of facility-based HIV self-testing on uptake of testing among outpatients in Malawi: a cluster-randomised trial. *Lancet Glob Health.* 2020;8(2):e276–87.
13. Boyd M, Boffito M, Castagna A, Estrada V. Rapid initiation of antiretroviral therapy at HIV diagnosis: definition, process, knowledge gaps. *HIV Med.* 2019;20(S1):3–11.
14. Lilian RR, Rees K, McIntyre JA, Struthers HE, Peters RPH. Same-day antiretroviral therapy initiation for HIV-infected adults in South Africa: analysis of routine data. *PLoS One.* 2020;15(1):e0227572.
15. Koduah Owusu K, Adu-Gyamfi R, Ahmed Z. Strategies to improve linkage to HIV care in urban areas of sub-Saharan Africa: a systematic review. *HIVAIDS Auckl NZ.* 2019;2(11):321–32.
16. Chauke P, Huma M, Madiba S. Lost to follow up rate in the first year of ART in adults initiated in a universal test and treat programme: a retrospective cohort study in Ekurhuleni District, South Africa. *Pan Afr Med J.* 2020;37:198.
17. Telayneh AT, Tesfa M, Woyraw W, Temesgen H, Alamirew NM, Haile D, et al. Time to lost to follow-up and its predictors among adult patients receiving antiretroviral therapy retrospective follow-up study Amhara Northwest Ethiopia. *Sci Rep.* 2022;12(1):2916.
18. Dessu S, Mesele M, Habte A, Dawit Z. Time until loss to follow-up, incidence, and predictors among adults taking ART at public hospitals in Southern Ethiopia. *HIV AIDS Auckl NZ.* 2021 Feb;17(13):205–15.
19. Lambert CC, Tarver WL, Musoke PL, Stringer KL, Whitfield S, Turan B, et al. Complexities of HIV disclosure in patients newly entering HIV care: a qualitative analysis. *J Assoc Nurses AIDS Care JANAC.* 2020;31(2):208–18.
20. Yeatman S, Chamberlin S, Dovel K. Women's (health) work: a population-based, cross-sectional study of gender differences in time spent seeking health care in Malawi. *PLoS One.* 2018;13(12):e0209586.
21. Dovel K, Dworkin SL, Cornell M, Coates TJ, Yeatman S. Gendered health institutions: examining the organization of health services and men's use of HIV testing in Malawi. *J Int AIDS Soc.* 2020;23(Suppl 2): e25517.
22. Colvin CJ. Strategies for engaging men in HIV services. *Lancet HIV.* 2019;6(3):e191–200.

23. Phiri K, McBride K, Moucheraud C, Mphande M, Balakasi K, Lungu E, et al. Community and health system factors associated with antiretroviral therapy initiation among men and women in Malawi: a mixed methods study exploring gender-specific barriers to care. *Int Health*. 2021;13(3):253–61.
24. Muhula S, Gachohi J, Kombe Y, Karanja S. Interventions to improve early retention of patients in antiretroviral therapy programmes in sub-Saharan Africa: a systematic review. *PLoS One*. 2022;17(2):e0263663.
25. Hlongwa M, Cornell M, Malone S, Pitsillides P, Little K, Hasen N. Uptake and short-term retention in HIV treatment among men in South Africa: the coach Mpilo pilot project. *Glob Health Sci Pract*. 2022;10(1):e2100498.
26. Choko AT, Coates TJ, Mphande M, Balakasi K, Robson I, Phiri K, et al. Engaging men through HIV self-testing with differentiated care to improve ART initiation and viral suppression among men in Malawi (ENGAGE): a study protocol for a randomized control trial. *PLoS One*. 2023;18(2):e0281472.
27. Govindasamy D, Meghij J, Negussi EK, Baggaley RC, Ford N, Kranzer K. Interventions to improve or facilitate linkage to or retention in pre-ART (HIV) care and initiation of ART in low- and middle-income settings—a systematic review. *J Int AIDS Soc*. 2014; 17(1):19032.
28. Rosen S, Fox MP. Retention in HIV care between testing and treatment in sub-Saharan Africa: a systematic review. *PLoS Med*. 2011; 8(7):e1001056.
29. Eshun-Wilson I, Awotiwon AA, Germann A, Amankwaa SA, Ford N, Schwartz S, et al. Effects of community-based antiretroviral therapy initiation models on HIV treatment outcomes: a systematic review and meta-analysis. *PLoS Med*. 2021;18(5):e1003646.
30. Mukherjee JS, Barry D, Weatherford RD, Desai IK, Farmer PE. Community-based ART programs: sustaining adherence and follow-up. *Curr HIV/AIDS Rep*. 2016;13(6):359–66.
31. Dave S, Peter T, Fogarty C, Karatzas N, Belinsky N, Pai NP. Which community-based HIV initiatives are effective in achieving UNAIDS 90-90-90 targets? A systematic review and meta-analysis of evidence (2007-2018). *PLoS One*. 2019 Jul 17;14(7):e0219826.
32. Katz IT, Bogart LM, Fitzmaurice GM, Staggs VS, Gwadz MV, Bassett IV, et al. The treatment ambassador program: a highly acceptable and feasible community-based peer intervention for south Africans living with HIV who delay or discontinue antiretroviral therapy. *AIDS Behav*. 2021;25(4):1129–43.
33. Karwa R, Maina M, Mercer T, Njuguna B, Wachira J, Ngetich C, et al. Leveraging peer-based support to facilitate HIV care in Kenya. *PLoS Med*. 2017;14(7):e1002355.
34. Koenig SP, Dorvil N, Dévieux JG, Hedt-Gauthier BL, Riviere C, Faustin M, et al. Same-day HIV testing with initiation of antiretroviral therapy versus standard care for persons living with HIV: a randomized unblinded trial. *PLoS Med*. 2017 Jul 25;14(7): e1002357.
35. Nhassengo P, Cataldo F, Magaço A, Hoffman RM, Nerua L, Saide M, et al. Barriers and facilitators to the uptake of test and treat in Mozambique: a qualitative study on patient and provider perceptions. *PLoS One*. 2018;13(12):e0205919.
36. Plazy M, Perriat D, Gumede D, Boyer S, Pillay D, Dabis F, et al. Implementing universal HIV treatment in a high HIV prevalence and rural south African setting—field experiences and recommendations of health care providers. *PLoS One*. 2017;12(11):e0186883.
37. Arksey H, O'Malley L. Scoping studies: towards a methodological framework. *Int J Soc Res Methodol*. 2005;8(1):19–32.
38. Levac D, Colquhoun H, O'Brien KK. Scoping studies: advancing the methodology. *Implement Sci*. 2010;5(1):69.
39. Tricco AC, Lillie E, Zarin W, O'Brien KK, Colquhoun H, Levac D, et al. PRISMA extension for scoping reviews (PRISMA-ScR): checklist and explanation. *Ann Intern Med*. 2018;169(7):467–73.
40. Hariprasad S, Hubbard J, Nichols B, Cornell M, Hoffman R, Choko A, et al. Strategies to improve antiretroviral therapy (ART) initiation and early engagement among heterosexual men in sub-Saharan Africa: a scoping review. 2022 [cited 2022 Jun 1]. Available from: <https://osf.io/dwt8b>
41. The EndNote Team. EndNote 20. Philadelphia, PA: Clarivate; 2013.
42. Duncombe C, Rosenblum S, Hellmann N, Holmes C, Wilkinson L, Biot M, et al. Reframing HIV care: putting people at the centre of antiretroviral delivery. *Trop Med Int Health TM IH*. 2015;20(4):430–47.
43. Mwango LK, Stafford KA, Blanco NC, Lavoie MC, Mujansi M, Nyirongo N, et al. Index and targeted community-based testing to optimize HIV case finding and ART linkage among men in Zambia. *J Int AIDS Soc*. 2020;23(S2):e25520.
44. Ahmed I, Demissie M, Worku A, Gugsa S, Berhane Y. Effectiveness of same-day antiretroviral therapy initiation in retention outcomes among people living with human immunodeficiency virus in Ethiopia: empirical evidence. *BMC Public Health*. 2020;20(1):1802.
45. Rosen S, Maskew M, Larson BA, Brennan AT, Tsikhutsu I, Fox MP, et al. Simplified clinical algorithm for identifying patients eligible for same-day HIV treatment initiation (SLATE): results from an individually randomized trial in South Africa and Kenya. *PLoS Med*. 2019; 16(9):e1002912.
46. Maskew M, Brennan AT, Fox MP, Vezi L, Venter WDF, Ehrenkranz P, et al. A clinical algorithm for same-day HIV treatment initiation in settings with high TB symptom prevalence in South Africa: the SLATE II individually randomized clinical trial. *PLoS Med*. 2020;17(8):e1003226.
47. Labhardt ND, Ringera I, Lejone TI, Klimkait T, Muhairwe J, Amstutz A, et al. Effect of offering same-day ART vs usual health facility referral during home-based HIV testing on linkage to care and viral suppression among adults with HIV in Lesotho: the CASCADE randomized clinical trial. *JAMA*. 2018;319(11):1103–12.
48. Katbi M, Adegboye AA, Bello M, Gumel AG, Adedoyin A, Yunusa F, et al. Effect of community treatment initiative on antiretroviral therapy uptake among linkage-resistant people living with HIV in northern Nigeria. *Int J Infect Dis*. 2019;1(87):185–92.
49. Maina I, Mungai E, Ngwenya T, Ndlovu F. Universal test and treat: reaching underserved farm workers and their families in four sub-districts of uMgungundlovu district. Mexico: South Africa. In Mexico City; 2019.
50. Grasso MA, Hamunime N, Maher AD, Cockburn D, Williams DB, Taffa N, et al. Improving the benefits of HIV testing and referrals in large household surveys through active linkages to care: lessons and recommendations from the Namibia population-based HIV impact assessment (NAMPHIA), 2017. *AIDS Care*. 2021;33(10):1308–11.
51. Choi K, Jones J, Brooks R, Moll A, Friedland G, Sheno S. Alcoholic venue screening: a novel point of engagement with a hard-to-reach population of men for HIV testing and linkage to care in rural South Africa. 10th International AIDS Society Conference on HIV Science. Mexico City, Mexico; 2019.
52. Baisley K, Seeley J, Siedner M, Koole K, Matthews P, Tanser F, et al. Findings from home-based HIV testing and facilitated linkage after scale-up of test and treat in rural South Africa: young people still missing. *HIV Med*. 2019;20(10):704–8.
53. MacKellar D, Williams D, Dlamini M, Byrd J, Dube L, Mndzebele P, et al. Overcoming barriers to HIV care: findings from a peer-delivered, community-based, linkage case management program (CommLink), Eswatini, 2015–2018. *AIDS Behav*. 2021;25(5):1518–31.
54. MacKellar D, Maruyama H, Rwabiyago OE, Steiner C, Cham H, Msumi O, et al. Implementing the package of CDC and WHO recommended linkage services: methods, outcomes, and costs of the Bukoba Tanzania combination prevention evaluation peer-delivered, linkage case management program, 2014–2017. *PLoS One*. 2018;13(12):e0208919.
55. Malone S, Hlongwa M, Little K, Hasen N, Levy M, Clutton L, et al. Coach Mpilo: a peer-support intervention to improve men's ART linkage & retention. [CROI Abstract 756]. Abstracts from the virtual 2021 Conference on Retroviruses and Opportunistic Infections. *Top Antivir Med*. 2021;29(1):296.
56. Fahey CA, Njau PF, Katabaro E, Mfaume RS, Ulenga N, Mwenda N, et al. Financial incentives to promote retention in care and viral suppression among HIV-positive adults initiating antiretroviral therapy

- in Tanzania: a three-arm randomised controlled trial. *Lancet HIV*. 2020 Nov;7(11):e762–71.
57. Barnabas RV, van Heerden A, McConnell M, Szpiro AA, Krows ML, Schaafsma TT, et al. Lottery incentives have short-term impact on ART initiation among men: results from a randomized pilot study. *J Int AIDS Soc*. 2020;23(S2):e25519.
 58. Coursey K, Phiri K, Choko AT, Kalande P, Chamberlin S, Hubbard J, et al. Understanding the unique barriers and facilitators that affect Men's initiation and retention in HIV care: a qualitative study to inform interventions for men across the treatment Cascade in Malawi. *AIDS Behav*. 2022;1–10.
 59. Brittain K, Teasdale CA, Ngeno B, Odondi J, Ochanda B, Brown K, et al. Improving retention in antenatal and postnatal care: a systematic review of evidence to inform strategies for adolescents and young women living with HIV. *J Int AIDS Soc* [Internet]. 2021 [cited 2023 Apr 6];24:e25770. <https://doi.org/10.1002/jia2.25770>
 60. Cornell M, Horton K, Colvin C, Medina-Marino A, Dovel K. Perpetuating gender inequity through uneven reporting. *Lancet*. 2020 Apr 18;395(10232):1258.
 61. Chang LW, Mbabali I, Hutton H, Amico KR, Kong X, Mulamba J, et al. Novel community health worker strategy for HIV service engagement in a hyperendemic community in Rakai, Uganda: a pragmatic, cluster-randomized trial. *PLoS Med*. 2021 Jan 6;18(1):e1003475.
 62. Stockton MA, Udedi M, Kulisewa K, Hosseinipour MC, Gaynes BN, Mphonda SM, et al. The impact of an integrated depression and HIV treatment program on mental health and HIV care outcomes among people newly initiating antiretroviral therapy in Malawi. *PLoS One*. 2020 May 6;15(5):e0231872.
 63. Heidari S, Babor TF, De Castro P, Tort S, Curno M. Sex and gender equity in research: rationale for the SAGER guidelines and recommended use. *Res Integr Peer Rev*. 2016 May 3;1(1):2.
 64. Welch V, Petticrew M, Petkovic J, Moher D, Waters E, White H, et al. Extending the PRISMA statement to equity-focused systematic reviews (PRISMA-E 2012): explanation and elaboration. *J Clin Epidemiol*. 2016;70:68–89.
 65. Welch VA, Norheim OF, Jull J, Cookson R, Sommerfelt H, Tugwell P, et al. CONSORT-equity 2017 extension and elaboration for better reporting of health equity in randomised trials. *BMJ*. 2017;23(359):j5085.
 66. Odeny TA, Hughes JP, Bukusi EA, Akama E, Geng EH, Holmes KK, et al. Text messaging for maternal and infant retention in prevention of mother-to-child HIV transmission services: a pragmatic stepped-wedge cluster-randomized trial in Kenya. *PLoS Med*. 2019;16(10):e1002924.
 67. Steinert JJ, Khan S, Mlambo K, Walsh FJ, Mafara E, Lejeune C, et al. A stepped-wedge randomised trial on the impact of early ART initiation on HIV-patients economic outcomes in Eswatini. *eLife*. 2020;24(9):e58487.
 68. Bor J, Fox MP, Rosen S, Venkataramani A, Tanser F, Pillay D, et al. Treatment eligibility and retention in clinical HIV care: a regression discontinuity study in South Africa. *PLoS Med*. 2017;14(11):e1002463.
 69. Mody A, Sikazwe I, Namwase AS, Mwanza MW, Savory T, Mwila A, et al. Effects of implementing universal and rapid HIV treatment on initiation of antiretroviral therapy and retention in care in Zambia: a natural experiment using regression discontinuity. *Lancet HIV*. 2021;8(12):e755–65.
 70. Bauermeister JA, Bonett S, Rosengren AL, Choi SK, Watson D. Approaches to promoting linkage to and retention in HIV care in the United States: a scoping review. *Curr HIV/AIDS Rep*. 2021 Aug;18(4):339–50.
 71. Brennan A, Browne JP, Horgan M. A systematic review of health service interventions to improve linkage with or retention in HIV care. *AIDS Care*. 2014;26(7):804–12.
 72. Grimsrud A, Wilkinson L, Eshun-Wilson I, Holmes C, Sikazwe I, Katz IT. Understanding engagement in HIV Programmes: how health services can adapt to ensure No one is left behind. *Curr HIV/AIDS Rep*. 2020 Oct 1;17(5):458–66.
 73. Kimeu M, Burmen B, Audi B, Adega A, Owuor K, Arodi S, et al. The relationship between adherence to clinic appointments and year-one mortality for newly enrolled HIV infected patients at a regional referral hospital in Western Kenya, January 2011–December 2012. *AIDS Care*. 2016;28(4):409–15.
 74. Mukumbang FC. Leaving No man behind: how differentiated service delivery models increase Men's engagement in HIV care. *Int J Health Policy Manag*. 2020;10(3):129–40.
 75. Rosen S, Grimsrud A, Ehrenkrantz P, Katz I. Models of service delivery for optimizing a patient's first six months on antiretroviral therapy for HIV: an applied research agenda [Internet]. *Gates Open Res*. 2020; [cited 2022 Mar 22]. Available from: <https://gatesopenresearch.org/articles/4-116>
 76. Barnabas RV, Szpiro AA, van Rooyen H, Asiimwe S, Pillay D, Ware NC, et al. Community-based antiretroviral therapy versus standard clinic-based services for HIV in South Africa and Uganda (DO ART): a randomised trial. *Lancet Glob Health*. 2020;8(10):e1305–15.
 77. GSMA. The Mobile economy sub-Saharan Africa 2021 [Internet]. London: GSMA; 2021 [cited 2022 Jun 7]. Available from: https://www.gsma.com/mobileeconomy/wp-content/uploads/2021/09/GSMA_ME_SSA_2021_English_Web_Singles.pdf
 78. Visser M, Kotze M, van Rensburg MJ. An mHealth HIV prevention programme for youth: lessons learned from the iloveLife.mobi programme in South Africa. *AIDS Care*. 2020;32(Suppl 2):148–54.
 79. Ippoliti NB, L'Engle K. Meet us on the phone: mobile phone programs for adolescent sexual and reproductive health in low-to-middle income countries. *Reprod Health*. 2017;14(1):11.
 80. Moshabela M, Zuma T, Orne-Gliemann J, Iwuji C, Larmarange J, McGrath N. "It is better to die": experiences of traditional health practitioners within the HIV treatment as prevention trial communities in rural South Africa (ANRS 12249 TasP trial). *AIDS Care*. 2016;28(Suppl 3):24–32.
 81. Chimatiro CS, Hajison P, Muula AS. The role of community leaders on adolescent's HIV and sexual reproductive health and rights in Mulanje, Malawi. *Reprod Health*. 2020;17(1):66.

How to cite this article: Dovel KL, Hariprasad S, Hubbard J, Cornell M, Phiri K, Choko A, et al. Strategies to improve antiretroviral therapy (ART) initiation and early engagement among men in sub-Saharan Africa: A scoping review of interventions in the era of universal treatment. *Trop Med Int Health*. 2023;28(6):454–65. <https://doi.org/10.1111/tmi.13880>