

Digital Counseling and Testing Services to Improve HIV Self-Testing Acceptance in Key Populations: A Systematic Review

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Abstract: Key populations still experience stigma, privacy concerns, and limited access to HIV testing. Digital counseling and HIV self-testing offer a safer alternative. This systematic review synthesized evidence on the effectiveness of technology-based counseling and testing services in improving self-testing acceptability, uptake among key populations and linkage to care. A literature search was conducted (July–September 2025) in five databases, including studies published between 2017 and 2024, in accordance with PRISMA guidelines. This review protocol was registered with PROSPERO (CRD420251084235). Inclusion criteria comprised adult key populations receiving technology-based interventions in randomised controlled trials, cohort, or quasi-experimental designs that reported outcomes on acceptance, uptake, and/or linkage to care. Risk of bias was evaluated using the Joanna Briggs Institute tools, and results were synthesized narratively. Twelve studies from middle and high-income countries (n = 8,328) were included.

The most consistently effective interventions were models that integrated HIV self-testing with structured digital counselling, including pre-and post-test education and direct referral systems to healthcare services. These services increased HIV testing frequency compared to standard care, were well accepted, and successfully reached many first-time testers. However, challenges remain, including disparities in digital access, sustainability of self-testing kit supply, and variability in intervention components. In this context, nurses play a critical role as digital care navigators by providing digital pre- and post-test counseling through smartphone-based platforms, such as widely used applications like WeChat, while also ensuring digital health literacy, addressing technical barriers, and coordinating referrals for confirmatory testing.

Keywords: Counseling, Digital health, HIV self-testing, HIV testing, Key populations, Nurses, Systematic review, Telemedicine

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Introduction

Human immunodeficiency virus (HIV) poses a considerable public health issue globally to this day. During 2023, about 39.9 million people worldwide were living with the virus, accompanied by an estimated 630,000 HIV-related fatalities and 1.3 million new diagnoses in the same year.¹ The World Health Organization (WHO) recommends routine HIV screening, particularly among key populations, to strengthen prevention efforts and ensure timely access to treatment.¹ HIV prevalence remains higher among key populations,

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including men who have sex with men (7.6%), transgender individuals (8.5%), people who inject drugs (7.1%), sex workers (2.7%), and individuals in correctional settings (1.4%).² These disparities are driven by stigma, structural barriers, and restricted access to healthcare, which increase the risk of transmission.² Expanding access to HIV testing is essential for limiting transmission and ensuring timely initiation of antiretroviral therapy (ART).

The WHO and UNAIDS 95–95–95 targets serve as a global strategy to end the HIV/AIDS epidemic by 2030. In 2024, approximately 87% of people living with HIV were aware of their status, indicating that a gap remains toward achieving the first target (95%).³ Within this global strategy, increasing awareness of HIV status to 95% among people living with HIV is essential to accelerate engagement in care and timely initiation of treatment.⁴ Achieving the first target requires expanding HIV testing services that are safe and easily accessible. Privacy limitations, such as open counseling spaces and service pathways that may inadvertently disclose a client's status, often lead people to decline HIV testing.^{5,6}

Among key populations such as men who have sex with men (MSM), transgender individuals, and heterosexual men, reluctance or postponement of HIV testing is often shaped by anticipated stigma, including concerns about rejection and discriminatory treatment.⁷ Numerous people delay getting tested for HIV because they worry about the emotional suffering of getting a positive diagnosis.⁸ Doubts about service confidentiality and the fear of accidentally revealing one's HIV status also exacerbate these concerns.⁹ In this context, HIV self-testing (HIVST) allows individuals to conduct screenings privately, without visiting a healthcare facility, thereby reducing interactions that may trigger stigma.¹⁰ The HIVST is a primary screening test for identifying antigens. Ongoing clinical monitoring for individuals diagnosed with HIV involves viral load testing to determine the effectiveness of antiretroviral therapy and CD4 testing to evaluate their immune system status.^{11,12}

However, a major challenge in HIVST implementation is ensuring that individuals with

reactive results are promptly linked to confirmatory testing and follow-up care.¹³ Nurses have a crucial role in providing education before and after testing, supporting clients' mental preparedness, maintaining confidentiality, and enabling swift, secure connections to follow-up services and ongoing care.¹⁴ Recent developments in digital technology have allowed for the use of multiple platforms to improve pre- and post-HIVST counseling.

HIV counseling and testing using digital technology can boost awareness, decrease stigma, and enable the online discussion of HIVST results via platforms like mobile apps, phone support, chatbots, and educational videos.^{15,16} In line with these discoveries, a prior systematic review looked at digital support methods for HIV self-testing, which encompassed mobile apps and online ordering systems.¹⁷ However, these reviews primarily focused on digital facilitation mechanisms and variations in intervention components and counseling intensity, rather than systematically evaluating the effectiveness of integrated digital counseling and testing models on acceptance, uptake, and linkage to care outcomes, particularly among key populations. To respond to this identified gap, our review examined the effectiveness of digital counseling and testing interventions in enhancing HIVST acceptance, uptake, and linkage to care among key populations. The review question guiding this study was: What is the effectiveness of digital counseling and testing services on acceptance, uptake, and linkage to care outcomes of HIVST among key populations?

Literature Review

One of the WHO-recommended approaches to HIV/AIDS control is voluntary counseling and testing (VCT). VCT services emphasize confidentiality and informed consent, ensuring that individuals fully understand the testing process and their rights.¹⁸ VCT aims to help individuals understand their infection status, reduce anxiety, and provide psychological support before and after testing. However, perceived breaches of confidentiality and the stigma associated with a positive

result can undermine trust and reduce individuals' willingness to undergo testing.¹⁹ Concerns about stigma and discriminatory treatment when seeking VCT services are frequently described by key populations, particularly female sex workers and MSM.²⁰

This situation underscores the need for counseling and testing strategies that better protect privacy, including digital approaches that have been shown to reduce stigma-related barriers and enhance individuals' sense of safety throughout the testing process.²¹ Given the privacy limitations of conventional services, leveraging technology offers an alternative to improve the safety and comfort of care. HIVST enables individuals to test themselves. HIVST offers convenience, reduces stigma, and reaches those reluctant to use conventional services.^{17,22}

Nevertheless, limited access to counseling, challenges in linking individuals with reactive results to health facilities, and concerns about result interpretation remain key challenges.² Advances in digital technology have enabled the use of a wide range of platforms, from mHealth and eHealth to text messaging, video counseling, and chatbots, to optimize pre- and post-HIVST counseling.²³ Individuals can directly consult regarding their HIVST results, schedule virtual appointments, and receive counseling without visiting health care facilities that may be perceived as stigmatizing.²⁴ In addition, e-counseling delivered via video calls, telephone, or online chat enables real-time interaction with counselors, which can strengthen psychosocial support and help ensure follow-up to health facilities after a reactive result.²⁵ In this context, nurses play a central role in HIV case detection and strengthening linkage to care, particularly through the use of HIVST. Their involvement spans several services, from direct clinical care and health education to counseling, all of which are crucial for effective HIV prevention and management.²⁶ Consistent with this, nurse-led service models are feasible and effective. Examples include the HIVST Education and Promotion (STEP) program, which combines peer education with nurse-led kit distribution, as well as nurse-initiated screening approaches that have increased HIVST ordering and use.²⁷

Study Aim

This review assessed the impact of digital counseling and testing approaches on HIVST acceptance, uptake, and care linkage among adult key populations, and explored intervention features that contribute to effective implementation and inform nursing practice.

Methods

This study employed a systematic review methodology and adhered to the PRISMA 2020 guidelines in reporting its findings.

Protocol and Registration: The study protocol was registered in PROSPERO under registration number CRD420251084235, available at <https://www.crd.york.ac.uk/PROSPERO/view/CRD420251084235>. An initial search was conducted before the review, and no studies similar to this review were identified.

Article Eligibility Criteria: This review included studies involving adult participants (≥ 18 years) from HIV key populations, specifically MSM, transgender, people who inject drugs, and female sex workers. The interventions comprised digital HIV counseling and testing services delivered via telephone, short message service (SMS), smartphone applications (e.g., WhatsApp, WeChat), mHealth, and other technologies. This review encompassed experimental (randomized controlled trial: RCT), quasi-experimental, and cohort studies, as these methodologies enable the evaluation of intervention efficacy. Articles published in English between 2017 and 2024 were considered, with a language restriction to maintain methodological accuracy and conserve translation resources. We excluded studies involving non-key HIV populations and articles for which the full text was unavailable.

Search Strategies: The literature search was conducted from July 1 to September 21, 2025, using Scopus, ProQuest, ScienceDirect, Cochrane, and PubMed, supplemented by secondary searches. Relevant search terms were developed for each

database by confirming synonyms, applying Boolean operators, and using Medical Subject Headings (MeSH). An example of the PubMed search strategy is provided in the appendix (**Table A1**).

Data Extraction and Synthesis: Three reviewers (SE, SY, and INR) independently conducted study selection and data extraction using a pre-defined table. Discrepancies were resolved through discussion, and additional input from EN and AK was sometimes obtained to reach an agreement.

Extracted data included the study title and authors, participant characteristics, study design, intervention model, type of technology, intervention duration or frequency, measurement instruments, and study outcomes. All items are presented in the data extraction table (**Table A2**). Findings were synthesized narratively, considering mean differences, confidence intervals (CIs), and p-values. A quantitative meta-analysis was considered unsuitable because of significant disparities in study methodologies and intervention characteristics across the studies reviewed.

Assessment of Study Quality and Risk of Bias:

The included studies were evaluated for methodological quality and potential bias using the Joanna Briggs Institute (JBI) instruments.²⁸ For the nine RCTs, the JBI Checklist for Randomized Controlled Trials was used, which consists of 13 items.^{29–37} Two cohort studies were evaluated using the 11-item JBI Checklist for Cohort Studies.^{38,39} One quasi-experimental study was assessed using the JBI Checklist for Quasi-Experimental Studies, comprising nine items.⁴⁰ Three reviewers (SE, SY, and INR) independently assessed the methodological quality of studies, using pre-set standards that required a minimum of nine “yes” ratings out of 13 criteria for randomised controlled trials, six out of nine criteria for quasi-experimental designs, and nine out of 11 criteria for cohort studies. No major discrepancies were identified among reviewers; any differences were resolved through discussion with additional reviewers (EN, AK) until consensus was reached. The full results of the critical appraisal are provided in the appendices (**Tables 3**

and 4). In addition, each study was assigned a quality rating: good quality if “yes” responses accounted for 80%–100%, sufficient quality for 50%–79%, and poor quality for < 50%. These ratings are presented in the Supplementary File (**Table A.5**).

Results

Study Selection Process

Three reviewers (SE, SY, and INR) conducted an independent search across five databases, namely Scopus, ProQuest, ScienceDirect, Cochrane, and PubMed, and retrieved 1,946 records. Following the removal of 97 duplicate entries, 1,849 titles and abstracts were evaluated for suitability. Thus, 1,797 studies were excluded, with 108 due to flawed study design, 217 because the populations were not eligible, and 1,472 because their titles and abstracts indicated a lack of relevance. A total of 52 articles were evaluated during the full-text examination stage. Institutional library access and supplementary searches in Google Scholar and academic repositories were used to obtain full-text articles. Despite this, 15 articles remained inaccessible and were consequently excluded from the selection process, leaving 37 studies for further review.

Handsearching identified two additional articles, resulting in 39 studies assessed for eligibility. At this stage, 27 studies were excluded (did not use digital approaches, $n = 8$; ineligible outcomes, $n = 19$). A total of 12 studies met the eligibility criteria and were selected for the final analysis. Of these, nine employed a randomized controlled trial (RCT) design,^{29–37} two adopted a cohort design,^{38,39} and one used a quasi-experimental framework.⁴⁰ The low number of qualifying studies resulted from the strict selection criteria used, which concentrated on integrated digital interventions that combined counseling and testing associated with HIV self-testing among high-risk groups, with mandatory reporting of predetermined primary outcomes. Further details are presented in the PRISMA flow diagram (**Figure 1**).

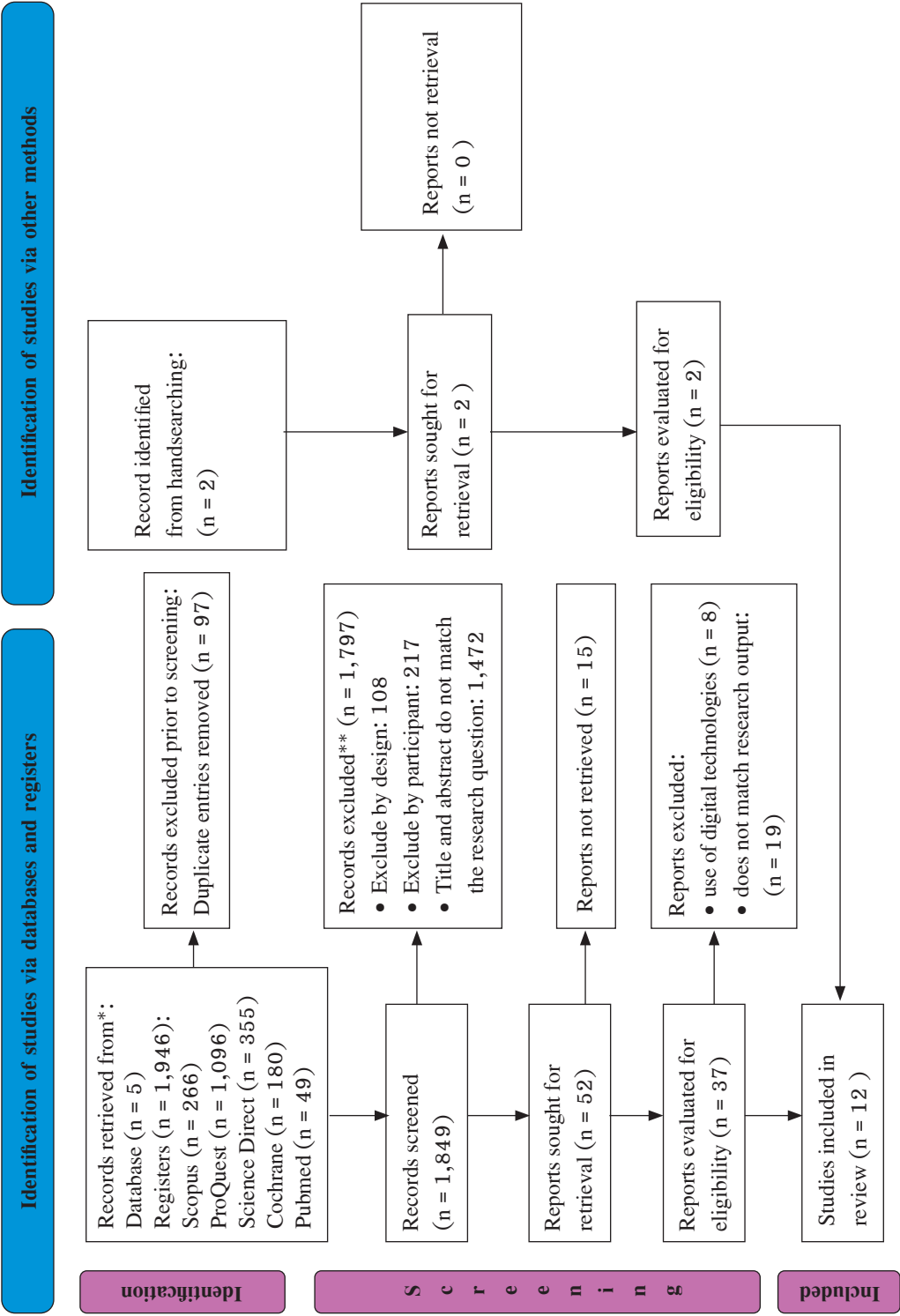


Figure 1. PRISMA flow diagram of the study selection process

Study Characteristics

Overall, the 12 included studies^{29–40} were primarily conducted in upper-, middle- and high-income settings (China, Hong Kong, Thailand, South Africa, and the United States), with one trial involving lower- and middle-income countries in Africa (Zambia and Uganda).³³ Nine studies were randomized controlled trials (RCTs),^{29–37} two were cohort studies,^{38,39} and one was a quasi-experimental study.⁴⁰ The studies encompassed a total of 8,328 participants, with a majority comprising men who have sex with men, along with transgender women and female sex workers. The majority of the sample were young adults.

Assessment of Methodological Quality

Nine randomized controlled trials assessed using the JBI checklist for trials met the predetermined quality standard, with all achieving at least nine affirmative ratings out of 13 items.^{29–37} Overall, the studies reported appropriate randomization, baseline comparability between groups, and clearly described intervention procedures for both arms (Q1, Q3, Q6). Outcomes were measured consistently and reliably across groups (Q8–Q9). The primary methodological issue centred on blinding procedures, with the majority of studies failing to conceal allocation from participants or intervention providers and providing limited information about the blinding of outcome assessors (Q4–Q5, Q7). Nevertheless, most trials reported follow-up procedures, conducted analyses according to initial randomization groups, and applied appropriate statistical methods (Q10–Q13). The methodological quality assessment indicated that the nine RCTs scored between 10 and 11 out of 13 “yes” criteria (76.9–84.6%). Three of these trials were classified as good quality.^{33,34,36} The remaining six RCTs were classified as of sufficient quality.^{29–32,35,37} Nine randomised controlled trials showed an acceptable level of risk of bias and were therefore included in the final synthesis.

Both cohort studies demonstrated generally good methodological quality, with nearly all items

rated “yes” (Q1–Q8).^{38,39} The main limitations related to the completeness of follow-up and how loss to follow-up was addressed, which were rated as “unclear” or “no” (Q9–Q10), although both studies used statistical analyses judged to be appropriate (Q11). The quasi-experimental study also demonstrated reasonably good quality.⁴⁰ Although participant comparability between groups was rated “unclear” (Q3), the study reported follow-up across groups and applied appropriate statistical analyses (Q8–Q9). The methodological quality assessment showed that the two cohort studies scored nine out of 11 “yes” criteria (81.8%) and were classified as good quality.^{38,39} The quasi-experimental study met eight out of nine “yes” criteria (88.8%) and was rated as good quality.⁴⁰ Independent assessments of the methodological quality of the included studies were conducted by three reviewers (SE, SY, and INR). No discrepancies were identified among reviewers; any differences were resolved through discussion with additional reviewers (EN and AK) until consensus was reached. The full critical appraisal results are provided in the appendices (Tables A3 and A4).

Digital HIVST Counseling and Testing Intervention Models

Overall, the 12 studies indicated that technology-based HIV counseling and testing models commonly combined the distribution of HIV self-testing (HIVST) kits with structured counseling delivered online. Participants received HIVST kits via various digital channels, including instant messaging applications and mHealth platforms (e.g., WeTest), as well as live chat, video calls, and automated booths in health facilities. Through these channels, participants received counseling, step-by-step guidance before testing, support during the testing process, assistance with result interpretation, and referrals to confirmatory testing and treatment services if the result was reactive.^{31,34,35} Some online service models, such as HIVST-OIC, emphasized synchronous counseling delivered by nurses or counselors via live chat/video

calls, combined with motivational interviewing by telephone.^{36,38,39} Other studies provided packages containing multiple HIVST kits for self-use, accompanied by digital educational materials and access to remote counseling, including via platforms such as e-Test.^{29,30,32} Among female sex workers, peer educators used digital tools to monitor HIVST receipt and use through repeated structured interviews.³³ In South Africa, the Aviro Pocket Clinic application guided the entire self-testing process via a tablet-based system, with nurses serving as facilitators.⁴⁰ It can be inferred that, across all included studies, the intervention model consisted of an HIVST package integrated with pre- and post-test counseling and service navigation, delivered through various digital technologies.

Types of Digital Technologies Used

Based on the synthesis of the 12 included studies, smartphone-based applications and instant messaging were the most commonly used technological components. WeChat was used for kit distribution, use instructions, result interpretation, follow-up referrals, and ongoing online counseling.^{31,34} The WeTest platform, built on WeChat, also integrated the distribution of oral HIVST kits, photo uploads of test results, and weekly educational messaging.³⁵ Several other studies added live chat or video chat features to support pre-test counseling, real-time supervision of test administration, online observation of testing, and post-test counseling.^{36,38,39} Other studies used telephone calls as one of the most frequently applied technologies, combined with mHealth mobile applications to provide linkage and support, including motivational interviewing after live chat sessions, telephone counseling, SMS messaging, and follow-up for reactive results.^{29,30,36} The eTEST pilot study used HIVST kits equipped with a Bluetooth beacon to enable post-test counseling and service referral.³² Other technologies included computer-assisted personal interviewing (CAPI) to monitor PrEP and HIVST uptake and use,³³ and tablet-based applications, such as Aviro Pocket Clinic, within digital booths to guide the entire testing process.⁴⁰

Challenges and Enabling Factors for Digital Technology-based Services

Several challenges were identified in implementing technology-based HIVST counseling and testing. Concerns are frequently voiced about the long-term affordability and steady availability of HIV self-testing kits, particularly for highly vulnerable groups such as transgender women and sex workers.^{31,33,34} Some interventions required smartphone ownership, the ability to use applications, and stable internet connectivity, which may limit reach among certain groups.^{29,30,32,35,37} A further challenge was the linkage-to-care gap, reflected in lower rates of confirmatory diagnosis and ART initiation in online HIVST models.^{34,39} Other technical challenges included difficulties with finger-prick blood collection, returning kits, and interpreting results.^{30,33,38,40}

Conversely, several factors supported the success of technology-enabled HIVST. HIVST, combined with digital support, was perceived as more convenient and private and as reducing stigma compared with facility-based testing, thereby increasing acceptability and the frequency of repeat testing.^{33,34,38,40} Using platforms such as WeChat, SMS, mHealth applications, and telephone calls facilitated education, counseling, automated reminders, and result reporting.^{30,32,35-37} Integration with community-based organizations, gay-friendly clinics, and existing HIV services supported by real-time counseling and clear referral pathways helped ensure confirmatory testing and ART initiation even when initial testing was self-administered.^{32,36,37,39} In addition, free kit distribution, self-ordering through applications, and uploading photos of test results further promoted repeat use and extended testing to sexual partners.^{30,31,35,37}

Duration of Digital Technology-based Counseling Interventions

Several studies explicitly reported the duration of digital counseling, with varying time frames. For example, a study³⁶ described a brief counseling

package delivered via live chat and telephone, lasting approximately 10–15 minutes for pre-test counseling and about 15–25 minutes for post-test counseling. Another study³⁸ reported a sequence of pre-test counseling, online HIVST supervision, and post-test counseling with a total duration of approximately 50–60 minutes per participant, while another⁴⁰ reported an average time of 20–30 minutes per visit to use the digital HIVST booth. However, most other studies described counseling support or a hotline without specifying the duration of each session.^{29–35,39}

Assessment Tools

Most of the 12 studies used structured questionnaires as the primary tool to measure intervention outcomes, delivered either as app- or web-based online surveys (e.g., via WeChat or other online platforms) or as telephone surveys. These instruments commonly assessed the frequency and location of HIV testing, testing history and regularity, acceptability and preferences for HIVST, knowledge and sexual risk behaviors, and barriers to testing.^{31,32,34–36,39} Several studies complemented questionnaire data with biological measures and service logs, such as dried blood spot (DBS) sampling for laboratory confirmation.²⁹ Other studies combined kit-order tracking, laboratory result reports, and qualitative interviews or computer-assisted personal interviewing to assess acceptability and repeat use.^{30,33} At the facility level, clinic registers and digital application data (Aviro) were used to quantify testing volume, the proportion of reactive results, and ART initiation.⁴⁰ Another study used HIVST-online service utilization data linked to pre- and post-test counseling outcomes.³⁸

Effect of Intervention on Acceptance, HIVST Uptake, and Linkage to Care

Across the included studies, interventions combining free HIV self-testing kit distribution with structured digital counseling (e.g., live chat or video-based support) consistently demonstrated higher uptake compared to standard care.^{29,32,34,36}

App-based and online ordering models showed high acceptability and increased user preference for digital HIVST service.^{30,33,35,38–40} Interventions integrating real-time counseling and structured referral systems were associated with stronger linkage to care outcomes compared to stand-alone kit distribution.^{31,38,39}

In terms of acceptability, several studies indicated that digital HIVST was generally well accepted across key populations. Approximately two-thirds of participants ordered HIVST kits through an application, and most reported that the ordering feature was highly helpful.³⁰ Another study reported that 82–87% of female sex workers in Uganda and Zambia preferred HIVST over standard testing services.³³ Additional findings showed that nearly half of the participants used HIVST-online services (40.4%)³⁸ and there was a marked increase in confidence in HIVST test outcomes in the intervention group, with an adjusted relative risk of 2.17 (95% CI: 1.08–4.37).³⁵ In the service delivery context, one study found that about two-thirds of participants chose online or mixed services, and these two groups accounted for more than half of new HIV diagnoses in that study.³⁹ Another study reported a 25% increase in testing capacity following the implementation of the Aviro app-based HIVST booth.⁴⁰ These findings indicate that combining HIVST kit distribution with digital counseling support and technology-based reminders is effective in improving HIVST acceptability and uptake across diverse key populations.

Discussion

Effectiveness of Digital Counseling and Testing Services for HIV Self-Testing

This review examined whether technology-enabled HIV counseling and testing services increase acceptance, adoption, and linkage to care for HIVST among priority populations. Digitally delivered counseling and testing interventions consistently enhance HIVST acceptance and uptake within these

groups. Across the 12 studies analyzed, integrated digital strategies included live chat platforms (e.g., WeChat), video-supervised testing, SMS reminders, and mobile health (mHealth) applications. Online testing booths were associated with increased testing frequency, greater readiness to test, and higher engagement among first-time testers, such as men who have sex with men, transgender women, and individuals engaged in sex work.^{29,31,34,36,37}

The results indicate that incorporating digital elements not only increases acceptability but also encourages more consistent HIV testing practices. Results regarding linkage to care showed greater variability. Studies have shown that interventions that included structured referral systems, real-time counseling, and dedicated hotlines, particularly online-to-offline models used in China and Thailand, resulted in higher proportions of participants with reactive results progressing to confirmatory testing and the initiation of antiretroviral therapy (ART).^{31,38,39} In contrast, a stand-alone HIVST kit without intensive counseling support showed less consistent linkage outcomes, particularly when interventions relied mainly on self-reporting via mobile applications or websites.^{29,30,32–35,39}

The efficacy of digital interventions may be impacted by multiple underlying processes. Digital platforms are known to boost privacy and decrease anticipated stigma, two factors that have been widely acknowledged as significant obstacles to obtaining facility-based HIV testing services. Reported barriers included limited counseling, low motivation, and privacy concerns, highlighting the need for more personalized digital engagement strategies.⁴¹ Digitally delivered counseling strategies can potentially reduce barriers associated with stigma, confidentiality issues, and limited access, ultimately enhancing the accessibility of HIVST among high-risk groups.^{42,43} Second, real-time interactions through chat or video facilitate more responsive emotional support and immediate clarification of test results, thus improving the acceptance, confidence,

and accessibility of HIVST.^{44,45} Thirdly, digital mechanisms for follow-up and referrals provide a structured approach to bridge the gap between self-testing and confirmatory services, ultimately enhancing treatment initiation and continuity of care. Innovative strategies, including virtual counseling and mobile health apps, appear to speed access to care by easing barriers related to stigma and limited access.^{46,47}

Our findings are consistent with previous research combining 46 studies conducted in different countries, indicating that web-based innovations (websites, chatbots, and videos) were preferred by nearly half of first-time users over in-person options, and app-based innovations had acceptability rates ranging from 87–95%.¹⁷ However, earlier reviews primarily emphasized user preferences and digital facilitation mechanisms, rather than systematically evaluating the effectiveness of integrated digital counseling and testing models in terms of measurable outcomes. Various forms of digital support for HIVST, including chatbots and mobile applications, have consistently been reported as feasible and well accepted, as they can provide real-time instructions and counseling while efficiently using resources.⁴⁴ Through these tools, individuals can perform and manage HIV testing discreetly from home.^{17,48}

This review extends the existing literature by synthesizing the effectiveness of digital counseling and testing interventions in achieving measurable outcomes, namely acceptance, uptake, and linkage to care, among key populations. Additional evidence from recent meta-analyses suggests that HIVST is more effective in linking people to care when combined with active digital counseling than distribution of the self-testing kits alone.^{21,49} Strategies like virtual counseling and mobile apps have been proven to make it easier to access healthcare services by overcoming obstacles such as stigma and limited access.^{46,47} Integrating digital counseling improves service convenience and supports continuity of care.

The accumulated evidence indicates that digital counseling and testing services play a strategic role in enhancing care acceptability, increasing service uptake, and sustaining engagement by enabling more efficient linkage mechanisms among key populations. The most significant effects were seen in interventions that included real-time counseling and organized referral systems. In contrast, trials that distributed HIVST through online channels without intensive counseling support found that some participants did not proceed to in-person services or initiate ART, particularly in interventions that relied heavily on self-reporting through apps or websites.^{29–35,39}

Implications for Nursing Practice and Digital Services Development in Key Populations

Findings from the 12 included studies indicate that technology-based counseling and HIVST consistently improve the acceptance and uptake of HIVST among key populations. The current results align with past meta-analyses that showcase digital HIVST as a primary strategy for expanding testing access, particularly in low- and middle-income countries, where integration into existing healthcare systems is necessary for successful implementation.⁵⁰ Nursing professionals should be more actively engaged in the evolution of digital health systems, including participation in user-centered development initiatives to ensure that technological solutions effectively meet the needs of both patients and healthcare providers.⁵¹ This underscores that nurses should not be limited to delivering face-to-face services, but should play a key role in designing and implementing digital health solutions so that the resulting technologies remain user-centered and aligned with clinical practice needs.⁵² Nurses are also essential in direct clinical care, including case finding, patient education, and counseling for people living with HIV.²⁶

Related evidence from digital interventions in other chronic conditions suggests similar patterns. Studies have reported that apps, SMS, and video-

observed therapy for tuberculosis are effective when nurses actively monitor patients and provide ongoing support.⁵³ Another study emphasized that mHealth programs for hypertension can improve adherence and quality of life when integrated into routine nursing practice.⁵⁴ In the HIV context, nurses can play a critical role in these interventions by leveraging their close relationships with patients and their understanding of patients' needs.⁵⁵ Accordingly, nurses are strategically positioned to lead the design, implementation, and scale-up of safe, inclusive, and user-centered digital HIV counseling services, which can ultimately increase HIV testing acceptability among key populations.

Limitations

Although this review demonstrates the significant potential of technology-based HIVST counseling and testing, several limitations should be noted. First, notable variation was observed among the included studies with respect to methodological designs (randomized controlled trials, cohort studies, and quasi-experimental approaches); the type and intensity of the technology used; and outcome measurement approaches. Consequently, a quantitative meta-analysis could not be conducted, and the analysis was limited to a narrative synthesis. Second, most trials were open-label, meaning that participants and intervention providers were not blinded, which may have introduced performance bias.

In several studies, reporting of methodological procedures such as allocation concealment, blinding of outcome assessors, and management of participant attrition was incomplete. Consequently, the risk-of-bias evaluation suggested that certain domains exhibited moderate to serious bias. Third, sample sizes varied across studies, and several were pilot trials with small numbers of participants, limiting statistical power to detect certain differences. Additionally, this review

was limited to studies published in English between 2017 and 2024 and retrieved from several major databases, potentially omitting relevant evidence. Fifteen full-text articles were also unavailable despite retrieval efforts, potentially introducing bias and affecting the completeness of the evidence synthesis.

Conclusion

This review shows that technology-based HIV counseling and testing services can be effective in increasing the acceptance and use of HIVST among adult key populations, as well as in improving linkage to care when combined with pre-post test counseling, service navigation, and a structured follow-up system. Intervention models that combine HIVST kit distribution with pre-post test counseling, automated reminders, and service navigation appear feasible, acceptable, and capable of strengthening linkage to HIV care. Interventions of short to moderate duration (approximately 15–60 minutes) were found to be feasible and sufficient to support both educational components and emotional support. Despite ongoing challenges such as digital inequities and the sustainability of test kit supply, the integration of digital services has the potential to expand early HIV detection in a more private and secure manner. Implementation should be accompanied by robust data protection measures, secure platform infrastructure, and discreet communication systems to safeguard confidentiality and protect key populations from stigma and discrimination.

Recommendations

HIV services in healthcare facilities and community settings should integrate a technology-enabled HIVST package that includes kit distribution, brief yet structured pre- and post-test counseling (approximately 15–30 minutes), automated reminders, and active navigation to key population-friendly confirmatory testing and ART services. Nurses'

capacity in digital counseling, digital health literacy, and the use of applications should be strengthened so that they can act as nurse digital navigators linking home-based HIVST with clinic services, monitoring follow-up, providing remote psychosocial support, and identifying groups facing barriers to digital access. Future research should employ more robust study designs, report intervention components and counseling duration in greater detail, use more standardized outcomes (acceptability, uptake, linkage), and incorporate cost analyses and digital equity considerations.

Author Contributions

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Editing the manuscript: S.E.

Revising the manuscript: S.E., S.Y., I.N.R., E.N., A.K.

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Declaration of Conflicting Interest

The authors disclose no potential conflicts of interest associated with this research.

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Appendix

Table A1. Search strategy

MEDLINE (PubMed): Search conducted in June 2025

Search	Query	Records retrieved
#1	(men who have sex with men[MeSH Terms]) OR (transgender women [MeSH Terms])) OR (Female sex workers[MeSH Terms])) OR (sex workers [MeSH Terms])) OR (HIV key population[MeSH Terms])) OR (high-risk population[MeSH Terms])	40.399
#2	((((HIV testing and counseling[MeSH Terms]) OR (digital counseling [MeSH Terms])) OR (mHealth[MeSH Terms])) OR (online counseling [MeSH Terms])	59.894
#3	((HIV self-testing[MeSH Terms]) OR (Self test[MeSH Terms])) OR (hiv testing[MeSH Terms])	28.441
#4	#1 AND #2 AND #3 (((((((men who have sex with men[MeSH Terms]) OR (transgender women[MeSH Terms])) OR (Female sex workers[MeSH Terms])) OR (sex workers[MeSH Terms])) OR (HIV key population[MeSH Terms])) OR (high-risk population[MeSH Terms])) AND (((((HIV testing and counseling[MeSH Terms]) OR (digital counseling[MeSH Terms])) OR (mHealth[MeSH Terms])) OR (online counseling[MeSH Terms])))) AND (((HIV self-testing[MeSH Terms]) OR (Self test[MeSH Terms])) OR (hiv testing[MeSH Terms]))	49

<https://pubmed.ncbi.nlm.nih.gov/advanced/>

Table A 2. Characteristics study

No	Author (year), study design, and country	Samples	Intervention type, duration/frequency, types of technology, and assessment tools	Outcomes
1.	Zhu YY, et al., ³⁴ Randomized controlled trial (China)	255 transgender women participated and were split into two groups.	The intervention consisted of education and instructions for using HIVST kits delivered via the WeChat application, with participants required to upload their test results within 24 hours using a QR code and receive online health counseling support. The program lasted six months with follow-up every three months, and all outcomes were assessed using an online questionnaire.	The digital HIV self-testing intervention significantly increased HIVST uptake, with the mean testing frequency in the intervention group nearly twice that in the control group ($p < 0.001$).
2.	Wang Z, et al., ³⁶ Randomized controlled trial (Hong Kong, China)	This study included 430 men who have sex with men (MSM) in Hong Kong who were allocated into two groups.	The intervention included 10–15 minutes of pre-test counseling via live chat with a trained nurse, a real-time video call-supervised HIVST, followed by 15–25 minutes of post-test counseling, a 4-minute educational video, and an approximately 15-minute motivational interviewing session conducted by telephone. Services were delivered using LINE and WhatsApp/Skype, along with a promotional video, and outcomes were assessed through a telephone survey lasting about 10 minutes.	The proportion of participants who underwent HIV testing was higher in the intervention group (89.8%) than in the control group (50.7%) ($p < 0.001$), indicating substantially greater acceptability and uptake of HIVST.
3.	MacGowan RJ, et al., ²⁹ Randomized clinical trial (United States of America)	A total of 2,665 MSM were recruited online in the United States. Participants were randomized to an intervention group ($n = 1,325$) and a control group ($n = 340$).	The intervention provided a package of HIV self-testing kits along with access to web-based educational resources and telephone counseling services as needed. Participants completed structured follow-up surveys at months 3, 6, 9, and 12. Counseling was delivered via telephone and online instructional videos, although the duration of counseling sessions was not specifically reported.	The intervention group demonstrated substantially higher HIVST uptake and acceptability, with a mean testing frequency of 5.29 tests compared with 1.50 tests in the control group and a significantly higher proportion of participants testing three or more times ($p < 0.001$).

Table A 2. Characteristics study (Cont.)

No	Author (year), study design, and country	Samples	Intervention type, duration/frequency, types of technology, and assessment tools	Outcomes
4.	Biello KB, et al., ³⁰ Randomized controlled trials of young men who have sex with men	Eighty male participants (MSM) were included.	The intervention used an mHealth platform (iOS/Android app) that enabled participants to order OraQuick HIV self-testing kits and a self-collection STI package (swab/serology) delivered to their homes. Reactive results were followed up with telephone counseling. Intervention evaluations were conducted at months 3 and 6 (counseling duration was not reported) using a combination of telephone, email, and instructional videos; outcomes were confirmed through laboratory dried blood spot testing and periodic online questionnaires.	Digital HIVST ordering services demonstrated high acceptability and uptake, as indicated by 65% of participants ordering a test, approximately 75% of those using HIVST at least once, and 87% reporting that the ordering feature was very helpful.
5.	Zhang C, et al., ³¹ A randomized controlled trial (China)	A total of 216 MSM participants were enrolled and allocated into two groups.	The intervention provided free HIVST kits, accompanied by counseling and interaction via the WeChat application, covering test-use instructions, result interpretation, electronic submission of result documentation, and guidance on follow-up in the event of a positive result. Participants received two kits at enrollment and an additional 2–4 kits every 3 months. Outcomes were assessed using questionnaires completed through an online platform.	Participants in the intervention group demonstrated substantially higher HIVST uptake, with an average testing frequency of 2.18 compared with 0.41 in the control group ($p < 0.001$).
6.	Cheng W, et al., ³⁷ Randomized controlled trial (China)	A total of 216 MSM participants were enrolled and allocated into two groups.	The intervention provided HIVST kits accompanied by SMS reminders every 3 months, an online tutorial video, and post-test counseling by a peer counselor via telephone. Testing was conducted at least once and was encouraged quarterly, supported through SMS, telephone, and online video. Outcomes were measured using a questionnaire covering demographic characteristics, sexual risk behaviors, HIV testing history, HIVST acceptability, and barriers to HIV testing.	The HIVST group showed higher uptake and more regular testing, with a testing proportion of 77.4% compared with 69.5% in the control group and greater odds of regular testing ($p < 0.05$).

Table A2. Characteristics study (Cont.)

No	Author (year), study design, and country	Samples	Intervention type, duration/frequency, types of technology, and assessment tools	Outcomes
7.	Zhu X, et al., ³⁵ Randomized controlled trial (China)	A total of 216 men who have sex with men (MSM) were recruited and assigned to two study groups.	The intervention consisted of digital counseling delivered via the WeTest group on the WeChat application, providing guidance on HIVST use, result interpretation, and education on HIV transmission and prevention. Participants received two oral HIVST kits at baseline and six-month follow-up. The intervention used the WeTest (WeChat-based) platform, and outcomes were assessed using questionnaires on demographic characteristics and photo uploads of HIVST results.	The intervention group was nearly twice as likely to undergo HIV testing as the control group ($p < 0.05$) and reported greater confidence in HIVST results ($p = 0.02$), reflecting increased uptake and trust in test accuracy.
8.	Wray TB, et al., ³² A pilot, randomized controlled trial (China)	A total of 65 MSM participants were allocated into three groups: the eTest group ($n = 21$), the standard group ($n = 21$), and the control group ($n = 22$).	The intervention provided HIVST kits equipped with a Bluetooth beacon linked to the eTEST application to detect kit opening. Within 24 hours, a counselor contacted the participants by telephone to provide post-test counseling, risk-reduction education, and referrals. The study lasted seven months, and outcomes were assessed using questionnaires on the frequency and location of HIV testing, test results, acceptability of counseling, and access to prevention resources and referral services.	HIV testing rates were significantly higher in the HIVST (eTEST) group than in the control group ($p = 0.001$), with approximately 4.4-fold higher odds of testing every 3 months ($p < 0.001$), indicating improved acceptability and uptake.
9.	Ortblad KF, et al., ³³ Randomized controlled trials (Uganda and Zambia)	The study included 965 participants in Zambia and 960 in Uganda, with each site randomly allowing participants to receive one of three interventions.	The intervention consisted of three online HIVST distribution models (direct delivery, coupon delivery, and standard of care) combined with four peer educator visits providing prevention counseling and HIV service information over 16 weeks. Data were collected using computer-assisted personal interviewing with a demographic questionnaire and an HIV risk scale.	HIVST acceptability was higher in the intervention groups, with participants more likely to choose HIVST than those receiving standard services ($p < 0.002$ in Zambia and $p < 0.001$ in Uganda).

Table A 2. Characteristics study (Cont.)

No	Author (year), study design, and country	Samples	Intervention type, duration/frequency, types of technology, and assessment tools	Outcomes
10.	Chan PS, et al., ³⁸ Cohort study (Hong Kong, China)	The study included 350 gay men in Hong Kong, divided into two groups: 228 new users of online HIV self-testing and 122 returning users who had previously used the service.	The intervention involved pre-test counseling via live chat, real-time supervised HIVST lasting approximately 20 minutes, followed by post-test counseling and psychological support for participants with positive results. Pre-test counseling lasted about 15 minutes, and post-test counseling approximately 15–25 minutes, delivered through a live chat application. Outcomes were assessed using telephone surveys, a Health Belief Model-based Perceptions Related to HIVST questionnaire, follow-up surveys, and log sheets.	A total of 48.3% of participants used HIVST-online, with higher acceptability among ever-users than new users ($p < 0.001$), indicating stronger uptake among those already familiar with the service.
11.	Phanuphak N, et al., ³⁹ Cohort study (Thailand)	A total of 564 participants were assigned to three groups: online ($n = 208$), offline ($n = 200$), and mixed modalities ($n = 156$).	Participants in the online intervention group received pre-test counseling and completed HIVST online; kits were delivered to their homes, and test use was guided in real time via video chat. The program lasted 12 months, with assessments at months 6 and 12, using smartphones and social media platforms (Facebook, LINE). Outcomes were measured using questionnaires covering demographic characteristics, HIV prevention knowledge, sexual risk behaviors, HIV testing history, HIVST acceptability, and barriers to testing.	Retention at months 6 and 12 was higher in the mixed and online models (up to approximately 80%) than in the offline model (around 48%). Among the 60 participants with reactive results, the highest proportion was observed in the online group (15.0%), followed by the offline group (13.0%) and the mixed group (3.4%).

Table A2. Characteristics study (Cont.)

No	Author (year), study design, and country	Samples	Intervention type, duration/frequency, types of technology, and assessment tools	Outcomes
12	Mshweshwe-Pakela NT, et al., ⁴⁰ Quasi-experimental study (South Africa)	A total of 2,267 respondents in Africa opted for digital HIV self-testing (HIVST).	The intervention provided HIVST services in a small booth (1 × 1 m) equipped with a tablet running the Aviro Pocket Clinic application and headphones. The application guided clients from registration and kit use to result interpretation, with a facilitator available to assist if needed. Each session lasted approximately 20–30 minutes, including the waiting time for results. The technologies used were a tablet (Aviro Pocket Clinic) and a mobile phone, and outcomes were recorded using clinic registers and application logs documenting the number of visits, client characteristics and demographics, test results, and care/ART status.	The number of HIV tests increased significantly from 14.5% to 19.9% ($p < 0.001$). Of 2,267 HIVSTs, 264 (11.6%) were reactive, with 230 cases confirmed positive; 150 participants (65%) initiated ART, and 80% of those started treatment within nine months, indicating reasonably good linkage to care.

Note. Keywords: Counseling; Digital Health; HIV Self-Testing; HIV Testing; Key Populations; Telemedicine

Table A3. JBI critical appraisal tool for assessing risk of bias for randomized controlled trials

No	Author/citation	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13
1	Zhu YY, et al. ³⁴	Yes	Yes	Yes	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
2	Wang Z, et al. ³⁶	Yes	Yes	Yes	No	U	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
3	Zhang C, et al. ³¹	Yes	Yes	Yes	No	No	Yes	N/A	Yes	Yes	Yes	Yes	Yes	Yes
4	MacGowan RJ, et al. ²⁹	Yes	Unclear	Yes	No	N/A	Yes	Unclear	Yes	Yes	Yes	Yes	Yes	Yes
5	Biello KB, et al. ³⁰	Yes	Yes	Yes	No	No	Yes	unclear	Yes	Yes	Yes	N/A	Yes	Yes
6	Cheng W, et al. ³⁷	Yes	Yes	Yes	No	No	Yes	N/A	Yes	Yes	Yes	Yes	Yes	Yes
7	Zhu X, et al. ³⁵	Yes	Unclear	Yes	No	No	Yes	N/A	Yes	Yes	Yes	Yes	Yes	Yes
8	Wray TB, et al. ³²	Yes	Yes	Yes	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
9	Ortblad KF, et al. ³³	Yes	Yes	Yes	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note. The percentage represents the proportion of items answered "Yes" out of the total 13 assessment questions.

Yes/No/Unclear and N/A = Non-applicable

Critical appraisal criteria for RCTs: Q1. Was true randomization used for assignment of participants to treatment groups? Q2. Was allocation to treatment groups concealed? Q3. Were treatment groups similar at the baseline? Q4. Were participants blind to treatment assignment? Q5. Were those delivering the treatment blind to treatment assignment? Q6. Were treatment groups treated identically other than the intervention of interest? Q7. Were outcome assessors blind to treatment assignment? Q8. Were outcomes measured in the same way for treatment groups? Q9. Were outcomes measured in a reliable way? Q10. Was follow up complete and if not, were differences between groups in terms of their follow up adequately described and analysed? Q11. Were participants analysed in the groups to which they were randomized? Q12. Was appropriate statistical analysis used? Q13. Was the trial design appropriate and any deviations from the standard RCT design (*individual randomization, parallel groups*) accounted for in the conduct and analysis of the trial?

Table A4. JBI critical appraisal checklist for cohort and quasi-experimental studies

No	Appraisal checklist cohort studies	38	39	Appraisal checklist quasi-experimental studies	40
1	Were the two groups similar and recruited from the same population?	Yes	Yes	Is it clear in the study what is the “cause” and what is the “effect” (i.e. there is no confusion about which variable comes first)?	Yes
2	Were the exposures measured similarly to assign people to both exposed and unexposed groups?	Yes	Yes	Was there a control group?	Yes
3	Was the exposure measured in a valid and reliable way?	Yes	Yes	Were participants included in any comparisons similar?	Unclear
4	Were confounding factors identified?	Yes	Yes	Were the participants included in any comparisons receiving similar treatment/care, other than the exposure or intervention of interest?	Yes
5	Were strategies to deal with confounding factors stated?	Yes	Yes	Were there multiple measurements of the outcome, both pre and post the intervention/exposure?	Yes
6	Were the groups/participants free of the outcome at the start of the study (or at the moment of exposure)?	Yes	Yes	Were the outcomes of participants included in any comparisons measured in the same way?	Yes
7	Were the outcomes measured in a valid and reliable way?	Yes	Yes	Were outcomes measured in a reliable way?	Yes
8	Was the follow up time reported and sufficient to be long enough for outcomes to occur?	Yes	Yes	Was follow-up complete and if not, were differences between groups in terms of their follow-up adequately described and analyzed?	Yes
9	Was follow up complete, and if not, were the reasons to loss to follow up described and explored?	Unclear	Unclear	Was appropriate statistical analysis used?	Yes
10	Were strategies to address incomplete follow up utilized?	Unclear	No		
11	Was appropriate statistical analysis used?	Yes	Yes		

Note. Yes/No/Unclear, and N/A = Non-applicable

Table A5. Assessment of study quality

Author, year	JBI critical appraisal checklist for randomized controlled trials, cohort studies, and quasi-experimental studies (%)	Quality evaluation
34	11/13 (84.6%)	Good quality
36	11/13 (84.6%)	Good quality
31	10/13 (76.9%)	Sufficient quality
29	9/13 (69.2%)	Sufficient quality
30	9/13 (69.2%)	Sufficient quality
37	9/13 (69.2%)	Sufficient quality
35	9/13 (69.2%)	Sufficient quality
32	10/13 (76.9%)	Sufficient quality
33	11/13 (84.6%)	Good quality
38	9/11 (81.8%)	Good quality
39	9/11 (81.8%)	Good quality
40	8/9 (88.8)	Good quality

Note. Good quality (80–100%), Sufficient quality (50–79%), Poor quality (< 50%)

การให้คำปรึกษาและบริการตรวจแบบดิจิทัลเพื่อเพิ่มการยอมรับการตรวจ เอชไอวีด้วยตนเองในกลุ่มประชากรหลัก : การทบทวนอย่างเป็นระบบ

Sudirman Efendi,* Sri Yona, Imami Nur Rachmawati, Elly Nurachmah, Aria Kekalih

บทคัดย่อ: กลุ่มประชากรหลักยังคงเผชิญกับการตีตราทางสังคม ความกังวลด้านความเป็นส่วนตัว และการเข้าถึงบริการตรวจเอชไอวีที่จำกัด การให้คำปรึกษาผ่านระบบดิจิทัลและการตรวจเอชไอวีด้วยตนเองจึงเป็นทางเลือกที่ปลอดภัยกว่า การทบทวนอย่างเป็นระบบครั้งนี้มีวัตถุประสงค์เพื่อสังเคราะห์หลักฐานเกี่ยวกับประสิทธิผลของบริการให้คำปรึกษาและการตรวจที่ใช้เทคโนโลยีเป็นฐานในการเพิ่มการยอมรับการตรวจด้วยตนเอง การเพิ่มอัตราการเข้ารับการตรวจในกลุ่มประชากรหลัก และการเชื่อมโยงเข้าสู่ระบบการดูแลรักษา การค้นหาวรรณกรรมดำเนินการระหว่างเดือนกรกฎาคม-กันยายน พ.ศ. 2568 ในฐานข้อมูล 5 แห่ง โดยคัดเลือกงานวิจัยที่ตีพิมพ์ระหว่างปี พ.ศ. 2560 ถึง 2567 ตามแนวทางของโปรโตคอล PRISMA การทบทวนนี้ได้ลงทะเบียนกับ PROSPERO (CRD420251084235) เกณฑ์การคัดเลือกประกอบด้วยกลุ่มประชากรหลักที่เป็นผู้ใหญ่ซึ่งได้รับการช่วยเหลือผ่านเทคโนโลยี ในการศึกษาประเภทการทดลองแบบสุ่มและมีกลุ่มควบคุม (randomised controlled trials) การศึกษาแบบกลุ่มตัวอย่างตามระยะเวลา (cohort) หรือการทดลองกึ่งทดลอง (quasi-experimental) ที่รายงานผลลัพธ์เกี่ยวกับการยอมรับการตรวจ การเข้ารับการตรวจ และ/หรือการเชื่อมโยงเข้าสู่การดูแลรักษา การประเมินความเสี่ยงของอคติใช้เครื่องมือของ Joanna Briggs Institute และสังเคราะห์ผลลัพธ์ด้วยวิธีการบรรยาย

มีการคัดเลือกรายงานวิจัยจำนวน 12 การศึกษาจากประเทศที่มีรายได้ปานกลางและรายได้สูง รวมผู้เข้าร่วมทั้งสิ้น 8,328 คน ผลการศึกษาแสดงให้เห็นว่าการบริการที่มีประสิทธิผลมากที่สุดอย่างสม่ำเสมอคือ รูปแบบที่ผสมผสานการตรวจเอชไอวีด้วยตนเองเข้ากับการให้คำปรึกษาดิจิทัลแบบมีโครงสร้าง ซึ่งรวมถึงการให้ความรู้ก่อนและหลังการตรวจ รวมถึงระบบส่งต่อไปยังบริการด้านสุขภาพโดยตรง บริการเหล่านี้ช่วยเพิ่มความถี่ของการตรวจเอชไอวีเมื่อเทียบกับการดูแลมาตรฐาน ได้รับการยอมรับในระดับดี และสามารถเข้าถึงผู้ที่ตรวจเป็นครั้งแรกได้จำนวนมาก อย่างไรก็ตาม ยังมีความท้าทายบางประการ เช่น ความเหลื่อมล้ำในการเข้าถึงเทคโนโลยีดิจิทัล ความยั่งยืนของการจัดหาชุดตรวจด้วยตนเอง และความแตกต่างขององค์ประกอบการช่วยเหลือในบริบทนี้ พยาบาลมีบทบาทสำคัญในฐานะผู้นำทางการดูแลสุขภาพดิจิทัล โดยให้คำปรึกษาก่อนและหลังการตรวจผ่านแพลตฟอร์มบนสมาร์ตโฟน เช่น แอปพลิเคชันที่ใช้กันอย่างแพร่หลายอย่าง WeChat พร้อมทั้งส่งเสริมความรู้ด้านสุขภาพดิจิทัล แก่ผู้เชี่ยวชาญทางเทคนิค และประสานงานการส่งต่อเพื่อการตรวจยืนยันผล

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คำสำคัญ: การให้คำปรึกษา สุขภาพดิจิทัล การตรวจเอชไอวีด้วยตนเอง การตรวจเอชไอวี
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