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Identifying effective strategies for improving engagement in HIV prevention and care among transgender persons in the United States: A systematic review

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Abstract

This systematic review synthesized published literature (2000 – 2023) to identify HIV interventions specifically designed for transgender persons in the United States (PROSPERO registration number: CRD42021256460). The review also summarized strategies for improving outcomes related to the four pillars of the Ending the HIV Epidemic (EHE) initiative in the United States: Diagnose, Treat, Prevent, and Respond. A comprehensive search was conducted using the Centers for Disease Control and Prevention’s HIV Prevention Research Synthesis Project database, which included over 120,000 citations from routine systematic searches in CINAHL, EMBASE, Global Health, MEDLINE, PsycInfo, and Sociological Abstracts. Of 23 interventions that met inclusion criteria, 94% focused on transgender women of color and 22% focused on young transgender persons aged 15–29 years old. Most interventions focused on Treat or Prevent, few focused on Diagnosis, and none focused on Respond. Twenty interventions (87%) showed improvement in at least one EHE related outcome and a quarter of these effective interventions were tested with randomized controlled trials. Common strategies observed in effective interventions include the following: engaging the community in intervention development; pilot-testing with the focus population to ensure appropriateness and acceptability; addressing social determinants of health (e.g. stigma, discrimination, violence) through empowerment and gender-affirming approaches; increasing access to care, prevention, and services through co-location and one-stop shop models; and utilizing peer-led counseling, education, support, and navigation. Continuous effort is needed in addressing gaps, including more research for transgender men and rural settings and for how best to adopt and adapt best practices for subgroups of transgender population.

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Resumen

Esta revisión sistemática sintetizó la literatura publicada (2000 – 2023) para identificar intervenciones relacionadas con el VIH diseñadas específicamente para personas transgénero en los Estados Unidos y resumió las estrategias para mejorar los resultados relacionados con los cuatro pilares de la iniciativa Poner fin a la Epidemia del VIH (EHE por sus siglas en inglés). Diagnosticar, Tratar, Prevenir y Responder. Este protocolo de estudio se registró en PROSPERO (CRD42022364101). Se realizó una búsqueda exhaustiva utilizando la base de datos del Proyecto de Síntesis de Investigación sobre Prevención del VIH de los Centros para el Control y la Prevención de Enfermedades, que incluyó más de 120.000 citas de búsquedas sistemáticas de rutina en CINAHL, EMBASE, Global Health, MEDLINE, PsycInfo y Sociological Abstracts. De las 23 intervenciones que cumplieron con los criterios de inclusión, el 94% se centró en mujeres transgénero de color y el 22% se centró en personas transgénero jóvenes de entre 15 y 29 años. La mayoría de las intervenciones se centraron en los pilares Tratar o Prevenir, pocas se centraron en el pilar de Diagnóstico y ninguna se centró en el pilar de Responder. Veinte intervenciones (87%) mostraron una mejora en al menos un resultado relacionado con la EHE; una cuarta parte de estas intervenciones efectivas se probaron con ensayos controlados aleatorios. Las intervenciones efectivas en todos los pilares compartían características comunes, como la participación de la comunidad en el desarrollo de la intervención; la realización de pruebas piloto con la población objetivo para garantizar la idoneidad y la aceptabilidad; el abordaje de los determinantes sociales de la salud (p.e., el estigma, la discriminación, la violencia, los problemas legales, la vulnerabilidad económica, la vivienda, el transporte, la alimentación) mediante enfoques de empoderamiento y afirmación de género; el aumento del acceso a la atención, la prevención y el servicio (p.e., Mediante la co-ubicación, y el sistema de ventanilla única); y el uso de asesoramiento, educación, apoyo y orientación dirigidos por pares. Se necesita un esfuerzo continuo para abordar las brechas, incluida una mayor investigación para los hombres transgénero y los entornos rurales y para determinar cuál es la mejor manera de adoptar y adaptar las mejores prácticas para los subgrupos de la población transgénero.

Keywords

Evidence-based interventions; HIV care; HIV prevention; Pre-exposure prophylaxis; Systematic review; Transgender persons

Keywords

Intervenciones basadas en evidencia; Cuidado del VIH; Prevención del VIH; profilaxis pre-exposición; Revisión sistemática; Personas transgénero

Introduction

Transgender persons are disproportionately affected by HIV and endure stark disparities in health outcomes [1–6]. It is estimated 1.6 million people aged 13 years and older are identified as transgender in the United States [7], while transgender persons accounted for approximately 2.3% of 35,769 reported HIV diagnoses in the United States in 2021 [8]. A recent survey conducted by the Centers for Disease Control and Prevention's (CDC's)

National HIV Behavioral Surveillance (NHBS) shows that 42% of transgender women interviewed tested positive for HIV, including 62% of Black/African American transgender women, 35% of Hispanic/Latina transgender women, and 17% of White transgender women [9]. The high prevalence of HIV, especially among transgender women of color, highlights the importance of addressing individual, sociocultural, and structural barriers that hinder engagement in HIV prevention and care among transgender persons. Various factors contribute to individual, interpersonal, and structural vulnerabilities to HIV among transgender persons, including mental health, violence, victimization, poverty, substance use, incarceration, intersectional stigma, discrimination, lack of access to health care and services, and distrust of or maltreatment by healthcare institutions [10–13].

A systematic review of HIV prevention intervention evaluation studies that address identified barriers is needed for detecting effective strategies that reduce HIV transmission and improve HIV prevention and care outcomes among transgender persons. Poteat et al. [10] reviewed the studies published between 2005 and 2017 and concluded that there was a lack of evidence-based HIV interventions for transgender people. A recently published topical review by Goldhammer et al. [2] focused on HIV care continuum interventions for transgender women with HIV from January 2010 to June 2020. Additional HIV prevention interventions for transgender persons have been evaluated and published since the publication of the two reviews. We expanded the scope of previously published reviews [2,12] by identifying interventions for transgender people related to the four pillars (also known as strategies) in the Ending the HIV Epidemic in the U.S. (EHE) initiative (<https://www.cdc.gov/ehe/php/about/goals.html>):

- Diagnose: interventions to increase HIV testing and status awareness
- Treat: interventions to increase linkage to and retention in HIV care, medication adherence, and viral suppression among persons with HIV
- Prevent: interventions to increase use of proven effective prevention strategies, including PrEP and syringe services programs
- Respond: interventions to increase responses to potential HIV outbreaks and provide vital prevention and treatment services to transgender persons

Additionally, we summarized effective strategies for improving EHE outcomes, identified gaps in the literature and suggested future directions for intervention and programmatic efforts for transgender persons in the United States.

Methods

Database Searches

The reporting of this review follows the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement [14,15]. The study protocol was registered in the International Prospective Register of Systematic Reviews (PROSPERO 2022 CRD42022364101). We conducted a comprehensive search of the CDC's HIV Prevention Research Synthesis (PRS) Project cumulative database that contains citations from 5 automated annual searches with supplemental manual searches focused on (1)

behavioral risk reduction; (2) medication adherence; (3) linkage to, retention in, and re-engagement in HIV care; (4) pre-exposure prophylaxis (PrEP) and (5) systematic reviews. The automated searches include the databases (platforms) MEDLINE (OVID), EMBASE (OVID), CINAHL (EBSCOhost), Global Health (OVID), PsycInfo (OVID), and Sociological Abstracts (ProQuest). All the searches were tested and developed in MEDLINE and the indexing terms were translated for the other databases. The MEDLINE search for each of the 5 automated searches and the manual search with full list of terms are shared in Supplemental Information. Librarians with experience developing and conducting comprehensive systematic searches routinely update the PRS database through electronic searches and manual checks (i.e., journals, reference lists, listservs) of the literature. Every citation added to the PRS database undergoes a base level of coding to classify the study population, prevention focus and label key outcomes to facilitate retrieval. The PRS database contains over 120,000 citations published from 1988 to present. For this review, a librarian performed searches on the coding conducted by team members related to transgender persons from 2000–2023, with the last search of the coding completed in December 2023 (see Supplemental Information for coding search). Citations identified through searches were exported to DistillerSR (a systematic review software, Evidence Partners, Ottawa, Canada) for screening, coding, and data abstraction.

A supplemental search was conducted in the NIH's RePORTER (RePORT Expenditures and Results) database to locate federal agency funded research and publications in progress. Search terms used in the database included the terms transgender HIV intervention, transgender HIV equity, and trans HIV intervention. The search of RePORTER was conducted in February 2023.

Inclusion criteria—Inclusion criteria for this systematic review are the following: (1) U.S.-based HIV intervention studies pre-published or published in English between 2000–2023; (2) specifically designed for transgender persons or provided stratified analysis by transgender persons; (3) included comparisons between groups (randomized or non-randomized) or pre-post; (4) reported relevant outcomes related to the four EHE pillars – diagnose, treat, prevent, and respond. More specifically, relevant outcomes for each of four EHE pillars include:

- Diagnose: HIV testing, including HIV self-test (based on a laboratory test result, surveillance data or self-report testing status)
- Treat: linkage to care, retention in care, ART initiation, medication adherence, viral suppression
- Prevent: PrEP outcomes (e.g., screening for PrEP eligibility and referring to PrEP services, PrEP initiation/uptake, PrEP use, PrEP medication adherence or persistence, PrEP drug levels); availability, use, and access to syringe exchange program; reduction in condomless sex or number of sex partners; reduction in sexual transmitted infection (STI); reduction in injection drug use
- Respond: detection and response to HIV clusters or outbreaks

For comprehensiveness, we accepted author's definitions of outcomes listed above.

Screening and Coding Procedures

All screening, coding and data abstraction forms were pilot tested and revised as necessary. First, a reviewer screened the citations by title and abstract to identify relevant reports based on inclusion criteria. Citations excluded by the first reviewer were verified by a second reviewer. Second, two reviewers independently reviewed the full text of relevant reports to confirm the eligibility of the studies for the systematic review. Third, for eligible studies, two reviewers independently abstracted data using a standard coding and data abstraction form. Disagreements in coding were resolved through discussion. If the two reviewers failed to reach agreement, a third reviewer resolved the discrepancy.

For each intervention study, risk of bias was assessed by using the Version 2 of the Cochrane risk-of-bias tool for randomization trials (RoB 2) (<https://www.riskofbias.info/welcome/rob-2-0-tool>) or the Modified New Castle-Ottawa for assessing risk of bias in non-randomized studies of interventions, including one-group pre and post design (Supplemental Information).

We qualitatively summarized findings reported by the authors of the intervention studies.

Results

We screened 460 relevant titles and abstracts; 122 were selected for the full-report review. Twenty-three unique interventions met inclusion criteria (Figure 1) [16–38]. Table 1 summarizes study, participant, intervention, and finding(s). The common study locations were San Francisco, Oakland, and Alameda county, California; [17,24,27,32,33,38] Los Angeles and Hollywood, California [17,18,21,34]; New York City and Brooklyn, New York [19,22,29,36]; Chicago, Illinois [16,23,30,31]; and Boston, Massachusetts [31,35]. The earliest publication date was 2005 [28,32]; eight studies were published between 2011 and 2020; more than half of the studies ($n = 13$, 57%) were published since 2021. Six interventions (26%) were tested in randomized controlled trials [16–18,31,33,37] and the remaining 17 (74%) with 1-group pre-post design. The sample size ranged from 17 to 514 with a median of 114. All studies were rated as some concern on the risk of bias scale, primarily due to comparability of groups or before-and-after intervention cohorts and self-report of outcome measures.

Of 23 interventions, 18 interventions (78%) were specifically focused on transgender women and the majority of study participants were Black and Hispanic/Latina persons. Five interventions were designed for young transgender persons aged between 15 and 29 years old, including three for women [19,30,31], one for transgender men [35], and one for both transgender men and women [16]. There was only one intervention specifically designed for transgender men [35]. The majority of interventions were theory-based (91%), developed using community engagement (87%), were pilot-tested with the focus population to ensure appropriateness and acceptability (87%), addressed at least one social determinants of health (e.g., stigma, discrimination, violence, economic vulnerability, legal issues, housing, transportation, 87%), were delivered by transgender peers (83%), included cognitive, behavioral, skill building, and coping components (83%), promoted empowerment and gender affirmation (70%), provided trans-specific care and services (e.g.,

gender-affirming medical care, drop-in center/safe place, legal issues related to gender identity, 70%), and increased HIV prevention services (e.g., PrEP, needle exchange) or access to care and ancillary services (e.g., housing, food, clothing, transportation, 70%). Of the 23 interventions, 20 interventions (87%) reported improvement on at least one EHE related outcome. One shared characteristic of the three interventions with a null result was that the interventions were not delivered by transgender peers (Table 2) [18,29,35].

The majority of interventions were focused on either the Treat (11 studies, 48%) or Prevent (11 studies, 48%) pillar. No study was found for the Respond pillar. Below, we summarized intervention findings within each EHE pillar and highlighted upcoming studies we found in RePORTER (Table 3) [39–49].

Diagnose Pillar

We identified one RCT that tested the feasibility of a telehealth intervention (Table 1), Project Moxie, for transgender youth aged 15–24 years [16]. This intervention provided home-based HIV self-testing coupled with gender-affirming counseling via video chat [16]. All of the participants in the intervention and control (home-based HIV self-testing only) groups ordered HIV self-testing kits. The result showed 96% of intervention participants performed an HIV self-test during the counseling session and 91% of control participants reported their HIV test results via study portal (no statistical test reported). At 3-month follow-up, intervention participants were more likely to test for STIs than control participants.

An upcoming RCT study called Shine is testing feasibility and effectiveness of a culturally-tailored, theoretically-driven mHealth intervention that is designed to reduce unique barriers that Black transgender women face (Table 3) [39]. Text messages will be guided by the Information-Motivation-Behavioral Skills Model and Model of Gender Affirmation and tailored to the user's HIV status to empower Black transgender women for improving HIV testing, prevention and treatment outcomes [39] (Leaf, project number: 5R44MH117837).

Treat Pillar

All of the 11 “Treat Pillar” interventions were focused on transgender women of color [17–19,21–27]. Two interventions were examined with RCTs [17,18]. Healthy Divas [17] is a peer-led intervention that supports transgender women with HIV by increasing healthcare empowerment with a gender-specific and gender-affirming approach. At 6-month follow-up, Healthy Divas participants were more likely to be in a higher HIV care engagement category than control participants. Another RCT, Text Me, Girl!, is a transgender-specific text-messaging intervention where participants received scripted messages that were culturally tailored and personalized [18]. There were no differences between the intervention and delayed control participants on HIV care visits, currently on ART, ART adherence, and viral suppression. However, exposure to the Text Me, Girl! intervention was associated with increases in retention in HIV care and viral suppression.

The remaining nine interventions (INFINI-T, TransActivate, T.W.E.E.T., TransLife care, Princess Project, Alexis Project, Howard Brown Center, TransAccess, and Brandy Martell Project) [19–27] were demonstration projects funded by the Health Resources and

Service Administration's (HRSA) Special Programs of National Significance (SPNS) and were examined with 1-group pre-post study design. While intervention contents varied across studies, all worked with local transgender communities to develop and implement innovative, theory-based, culturally appropriate interventions for transgender women of color living with HIV. All nine interventions conducted outreach to engage transgender women of color, engaged transgender women to deliver the interventions, and addressed at least one social determinant of health (e.g., stigma, access). The majority offered co-location of HIV care, gender-affirming care, and services to address structural barriers to access. All nine interventions showed improvement on viral suppression. Additionally, three interventions (TransActivate, T.W.E.E.T., and Howard Brown Center) [21,22,26] showed improvement on all four "treat" outcomes (i.e., care engagement, ART prescription, retention in care, viral suppression) at 12-month and/or 24-month post intervention follow-up (Table 1).

We did not identify additional upcoming interventions specifically designed for the Treat pillar in RePORTER, except for the mHealth intervention called "Shine," which addresses elements across the entire HIV care continuum (Leaf, project number: 5R44MH117837) [39].

Prevent Pillar

Of the 11 "Prevent Pillar" interventions, nine were specifically focused on sex and drug risk reduction [28–36] and two were focused on PrEP [37,38]. Of the nine risk reduction interventions, Project Life Skills and Couple HIV Intervention Program (CHIP) were examined in RCTs [31,33]. Project Life Skills Intervention is a peer-led, group-level intervention that addressed specific structural, developmental, and interpersonal challenges to sexual safety among young transgender women aged 16–29 years. Through an empowerment-based approach, participants learned HIV risk information and developed motivation and life skills to protect themselves. At the 4-month follow-up, Life Skills participants reported a greater reduction in condomless sex acts and mean number of sex partners than standard-of-care participants. Another RCT was the CHIP study where transgender women and their male partners received individual and couple counseling on sexual transmission of HIV/STIs, condom use, HIV testing, and effective partner communication. At the 3-month post-baseline follow-up, intervention couples reported a greater reduction in condomless sex with primary partners, having any casual partners, and the number of casual sex partners than comparison participants who received general HIV prevention.

The other seven risk reduction interventions were evaluated with 1-group pre-post designs [28–30,32,34–36]. Five interventions [28,30,32,34,36] (All Gender Health, Life Skills, TRANS, TransAction, Girlfriends) demonstrated a reduction in sexual risk (e.g., reduced number of sex partners, condomless sex) and common intervention characteristics included community engagement in intervention development, pilot-testing with focus population, at least one SDH addressed, peer delivered, transgender-specific services, empowerment and gender affirmation, and cognitive, behavioral, skill building, and coping components.

Two risk reduction interventions that were an adaptation of evidence-based interventions showed null results [29,35]. Healing Our Women (HOW) for Transgender Women is an adaptation of a group-level HIV risk-reduction intervention developed to address the role of sexual victimization in HIV risk and protective behaviors [29]. Life Skills for Men (LS4M), an adaptation of LifeSkills for transgender women, is a group-level intervention for young transgender men aged 18–29 years that was focused on identity recognition and affirmation, communication and partner negotiation, knowledge and skill building on sexual safety, sexual health prevention, and HIV/STIs [35]. Both interventions were conducted with a small number of participants (21 in HOW for Transgender women; 17 in LS4M).

Two Prevent pillar interventions were specifically focused on PrEP use. *Chicas Creando Acceso a la Salud* or Girls Creating Access to Health (*ChiCAS*) is a Spanish-language, group- and empowerment-based intervention delivered by peers [37]. *ChiCAS* helped participants develop knowledge and skills to seek and obtain PrEP and hormone therapy and build supportive relationships and sense of community. The result of a RCT showed that participants receiving *ChiCAS* were more likely to report current PrEP use than participants in the delayed control group at 6 months post intervention. Trans Research-Informed Communities United in Mobilization for the Prevention of HIV (TRIUMPH) is a community-led, transgender specific PrEP demonstration project [38]. Trained peer educators provided PrEP navigation, education and support and other needed services (e.g., legal service for name changes, asylum procedures, mental health, transportation) that addressed social determinants of health. Trans-specific PrEP and hormone clinics are held at drop-in clinics, providing PrEP adherence support with empowerment approaches. Monthly interactive social groups focus on trans health-related topics and includes culturally relevant elements to trans Latina participants, such as food, music, and topics related to immigration. At enrollment, 4% of TRIUMPH participants were on PrEP; 88% initiated PrEP during the study (no statistical test provided). PrEP uptake rate was 91% among transgender women, 96% among transgender men, and 70% among nonbinary participants.

From the RePORTER search, we identified 10 upcoming risk reduction interventions (Table 3): Peer-delivered Culturally, Developmentally and Gender-affirmative Intervention for transgender women [40]; Integrated Microeconomic Intervention for economically disadvantaged transgender women [41]; MyPEEPS Mobile for young transgender men aged 15–19 years old [42]; LifeSkills Mobile for young transgender women [43]; Tcher, Take Charge Intervention for transgender women in the deep South [44]; Sisters Influencing Sisters: Peer-led Messaging using Social Media Influencers for transgender women [45]; Peer-coaching Intervention for Latina transgender women in the Washington DC metropolitan area [46]; Culturally, Developmentally, and Gender-affirmative Intervention for transgender youth aged 15–24 years [47]; PrEP N’ Shine: Peer-led, Strength-based Case Management for transgender women [48]; and Digitally Delivered Peer-based Strategies for transgender men who have sex with men in residing in high HIV incidence geographic hotspots in the Eastern and Southern U.S [49]. While focus populations and intervention components vary across studies, all of them were built on community-based participatory research principles and were theory-based. Of the 10 interventions, six focused on PrEP, three on sex or drug risk reduction, and one on both. Nine out of the 10 interventions will be examined with RCTs to determine intervention efficacy, including testing four

digital delivered mhealth interventions (MyPEEPS Mobile; LifeSkills Mobile; Tcher, Take Charge Intervention; Digitally Delivered Peer-based Strategies) [42–44,49]. Four of the upcoming interventions are adaptations of previously developed interventions (some were evidence-based, such as LifeSkills) [43].

Respond Pillar

There were no intervention studies designed for improving response to potential HIV outbreaks or clusters.

Discussion

This systematic review identified 23 interventions from the published literature that are specifically designed for transgender persons, with over half published after 2021. Approximately 94% of these interventions are for transgender women of color, a group that is disproportionately affected by HIV due to individual, socio-cultural and structural barriers to prevention, care, and services. We also located 11 upcoming interventions from RePORTER. The spike in the number of interventions for transgender women, especially for transgender women of color in the recent years is evidence that an increasing effort is being made to address health disparities among this population.

While research on transgender women's health and HIV prevention continues to accumulate, a key research gap remains – a significant dearth of intervention studies for transgender men [2,10]. Additionally, only four of the assessed interventions were *not* located in urban places, with one study not reporting location. This highlights the need for interventions to reach less-resourced transgender communities in rural settings, a population that might experience even more ostracization and restriction to healthcare access. Moreover, there needs to be a concerted effort examining understudied areas including developing and testing interventions specifically designed for increasing HIV testing and HIV status awareness (Diagnose pillar) and for increasing responses to potential HIV outbreaks and clusters (Respond pillar).

One encouraging finding from this systematic review is that 20 of the 23 interventions showed improvement in at least one EHE related outcome. A quarter of these effective interventions were tested with RCTs and often related to the Prevent pillar. Our search of RePORTER identified 10 upcoming “Prevent pillar” interventions for transgender persons. It is exciting that nine of the 10 interventions will be tested with a more rigorous study design (i.e., RCT), including 6 RCTs focused on PrEP use. The majority of effective interventions (nine out of 10) for the Treat pillar were tested with 1-group pre-post study design. We did not identify additional “Treat pillar” interventions from our RePORTER search, pointing out the need of more rigorous studies with RCT for this area.

Two welcoming developments are on the way. First, four adaptation studies of evidence-based interventions are in the pipeline. Given that two adaptation studies of risk reduction interventions included in our systematic review (HOW For Transgender Women; LS4M) did not show an intervention effect, these forthcoming studies will shed light on the efficacy of adapted interventions. Second, four m-health interventions are on the way (MyPEEPS

Mobile; LifeSkills Mobile; Tcher, Take Charge Intervention; Digitally Delivered Peer-based Strategies), including three RCTs that test digitally delivered versions of adapted evidence-based interventions. Additionally, the findings from the transgender women area in the HRSA funded E2i project (i.e., “Using Evidence-Informed Interventions to Improve Health Outcomes Among People Living With HIV”) are currently in the final stages of completion [50–52]. These results will contribute significantly to our understanding of innovative implementation approaches aimed at expediting the effective intervention strategies in HIV service organizations.

Consistent with the cross-cutting themes identified by Goldhammer et al.’s review [2], the shared characteristics of effective interventions identified in this systematic review include engaging community in intervention development; pilot-testing with focus population to ensure appropriateness and acceptability; addressing social determinants of health (e.g., stigma, discrimination, violence, legal issues, economic vulnerability, housing, transportation, food) through empowerment and gender-affirming approaches; increasing access to care, prevention and service (e.g., through co-location, one-stop shop); utilizing peer-led counseling, education, support, and navigation. Our review findings also support the recommendations by Poteat et al. (2017) [10] for implementing transgender-specific interventions with skilled facilitators, preferably individuals of transgender experience; addressing community-identified needs related to social and medical gender affirmation; and concurrently addressing health, psychosocial, economic, and legal needs of transgender persons.

Some limitations warrant comment. First, we identified and synthesized studies that are pre-published or published between 2010 and 2023 in peer-reviewed journals and may miss studies that are not available in the published domain. Second, we searched the NIH’s RePORTER to locate federal agency funded research and publications in progress. Other potentially relevant studies that are in progress and not funded by federal agencies may be missed. Third, all the interventions consisted of multiple components, making it impossible to identify specific intervention components and strategies that directly contributed to intervention effect. We addressed this commonly encountered challenge with a qualitative synthesis where we identified the shared characteristics across effective interventions.

Despite the limitations, this systematic review provides a comprehensive synthesis of interventions specifically designed for transgender persons that are available in the published literature and interventions in progress that were funded by federal agencies through a search of RePORTER database. The findings of this systematic review suggest that most of the recent interventions have incorporated effective strategies that address individual, sociocultural, and structural barriers to improve HIV prevention and care outcomes among transgender women. To make progress towards the EHE goals, continuous effort is needed in addressing identified gaps: more research is needed for transgender men and rural settings, and for addressing related outcomes in the Diagnose and Respond pillars. More rigorous studies are also needed to explore how to effectively implement “Treat” and “Prevent” interventions, especially how best to adopt and adapt evidence-based interventions for subgroups of transgender population and implement them with technology (e.g., mobile,

digital delivery). Addressing the gaps identified in this review will help to decrease HIV-related disparities for transgender persons in the United States.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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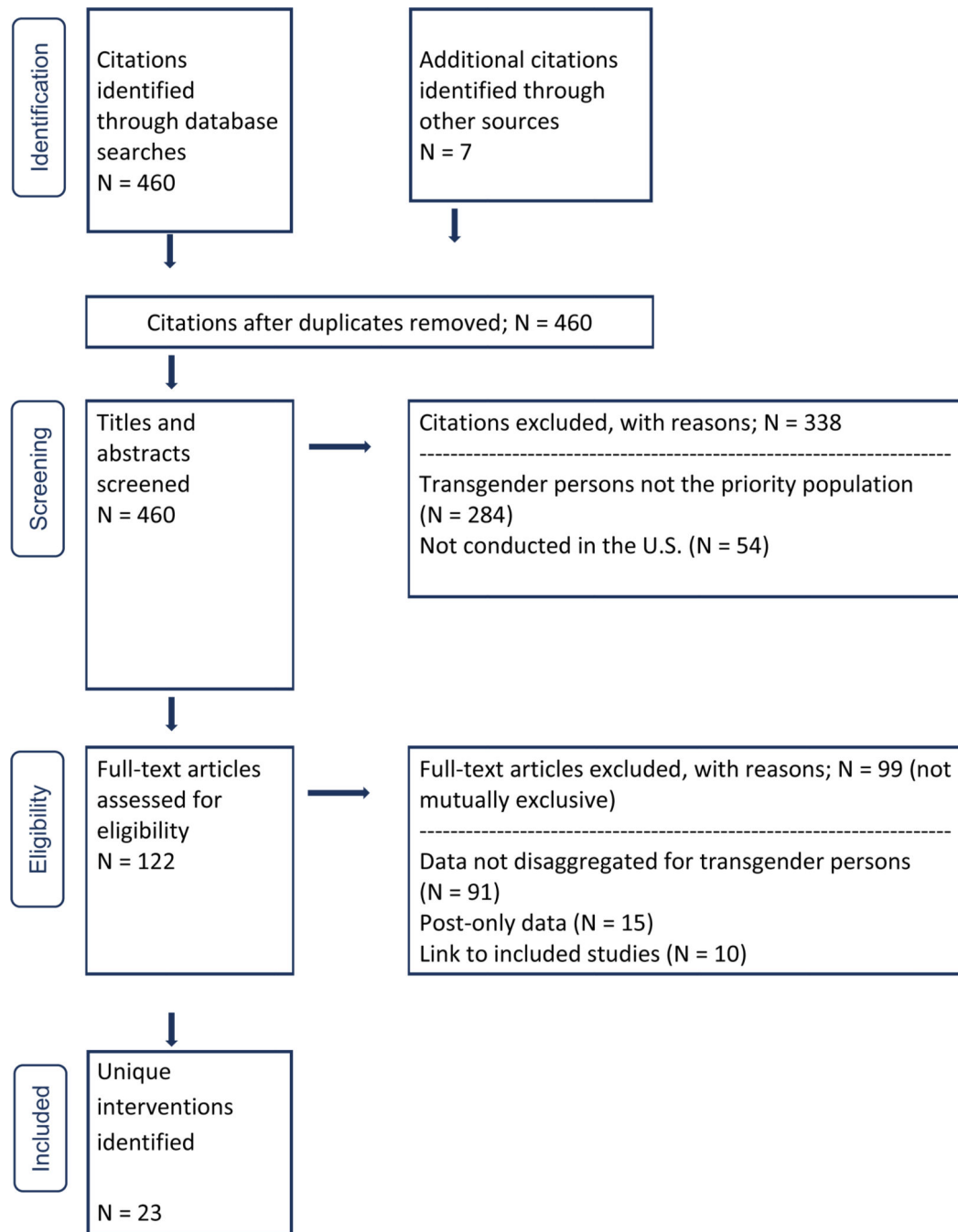


Figure 1. PRISMA Study Flow Diagram

Table 1.

Study, Participant, Intervention, and Findings of 23 Interventions for Transgender Persons

First Author, Year Intervention Name Pillar	Study Sample Study Design Study Location	Brief Intervention DescriptionKey Strategies Theory or Foundation	Intervention Effect
Stephenson, 2020 ¹⁶ Project Moxie Diagnose Prevent (PrEP, sex risk) <i>Study period: 2017–2019</i>	201 Transgender youth aged 15–24 years 67% White 33% other race/ ethnicity Majority age 21–24 Randomized control trial Michigan <i>Risk of Bias: some concern</i>	Project Moxie is a telehealth intervention providing home-based HIV self-testing and gender-affirming counseling using motivational interviewing via video chat. <i>Motivational Enhancement Theory</i>	Yes on STI testing At 3-month follow-up, intervention participants were more likely to test for STIs than control participants (72.5% vs. 42.9%, $p = 0.001$).
Sevelius, 2022 ¹⁷ Healthy Divas* Treat <i>Study period: 2016–2019</i>	278 Transgender women with HIV 45% Black 33% Hispanic/Latina 15% Other race/ethnicity 7% White Median age = 43 years Randomized control trial San Francisco and Los Angeles, CA <i>Risk of Bias: some concern</i>	Healthy Divas uses peer facilitators to support transgender women with HIV in improving their health outcomes by increasing healthcare empowerment with a gender-specific and gender-affirming approach. It consists of 6 peer-led individual sessions and one group workshop, all focused on HIV and gender-affirming care and culturally appropriate services. <i>Health Care Empowerment; Gender Affirmation</i>	Yes on care engagement At 6-month follow-up, intervention participants were more likely to be in a higher HIV care engagement category (based on self-reported HIV care engagement) than control participants (adjusted OR = 2.17, 95% CI: 1.06, 4.45).
Reback, 2021 ¹⁸ Text Me, Girl! Treat <i>Study period: 2016–2018</i>	134 young adult Transgender women with HIV aged 18–34 years 43% Hispanic/Latina 40% Black 17% Other race/ethnicity Mean age = 29 years Randomized control trial Study location not reported <i>Risk of Bias: some concern</i>	Text Me, Girl! is a theory-based, trans-specific text-messaging intervention. Participants received 270 scripted messages that were tailored (i.e., culturally responsive content in verbiage, language, slang) and personalized (i.e., participants' ability to customize their delivery time frame and platform). Each text message corresponds to a placement along the HIV care continuum: HIV positivity/physical and emotional health, linkage/retention in HIV care, and ART adherence/viral suppression. <i>Social Support Theory; Social Cognitive Theory; Health Belief Model</i>	No No differences between the intervention and delayed comparison arms on HIV care visit, currently on ART, ART adherence, viral suppression outcomes. Exposure to the Text Me, Girl! intervention was associated with an increase in retention in HIV care and viral suppression.
Eastwood, 2021; ¹⁹ Rebchook, 2022 ²⁰ INFINI-T (HRSa SPNS) Treat <i>Study period: 2013–2017</i>	32 Young transgender women of color with HIV 48% Black 48% Hispanic/Latina Mean age = 24 years 1-group pre-post Brooklyn, New York City <i>Risk of Bias: some concern</i>	INFINI-T is a multidisciplinary HIV care intervention designed to reduce the burden of psychosocial factors for transgender young women of color with HIV through outreach, HIV counseling and testing, social work for screening and referrals, case management, peer advocacy to facilitate linkage to and retention in HIV care, referrals to mental health, substance use, and medical services, and a psychoeducational group session. <i>Singer's Syndemics Theory</i>	Yes on care engagement, retention in care and viral suppression (VS) At 12-month follow-up, improved engagement in care: OR = 1.49 (95% CI: 1.15, 1.93), retention in care: OR = 11.93 (95% CI: 2.58, 55.20), VS: OR = 2.39 (95% CI: 1.03, 5.51). At 24-month follow-up, improved engagement in care: OR = 1.52 (95% CI = 1.08, 2.13) and retention in care: OR = 24.98 (95% CI = 3.22, 193.47).

First Author, Year Intervention Name Pillar	Study Sample Study Design Study Location	Brief Intervention DescriptionKey Strategies <i>Theory or Foundation</i>	Intervention Effect
Galvan, 2021; ²¹ Rebchook, 2022 ²⁰ TransActivate (HRSA SPNS) Treat <i>Study period: 2014–2016</i>	150 Latina transgender women with HIV 100% Latina Mean age = 44 years 1-group pre-post Los Angeles, CA <i>Risk of Bias: some concern</i>	TransActivate uses peer outreach, social networking testing, mobile testing and peer navigation to reach and guide clients through Los Angeles' complex medical system and ensure engagement, re-engagement and retention in HIV care among Latina transgender women with HIV <i>Trans Theoretical Model; Strengths-based perspective</i>	Yes on care engagement, ART prescription, retention in care and viral suppression (VS) At 12-month follow-up, improved engagement in care: OR = 2.31 (95% CI: 1.64, 3.24), ART prescription: OR = 1.60 (95% CI: 1.22, 2.10), retention in care: OR = 1.70 (95% CI: 1.08, 2.68), and VS: OR = 1.43 (95% CI: 1.09, 1.87). At 24-month follow-up, improved engagement in care: OR = 3.23 (95% CI: 2.06, 5.04), ART prescription: OR = 1.48 (95% CI: 1.05, 2.09), retention in care: OR = 2.07 (95% CI: 1.14, 3.77), and VS: OR = 1.56 (95% CI: 1.07, 2.26).
Hinsfield, 2021; ²² Rebchook, 2022 ²⁰ T.W.E.E.T (HRSA SPNS) Treat <i>Study period: 2013–2017</i>	162 Transgender women of color who have a new HIV diagnosis or are out of HIV care 89% Hispanic/Latina 4% Black, 3% Other race/ethnicity Mean age = 37 years 1-group pre-post New York City, NY <i>Risk of Bias: some concern</i>	T.W.E.E.T uses peers and social media networking to reach and recruit transgender women of color, provides referrals to HIV testing, medical assessments, and comprehensive and specialty services (e.g., trans-affirming surgeries, legal services for name changes, work authorizations, visas, political asylum, trans-sensitive shelters, housing specialists), and provide group education and discussion sessions facilitated by trained peers, on HIV and other STIs, sexual health, transitioning, wellness, and mental health <i>Social Cognitive Theory; Trans-theoretical Model</i>	Yes on care engagement, ART prescription, retention in care and viral suppression (VS) At 12-month follow-up, improved engagement in care: OR = 3.62 (95% CI: 1.54, 8.50), ART prescription: OR = 3.02 (95% CI: 2.11, 4.31), retention in care: OR = 5.42 (95% CI: 2.78, 10.57), and VS: OR = 2.67 (95% CI: 1.90, 3.75). At 24-month follow-up, improved engagement in care: OR = 3.85 (95% CI: 1.30, 11.40), ART prescription: OR = 3.91 (95% CI: 2.49, 6.13), retention in care: OR = 11.28 (95% CI: 4.78, 26.65), and VS: OR = 2.51 (95% CI: 1.64, 3.85).
Kuhns, 2021 ²³ TransLife Care (HRSA SPNS) Treat <i>Study period: 2013–2019</i>	120 Transgender women of color with HIV 94% Black 5% Hispanic/Latina 1% Other race/ethnicity Mean age = 28 years 1-group pre-post Chicago, IL <i>Risk of Bias: some concern</i>	TransLife Care utilizes an established "one-stop shop" offering multiple on-site services. Key aspects of the intervention include: event-based and street-based outreach to reach clients; weekly trans safe resource drop-in center; on-site medical, housing, employment, legal, and HIV services; patient navigation; trans-competent training for service providers, and trans-specific services developed for and by transgender women and delivered by transgender peers <i>Trauma-informed services; Client-centered care; Strengths-based approaches; Systems theory; Harm reduction</i>	Yes on viral suppression (VS) At 12-month follow-up and 24-month follow-up, improved VS: OR = 1.93 (95% CI: 1.09, 3.41) and OR = 2.41 (95% CI: 1.16, 5.00).
Nemoto, 2021; ²⁴ Rebchook, 2022 ²⁰ Princess Project (HRSA SPNS) Treat <i>Study period: 2012–2017</i>	60 Transgender women of color with HIV 80% Black 13% Hispanic/Latina 5% Other race/ethnicity 2% Asian Mean age = 41 years 1-group pre-post Oakland/Alameda County, CA <i>Risk of Bias: some concern</i>	Princess Project uses transgender health educators/peers to provide culturally and transgender-sensitive community outreach, HIV prevention services, referrals to comprehensive HIV care, support groups, and gender transition feminization medical services, and a safe physical space (Butterfly Nest) for transgender women that hosts weekly support groups and a legal clinic. <i>Motivational Enhancement Theory</i>	Yes on viral suppression (VS) At 24-month follow-up, improved VS: OR = 3.10 (95% CI: 1.19, 8.07).
Reback, 2021; ²⁵ Rebchook, 2022 ²⁰ The Alexis Project (HRSA SPNS)	139 Transgender women of color with HIV 39% Black 38% Hispanic/Latina 14% Other race/ethnicity, 7% American	The Alexis Project utilizes social network recruitment, peer health navigation, and contingency management (i.e., escalating reinforcement rewards for meeting care goals) to increase HIV testing and engagement in HIV care. Peer navigators help develop a treatment plan, identify, and address barriers to care, directly link clients to HIV health care and other needed services (e.g., dental, mental health, substance abuse treatment, job training, legal), send appointment reminders and provide transportation if needed,	Yes on ART prescription and viral suppression (VS) At 12-month follow-up, improved prescribed ART: OR = 1.33 (95% CI: 1.00, 1.77) and VS: OR = 1.61 (95% CI: 1.09, 2.39).

First Author, Year Intervention Name Pillar	Study Sample Study Design Study Location	Brief Intervention DescriptionKey Strategies Theory or Foundation	Intervention Effect
Treat <i>Study period: 2014–2016</i>	Indian or Alaskan Native 2% Asian persons Mean age = 36 years 1-group pre-post Hollywood, CA <i>Risk of Bias: some concern</i>	and help clients with survival needs such as housing, food, and clothing.	
Swartz, 2021; ²⁶ Rebchook, 2022 20 Howard Brown Center (HRSA SPNS) Treat <i>Study period: 2012–2016</i>	104 Transgender women of color with HIV 70% Black 19% Hispanic/Latina 7% Other race/ethnicity 2% Asian, Native Hawaiian, or another Pacific Islander Median age = 31 years 1-group pre-post Chicago, IL <i>Risk of Bias: some concern</i>	<i>Social Network Engagement; Social Cognitive Theory; Contingency Management/ Behavioral Economics</i> Howard Brown Center provides culturally relevant, tailored transgender and gender non-conforming services in a safe place. The intervention includes a biweekly evening trans-only drop-in that provides medical, pharmacy, needle exchange, and behavioral health services, staff- and community-led programming, insurance counseling, dinner, and other survival resources (e.g., clothing, hygiene products); weekly youth (ages 14–24) and biweekly adult (ages 25 and older) drop-in support groups; and training on providing trans-affirmative care to increase trans-competence among staff	Yes on care engagement, ART prescription, retention in care and viral suppression (VS) At 12-month follow-up, improved engagement in care: OR = 1.81 (95% CI: 1.12, 2.96), and VS: OR = 1.76 (95% CI: 1.24, 2.50) At 24-month follow-up, improved ART prescription: OR = 2.57 (95% CI: 1.34, 4.93), and VS: OR = 2.01 (95% CI: 1.21, 3.35)
Wilson, 2021; ²⁷ Rebchook 2022 20 TransAccess (HRSA SPNS) Treat <i>Study period: 2012–2020</i>	54 Transgender women of color with HIV 52% Black 22% Hispanic/Latina 15% Asian, Native Hawaiian, or another Pacific Islander 7% Other race/ethnicity Mean age = 42 years 1-group pre-post San Francisco, CA <i>Risk of Bias: some concern</i>	<i>Theory not reported</i> TransAccess integrates trans-affirming medical care, psychosocial and behavioral health support, and community empowerment. The intervention involves weekly drop-in medical clinic care including transgender and HIV and primary care, case management to help with accessing services (e.g., housing food assistance, insurance), peer navigators to help implement care plans and provide hands-on support (e.g., address racism, transphobia, HIV stigma), weekly trans-led support group and outreach to client who were out of care or needed additional assistance.	Yes on ART prescription and viral suppression (VS) At 12-month follow-up, improved ART prescription: OR = 2.52 (95% CI: 1.50, 4.23), and VS: OR = 1.87 (95% CI: 1.11, 3.16). At 24-month follow-up, improved ART prescription: OR = 2.87 (95% CI: 1.49, 5.53), and VS: OR = 2.16 (95% CI: 1.12, 4.19).
Wilson, 2021; ²⁷ Rebchook 2022 20 Brandy Martell Project (HRSA SPNS) Treat <i>Study period: 2013–2017</i>	46 Transgender women of color with HIV 70% Black 30% Hispanic/Latina Mean age = 37 years 1-group pre-post Alameda county, CA <i>Risk of Bias: some concern</i>	<i>Harm Reduction, Trauma-informed, Empowerment</i> Brandy Martell Project addresses structural barriers to HIV care engagement and retention among transgender women of color through outreach, provision of individual and comprehensive risk-reduction counseling services, comprehensive HIV care, agency- and venue-based screening for HIV, viral hepatitis, tuberculosis, and sexual transmitted infections, and legal assistance	Yes on ART prescription At 24-month follow-up, improved ART prescription: OR = 1.59 (95% CI: 1.02, 2.47).
Bocking, 2005 ²⁸ All Gender Health	181 Transgender men (22%) and women (78%) 93% Caucasian	<i>Critical Race Theory</i> All Gender Health incorporates disease prevention message and protective strategies into comprehensive, transgender-specific, community-based sex education seminar delivered by transgender-identified peer educators over two days. Key components include affirmation of diversity in transgender identities and expression, empowerment,	Yes on sex risk reduction At 3-month follow-up, increase in monogamous relationship (64% vs. 42% at baseline, $p = 0.008$) and low risk behavior

First Author, Year Intervention Name Pillar	Study Sample Study Design Study Location	Brief Intervention DescriptionKey Strategies <i>Theory or Foundation</i>	Intervention Effect
Prevent (sex risk) <i>Study period: 1999–2002</i>	mean age = 43 years 1-group pre-post Minnesota <i>Risk of Bias: some concern</i>	peer support, cognitive, behavioral skill building on sexual health care and safer sex, trans-specific service, and trauma focused (e.g., overcoming alcohol and drugs, harassment, violence, and prostitution). <i>Sexual Health Model</i>	(i.e., no condomless anal or vaginal sex outside of primary partner, 91% vs. 84% at baseline, $p = 0.039$).
Collier, 2015 ²⁹ Adaptation of Healing Our Women (HOW) for Transgender Women Prevent (sex risk) <i>Study period: not reported</i>	21 Transgender women of color 52% Black 24% Hispanic/Latina, 24% other (e.g., bi-racial) Mean age = 38 years 1-group pre-post New York City, NY <i>Risk of Bias: some concern</i>	Healing Our Women (HOW) for Transgender Women is an adaptation of a group-level HIV risk-reduction intervention developed to address the role of prior sexual victimization in HIV risk and protective behaviors. Key components include disclosing experiences of violence, emotional and cognitive processing of trauma, coping and resilience, and cultural, gender and spiritual beliefs, and enhancement of social support and journaling. <i>Map of Adaptation Process</i>	No on sex risk reduction Null result for condom use (pre-post mean difference: 6.49, $p = 6.1$) among 9 sexually active participants.
Garofalo, 2012, ³⁰ Life Skills Prevent (sex risk) <i>Study period: not reported</i>	51 young transgender women aged 16–24 years 67% Black 14% White 8% Asian/Pacific Islander 8% American Indian/ Alaska Native 4% Other race/ethnicity Mean age = 21 years 1-group pre-post Chicago, IL <i>Risk of Bias: some concern</i>	Life Skills intervention consists of six peer-led culturally relevant, educational and life skill sessions designed for young transgender women. Key components include transgender pride, link between stigma, self-esteem, and HIV risk, communication and respect, life skills building (learn how medical care, housing, and employment relate to personal safety), sexual health and HIV, partner negotiation, and referral to services. <i>Brofenbrenner's social-ecological theory</i>	Yes on sex risk reduction At 3-month follow-up, a reduced mean number of main male sex partners (1.40 vs. 3.12; $Z = -1.99$, $p \leq 0.5$) and a reduced mean number of unprotected receptive anal intercourse episodes with casual partners (0.20 vs. 0.50, $Z = -1.73$, $p \leq 0.5$).
Garofalo, 2018, ³¹ Project Life Skills Intervention Prevent (sex risk) <i>Study period: 2012–2016</i>	190 young transgender women aged 16–29 years 44% Black 25% White 18% Other race/ethnicity 13% Hispanic/Latina Mean age = 23 years Randomized Control Trial Boston, MA and Chicago, IL <i>Risk of Bias: some concern</i>	Project Life Skills is a group-level intervention that addresses the specific challenges to sexual safety among young transgender women, including structural, developmental, and interpersonal factors. It includes six sessions to communicate basic HIV risk and transmission information, develop motivation to protect oneself, and promote behavioral skills (e.g., condom use and assertive communication, including sexual partner communication and negotiation) through an empowerment-based approach. A "House of Life Skills" theme is used throughout the sessions to build a sense of community, complete with "House Rules" of behavior, participation, safety and respect. Sessions include information on Trans Pride and skills building to better equip participants to advocate for themselves, promote access to services like medical care and housing, and develop a personal action plan that helps to minimize their HIV risk. <i>Empowerment approach</i>	Yes on sex risk reduction Intervention participants reported a greater reduction (30.8%) in condomless sex acts at the 4-month follow-up (RR = 0.69, 95% CI: 0.60, 0.80) and at the 12-month follow-up (39.8%) (RR = 0.60, 95% CI: 0.50, 0.72) than comparison participants. Intervention participants reported a greater mean reduction (25%) in sexual partners at the 4-month follow up (RR = 0.75, 95% CI: 0.59, 0.95) than comparison participants.

First Author, Year Intervention Name Pillar	Study Sample Study Design Study Location	Brief Intervention DescriptionKey Strategies <i>Theory or Foundation</i>	Intervention Effect
Nemoto, 2005 ³² TRANS Prevent (sex risk, drug risk) <i>Study period: not reported</i>	109 Transgender women Demographic info not available 1-group pre-post San Francisco, CA <i>Risk of Bias: some concern</i>	Transgender Resources and Neighborhood Space (TRANS) offers culturally and gender-sensitive health education workshops in both English and Spanish delivered by Transgender peer educators. Eighteen regularly scheduled, culturally appropriate group workshops covering: sex, relationships, and health; reducing drug use and improving coping skills and general life needs. <i>Theory not reported</i>	Yes on sex risk reduction A decrease in levels of sexual risk during the past 30 days at the post-intervention assessment (mean = 1.6 vs. 1.8, Wilcoxon Test, $p = 0.03$).
Operario, 2017 ³³ CHIP Prevent (sex risk) <i>Study period: 2013–2014</i>	56 Transgender women and their male partners ($n = 112$) 45% Black 14% Hispanic/Latina 14% mixed race 8% Asian or Pacific Islander 2% American Indian or Alaskan Native Mean age = 44 years Randomized control trial San Francisco and Oakland, CA <i>Risk of Bias: some concern</i>	Couples HIV Intervention Program (CHIP) is a couples-focused intervention that involves three counseling sessions. In the first session, couples receive informational counseling on sexual transmission of HIV/STDs, condom use, and HIV testing. The second session is an individual session and includes discussion of HIV risk in the context of a primary relationship. Participants also discuss experiences of stigma related to gender identity (for transgender women) and sexuality (for cisgender male partners) and its impact on HIV risk behavior and sexual health. In the final session, couples discuss and role-play the following topics: effective partner communication, active listening, conflict resolution, enhancing mutual support, and identifying personal and couple-level HIV prevention goals. Participants were given homework after each session asking them to consider the take home points of the session or implement skills learned. <i>Ecological perspective</i>	Yes on sex risk reduction Intervention couples reported a greater reduction in condomless sex with primary partners than comparison couples at 3 months post-baseline which translates to 2 months and 1-week post-intervention (aOR = 0.5; 95% CI: 0.3 – 1.0). Intervention participants reported a greater reduction in having any casual partners than comparison participants at 3 months post-baseline which translates to 2 months and 1-week postintervention (aOR = 0.3; 95% CI: 0.1 – 1.0). Intervention participants reported a lower number of casual sex partners than comparison participants at 3 months post-baseline which translates to 2 months and 1-week post-intervention ($B = -1.5$; $SE = 0.4$, $p < 0.01$).
Reback, 2019 ³⁴ TransAction Prevent (sex risk, drug risk) <i>Study period: 2010–2017</i>	514 Transgender women 31% Black 29% Hispanic/Latina 28% Other/multi-racial 13% White Mean age = 33 years 1-group pre-post Hollywood/West Hollywood, CA <i>Risk of Bias: some concern</i>	TransAction is developed by transgender women for transgender women who experience a syndemic of health disparities. It consists of a comprehensive, culturally appropriate continuum of services that include street- and venue-based outreach, one-on-one peer-led, client-centered counseling sessions to discuss HIV risk, ART medication and adherence, PrEP use, family relationship, sexuality, transphobia; group sessions with a full hot meal that facilitate life skills building (e.g., name change, entering work force, safer sex work and dating, dealing with violence) and quarterly social events designed to convey health information, prevention messages and foster social support. <i>Health Belief Model; Social Cognitive Theory; Presentation of Self and Identity Management; Social Support Theory</i>	Yes on sex risk reduction At the 4 th visit, reduced the number of male sex partners (Mean=6.4 vs. 3.2), the number of anonymous male sexual partners (1.2 vs. 0.6), the number of exchange sex male sex partners (6.0 vs. 1.7), the percentage of participants that reported injection drug use (11.5% vs. 7.8%), engagement in sexual intercourse while high (54.9% vs. 52.4%) from the first visit.
Reisner, 2016 ³⁵ Life Skills for Men (LS4M)	17 young Transgender men aged 18–29 years 77% White 24% people of color	Life Skills for Men (LS4M) is an adaptation of LifeSkills, an evidence-based group-based behavioral HIV prevention intervention for transgender women. The intervention consists of 4 consecutive weekly small-group sessions lasting 2 hours focusing on identity recognition and affirmation, communication and partner negotiation, knowledge	No on sex risk reduction Null result for the mean number of sexual partners in past 4 months (4.76 pre and 4.18 post, $t = -0.53$, $p = 0.61$), unprotected vaginal sex (71% pre, 59% post, chi-square =

First Author, Year Intervention Name Pillar	Study Sample Study Design Study Location	Brief Intervention DescriptionKey Strategies Theory or Foundation	Intervention Effect
Prevent (sex risk) <i>Study period: 2013–2014</i>	Mean age = 24 years 1-group pre-post Boston, MA <i>Risk of Bias: some concern</i>	and skill building on sexual safety, sexual health prevention, and HIV/STIs.	0.52, $p = 0.47$), unprotected anal sex (41% pre, 30% post, chi-square = 0.52, $p = 0.47$), unprotected vaginal and anal sex (76% pre, 65% post, $p = 0.72$).
Taylor, 2011 ³⁶ Girlfriends Prevent (sex risk) <i>Study period: not reported</i>	63 Transgender women 46% Hispanic/Latina 35% Black 13% Other race/ethnicity 6% White Mean age = 38 years 1-group pre-post New York City, NY <i>Risk of Bias: some concern</i>	Girlfriends intervention consists of four, 90–120 min, group sessions over four weeks led by two-LGBT+ peers focused on transgender stress, stigma and risks, substance use, and personal growth and development. It incorporates strategies and techniques of motivational interviewing as a means of moving participants towards reducing their risk of HIV acquisition. <i>Information, Motivation, Behavior (IMB) Skill Model</i>	Yes on sex risk reduction At 3-month follow-up, reduction in the mean number of sex partners (1 vs. 2, $p = .043$), having exchange male partners (23.6% vs. 5.5%, $p = .013$), and unprotected at last vaginal or anal sex (34.5% vs. 21.8%, $p = .039$).
Rhodes, 2024 ³⁷ ChICAS Prevent (PrEP) <i>Study period: 2019–2022</i>	144 Latina transgender women without HIV 100% Hispanic/Latina Median age = 33 years Randomized control trial North Carolina, South Carolina <i>Risk of Bias: some concern</i>	ChICAS (Chicas Creando Acceso a la Salud or Girls Creating Access to Health) is a Spanish-language, group- and empowerment-based intervention that aims to increase use of PrEP, condoms, and medically supervised gender-affirming hormone therapy. The participants develop knowledge and skills to seek and obtain PrEP and hormone therapy from a medical provider within the community. <i>Social cognitive theory; Empowerment theory</i>	Yes on PrEP use Intervention participants were more likely to report current PrEP use than control participants at 6 months post-intervention (Adjusted OR = 4.64, 95% CI: 1.57 – 13.7).
Sevelius, 2021 ³⁸ TRIUMPH Prevent (PrEP) <i>Study period: 2017–2020</i>	183 Transgender persons (68% transgender women, 15% transgender men, 11% nonbinary) 58% Latinx 19% White 14% Multiracial 7% Black 2% Asian/Asian American, Median age = 28 years 1-group pre-post Oakland and Sacramento, CA <i>Risk of Bias: some concern</i>	TRIUMPH (Trans Research-Informed Communities United in Mobilization for the Prevention of HIV) is a community-led, transgender-specific pre-exposure prophylaxis (PrEP) demonstration project. Trained peer educators provided PrEP navigation, education and support and other needed services (e.g., legal services for name changes, asylum procedures, mental health, transportation). Trans-specific PrEP and hormone clinics are held at drop-in clinics during 2 late afternoon/early evenings per week, providing PrEP adherence support with empowerment approaches. Monthly interactive social groups focus on trans health-related topics and also includes culturally relevant elements to trans Latina participants, such as food, music, and topics related to immigration. Community mobilization efforts consist of peer-led, gender-affirming, sex-positive PrEP education and social marketing strategies. <i>Model of Gender Affirmation</i>	Yes on PrEP uptake 4% of participants were on PrEP at enrollment; 88% initiated PrEP during the study (no statistical test provided). PrEP uptake: 91% among transgender women, 96% among transgender men, and 70% among nonbinary participants. Most of those who did not initiate PrEP were not US-born (73%).

Table 2.

Key Intervention Strategies across 23 HIV Interventions for Transgender Persons

First Author	Pillar	Effective? ^a	Community engagement in interv development	Pilot tested	SDH addressed	Peer-support/delivery	Trans-specific services	E-health	Empowerment/affirmation	Cognitive, behavioral, skill building, coping	Relationships and support	Outreach	Access	HIV prevention services	Trauma	HIV care
Stephenson, 2020 Project Moxie ¹⁶	Diagnose, Prevent (SR, PrEP)	Yes			x			x		x		x	x	x		x
Eastwood, 2021; Rebchook, 2022 INFINT ¹⁹	Treat	Yes	x	x	x	x						x	x			
Galvan, 2021 TransActivate ²¹	Treat	Yes	x	x	x	x			x	x		x				x
Hirshfield, 2021; Rebchook, 2022 T.W.E.E.T. ²²	Treat	Yes	x	x	x	x	x		x	x		x	x	?	x	
Kuhns, 2021; Rebchook, 2022 TransLife Care ²³	Treat	Yes	x	x	x	x	x					x	x			x
Nemoto, 2021; Rebchook, 2022 Princess Project ²⁴	Treat	Yes	x	x	x	x	x			x	x	x	x	x		
Reback, 2021; Rebchook, 2022 Alexis ²⁵	Treat	Yes	x	x	x	x	x		x	x	x	x	x	x		
Swartz, 2021; Rebchook, 2022 Howard Brown Center ²⁶	Treat	Yes	x	x	x	x	x				x	x	x	x		
Wilson, 2021; Rebchook, 2022 TransAccess ²⁷	Treat	Yes	x	x	x	x	x					x	x		x	
Wilson, 2021; Rebchook, 2022 Brandy Marrell Project ²⁷	Treat	Yes	x	x	x	x	x		x	x	x	x	x		x	
Reback, 2021 Text Me, Girl! ¹⁸	Treat	No						x		x						x
Sevelius, 2022 Healthy Divas ¹⁷	Treat	Yes	x	x	x	x	x		x	x				x		x
Bocking, 2005 All Gender Health ²⁸	Prevent (SR)	Yes	x	x	x	x	x		x	x	x			?	x	

First Author	Pillar	Effective? ^a	Community engagement in interv development	Pilot tested	SDH addressed	Peer-support/delivery	Trans-specific services	E-health	Empowerment/affirmation	Cognitive, behavioral, skill building, coping	Relationships and support	Outreach	Access	HIV prevention services	Trauma	HIV care
Collier, 2015 Adaptation of Healing Our Women (HOW) for Transgender Men ²⁹	Prevent (SR)	No	x	x					x	x	x				x	
Garofalo, 2012 Life Skills ³⁰	Prevent (SR)	Yes	x	x	x	x	x		x	x						
Garofalo, 2018 Life Skills – RCT ³¹	Prevent (SR)	Yes	x	x	x	x	x		x	x	x					
Nemoto, 2005 TRANS ³²	Prevent (SR)	Yes	x	x	x	x	x		x	x	x	x			x	
Operario, 2017 CHIP ³³	Prevent (SR)	Yes	x	x	x				x	x						
Reback, 2019 TransAction ³⁴	Prevention (SR, DR)	Yes	x	x	x	x	x		x	x	x	x		x	x	x
Reisner, 2016 Life Skills for Men (LS4M) ³⁵	Prevention (SR)	No	x	x	x		x		x	x	x			x	x	
Taylor, 2011 Girlfriends ³⁶	Prevent (SR)	Yes	x	x	x	x			x	x	x			x	x	
Rhodes, 2024 ChICAS ³⁷	Prevent (PrEP)	Yes	x	x	x	x	x		x	x	x		x	x		
Sevelius, 2021 TRIUMPH ³⁸	Prevent (PrEP)	Yes	x	x	x	x	x		x	x	x		x	x		

^aYes = study that shows a significant intervention effect on at least one relevant intervention outcome

Study protocols of HIV prevention interventions for Transgender Persons Identified through the NIH's RePORTER

Table 3.

Principal investigator, EHE pillar, and source	Sample population	Intervention
Leaf S. L. ³⁹ Diagnose, Treat, and Prevent (risk reduction) 5R44MH117837	Black/African American transgender women	Shine: a mHealth Approach Based on the Information-Motivation-Behavioral Skills (IMB) model, Gender Affirmation Model, and Empowerment theory, conducting a randomized controlled trial with 215 African American transgender women to test feasibility and effectiveness of a culturally-tailored, theoretically-driven mHealth intervention "Shine" designed to overcome the unique barriers facing African American transgender women and addresses elements across the entire HIV care continuum.
Guy A.A. ⁴⁰ Prevent (sex and drug risk reduction) 5K99DA055508	Transgender women	Peer-delivered Gender-Affirming Stigma Intervention Using community-based participatory research (CBPR) principles to adapt, design, and test a peer-delivered gender affirming Acceptance and Commitment Therapy (ACT) intervention for improving substance misuse and HIV risk in transgender women in a randomized controlled trial (n=124).
Benolsch E. ⁴¹ Prevent (sex risk reduction) 5R34MH115775	Economically disadvantaged transgender women	Integrated Microeconomic Intervention Using community-based participatory research (CBPR) principles to develop and test the feasibility and efficacy of an integrated microeconomic intervention that addresses multiple economic vulnerability and improve financial status of economically disadvantaged transgender women in two U.S. HIV-prevalent, and resource-poor metropolitan areas (Richmond, VA and the St. Louis MO/IL metro area) in a randomized controlled trial (n not specified).
Schnall R. ⁴² Prevent (sex and drug risk reduction) 5R34MH128163	Young transgender men (aged 15–19 years)	MyPEEPS Mobile Using qualitative methodology, expert feedback, and usability assessment to develop and adapt a mobile HIV prevention intervention (MYPEEPS Mobile) designed by, and piloted for, a diverse group of young transgender men; conducting a pilot randomized controlled trial (n=80) to examine the feasibility, acceptability and preliminary efficacy of the revised MYPEEPS Mobile App.
Mimiaga M.J. ⁴³ Prevent (sex and drug risk reduction, PrEP) 5U01AI156875	Young transgender women	LifeSkills Mobile Using community-based participatory research (CBPR) principles to adapt and test the face-to-face version of Project LifeSkills, an evidence-based intervention, to an online-delivered, mobile app platform for promoting bio-behavioral HIV prevention strategies based on empowerment theory in a randomized controlled trial (n=5,000).
Barak N. ⁴⁴ Prevent (PrEP) 5R01MH128049	Transgender women in the deep South	Tcher, Take Charge Intervention Building on a population-based study of transgender women and adaptation of two evidence-based interventions, Tcher, Take Charge intervention is designed to use social media campaigns and digital mHealth peer navigation model to increase PrEP awareness, uptake, and adherence among transgender women. The intervention will be evaluated with a randomized stepped wedge cross-over study design (n not specified).
Bass S. ⁴⁵ Prevent (PrEP) 5R34MH129189	Transgender women	Sisters Influencing Sisters (SIS): Peer-led Messaging using Social Media Influencers Using the Gender Affirmation Framework, EPIS Implementation Framework, and commercial marketing techniques (i.e., perceptual mapping and vector message) to develop and test PrEP messages and materials delivered by transgender women social influencers via Instagram and assess feasibility, acceptability and preliminary efficacy data in an implementation evaluation study.
Del Rio-Gonzalez A. ⁴⁶ Prevent (PrEP, PEP) 5U01PS005218	Latina transgender women in the Washington DC metropolitan area	Peer-coaching Intervention Using community-based participatory research (CBPR) principles to develop and test an intervention, which includes: 1) peer-coaching sessions for improving HIV-risk assessments, providing information about PrEP/PEP, and supporting PrEP/PEP uptake and adherence, 2) navigation to existing PrEP/PEP services and 3) other culturally appropriate components relevant to Latina transgender women in a randomized delayed-intervention control trial (n=50).
Hosek S. ⁴⁷ Prevent (PrEP) 5R01MH114753	Transgender youth (aged 15–24 years)	Culturally, Developmentally and Gender-affirmative Intervention Using ethnographic data and theories (Information-Motivation-Behavioral Skills Model of Behavior Change, Gender Affirmation, Empowerment Theory) to develop and test a culturally, developmentally, and gender-affirmative intervention to improve uptake and adherence to PrEP in transgender youth in a small randomized controlled trial (N=100) within a PrEP demonstration project.

Principal investigator, EHE pillar, and source	Sample population	Intervention
Mimiaga M.J. ⁴⁸ <i>Prevent (PrEP)</i> 5R34MH122499	Transgender women	PrEP N' Shine: Peer-led, strengths-based case management Building on formative and programmatic work grounded in Empowerment Theory and Social Cognitive Theory, PrEP N' Shine intervention addresses multi-level barriers to PrEP uptake and adherence among transgender women via two separate but complementary interventions: 1) peer-led, strengths-based case management (SBCM) for PrEP linkage and uptake; and 2) a "stepped-care" component in which the least resource intensive part of an intervention is delivered first, and only those who continue to have problems adhering to PrEP receive the more resource-intensive components. A 2-stage randomized controlled trial (n=106) will be conducted to test the efficacy of the intervention.
Reisner S. ⁴⁹ <i>Prevent (PrEP)</i> 5R01MH129175	Transgender men who have sex with men residing in high HIV incidence geographic hotspots in the Eastern and Southern U.S.	Digitally Delivered Peer-based Strategies Using community-based participatory research (CBPR) principles to compare the efficacy of individual (PrEP4T: one-on-one peer navigation) and group-based (LifeSkills for men: small group-based behavioral intervention) peer-delivered HIV prevention strategies in PrEP-indicated HIV-negative adult trans MSM; to examine mechanisms by which peer-delivered interventions impact PrEP uptake focusing on healthcare empowerment, trans community support, and information, motivation, and behavioral skills in a randomized 2x2 factorial trial (n not specified).