THE EFFECTIVENESS OF INTERVENTIONS TO INCREASE ANTIRETROVIRAL THERAPY (ART) ADHERENCE AMONG LATINX MEN WHO HAVE SEX WITH MEN (MSM) WITH HUMAN IMMUNODEFICIENCY VIRUS (HIV) IN THE UNITED STATES: A SYSTEMATIC REVIEW

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THE EFFECTIVENESS OF INTERVENTIONS TO INCREASE ANTIRETROVIRAL THERAPY (ART) ADHERENCE AMONG LATINX MEN WHO HAVE SEX WITH MEN (MSM) WITH HUMAN IMMUNODEFICIENCY VIRUS (HIV) IN THE UNITED STATES: A SYSTEMATIC REVIEW

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Doctor of Psychology

By
Everardo Leon, M.S.

May 2023
EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE

PsyD Clinical Dissertation Signature Page

This Clinical Dissertation, written under the direction of the student’s Clinical Dissertation Chair and Committee and approved by Members of the Committee, has been presented to and accepted by the faculty of the Clinical Psychology PsyD Program in partial fulfillment of the requirements for the degree of Doctor of Psychology. The content and research methodologies presented in this work represent the work of the student alone.

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EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE

TABLE OF CONTENTS

ABSTRACT 5

INTRODUCTION 7
  Statement of the Problem 7
  Research Question and Aims 9
  Research Design 9
  Definition of Terms

LITERATURE REVIEW 12
  Brief History of HIV and Early Preventions 12
  The State of Preexposure Prophylaxis 15
  Current HIV Prevalence Rates 16
  Current Initiatives to Reduce HIV Infections 17
  Compendium of Interventions for HIV Prevention 18
    Structural Interventions 19
    Linkage to, Retention in, and Re-engagement in HIV Care Interventions 20
    Medication Adherence Interventions 21
    Risk Reduction Interventions 22
  Mental Health Approaches 24
  Psychosocial Concerns 25
  The Role of Syndemic Theory and Conditions 30
  The Importance and Challenges of Medication Adherence 32
  Justification of the Current Project 34

METHOD 36
  Overview of the Methodology 36
  Research Question and Aims 36
  The Research Team 37
  Inclusion/Exclusion Selection Criteria 37
    Timeframe 37
    Study Design of Interest 37
    Population Criteria 38
    Intervention Selection Criteria 39
    Comparison 39
    Outcomes 40
    Exclusion Criteria 41
  Data Collection Form 41
  Databases and the Search Strategies 42
  Collecting References and Abstracts, and Removing Duplicates 42
  Contacting Experts and Gathering Additional References 43
  Screening Titles & Abstracts and Retrieving Full Texts 43
  Screening Full Texts 44
  Final Selection of Full Texts Using the PRISMA Flow Diagram 44
  Assessing Study Quality and Risk of Bias 45
EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE

ABSTRACT

The human immunodeficiency virus (HIV) continues to affect Latinx men who have sex with men (MSM). Interventions have been developed to improve antiretroviral therapy (ART) adherence, but little is known about the number of available interventions and their effectiveness to assist Latinx MSM. The current systematic review investigated the effects of interventions aimed at improving ART adherence for the treatment of adult Latinx MSM with HIV in the United States. The systematic review followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines to communicate the results.

The inclusion criteria comprised Latinx MSM with HIV, any type of intervention with an ART adherence outcome, a comparison group, and quantitative data. Records were obtained from PubMed, PsycINFO, CINAHL, SCOPUS, ProQuest, and Google Scholar on April 21, 2022, and additional records were gathered through other sources. The final sample entailed 4 studies with 3 interventions, and the ROBINS-I and the RoB 2 were utilized to assess risk of bias. Among the 3 interventions, only one was specifically tailored for Latinx MSM with HIV. All 3 interventions were delivered in Spanish and targeted Spanish-speaking Latinx groups in Los Angeles and New York City. Adherence to ART improved in the short-term but it was not sustained over time. None of the interventions included the examination of depressive symptomatology, which is a non-adherence factor among Latinx MSM.

The three interventions are not inclusive of language and cultural differences among Latinx MSM with HIV and may not be generalizable to other cities, as they were conducted in Los Angeles and New York City. The three interventions are not comprehensive by integrating ancillary services to increase ART adherence, which may explain why improvements in
EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE

adherence were not sustained long-term. The scarcity of ART adherence interventions place Latinx MSM at a disadvantage in reducing their HIV viral load by improving their adherence. More ART adherence interventions for Latinx MSM are warranted. Greater initiatives and investment are needed to assist Latinx MSM with HIV and to address the current gap in the field of ART adherence interventions.
EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE

INTRODUCTION

Statement of the Problem

The human immunodeficiency virus (HIV) infection continues to negatively impact the health and psychological wellbeing of the general population in the United States (U.S.), but more specifically within the Latinx\(^1\) community. The Centers for Disease Control and Prevention (CDC, 2022) reported a total of 30,403 new HIV diagnoses in the year 2020 among the overall U.S. population. Although the 2020 HIV prevalence rate has been the lowest since 2016 (CDC, 2022), Hispanics/Latinos\(^2\) made up 26% of the HIV diagnoses making them the second most impacted group by HIV/AIDS (CDC, 2022). Among the 8,008 HIV diagnoses in the Hispanic/Latino community in 2020 (CDC, 2022), Latinx men continue to be disproportionately affected as they accounted for 77% of these cases (CDC, 2022), placing them at a higher risk in contracting the virus.

Men who have sex with men (MSM) continue to be the group that is most at risk for HIV (CDC, 2022). The term MSM was established by Glick et al. (1994) to illustrate the sexual behavior between men regardless of sexual orientation, gender identity, or other pertinent characteristics. MSM accounted for 68% of the total diagnoses in 2020 (CDC, 2022). Hispanic/Latino MSM made up 20% of the HIV diagnoses in 2020, second only to Blacks/African Americans (CDC, 2022). Evidently, Hispanic/Latino MSM are more vulnerable to HIV and it is important to understand the factors for this increased vulnerability.

\(^1\) Latinx is a term that recognizes the diversity, neutrality, and inclusivity within the community while defying the Spanish, gender binary constraints such as Latino and Latina (Guidotti-Hernández, 2017). Therefore, Latinx is the preferred term used within this dissertation to highlight its diverse and inclusive nature and to describe the population of interest.

\(^2\) The terms Hispanic(s) or Latino(s) are used intermittently within this dissertation in accordance to how they were used or presented in a particular context, publication, research, or study. However, the preferred term within this dissertation is Latinx in order to describe the population of interest.
EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE

Hispanics/Latinos face unique challenges that contribute to the prevalence of HIV. These challenges as reported by Crim et al. (2020), Guilamo-Ramos et al. (2020), and Chen et al. (2012) include poverty, drug use, depression, unmet needs for ancillary services, language barriers, immigration status, acculturation, lack of health insurance, and stigma. Individual risks and social determinants for Hispanic/Latino MSM can be observed through the lens of Syndemics Theory as proposed by Singer (2009). The theory encapsulates the dynamic interplay between an individual and the environment, and suggests that the interaction of existing epidemics affecting a specific population may exacerbate the effects of another disease.

For instance, González-Guarda et al. (2011) designed a comprehensive framework for Hispanics to illustrate the syndemic conditions of substance abuse, HIV infection, intimate partner violence, and mental health amid the co-existing interactions of individual, cultural, socio-environmental, and relationship factors. In addition to the four syndemic conditions, Wilson et al. (2014) endorsed the inclusion of poverty, trauma, and incarceration to make the framework more relevant for Latino men in the U.S. Consequently, the insurmountable idiographic and syndemic challenges may deter Hispanics/Latinos from seeking HIV testing, services, and treatments, and thus perpetuate future HIV infections.

Antiretroviral therapy (ART) is a medication treatment that allows people with HIV to live longer, have better health outcomes, and reduces the risk of transmitting the virus to others. According to Peterson et al. (2000), viral suppression can be achieved with 95% or greater adherence to ART. However, people with HIV need to work closely with a healthcare provider to develop a treatment plan and maintain their adherence over time to ensure success. The National Center for HIV/AIDS, Viral Hepatitis, STD, and TB prevention (2016) indicated that 60% of Hispanics/Latinos with HIV received care in 2015, 1 in 5 were not retained in care, and 53 for
EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE
every 100 HIV-positive Hispanics/Latinos were virally suppressed in 2018 (CDC, 2020). This
underscores the need to examine the number of available interventions that can effectively
improve medication adherence and guarantee adequate care for approximately 274,100
Hispanic/Latinos living with HIV, especially those who are not virally suppressed (CDC, 2020).

Research Question and Aims

The project answered the following research question: What are the effects of
interventions aimed at improving antiretroviral therapy (ART) adherence for the treatment of
adult Latinx MSM with HIV? The following aims helped answer the research question:

Aim 1: Identify interventions designed to increase ART adherence among Latinx MSM
with HIV in the U.S.

Aim 2: Review the extent of cultural adaptations or modifications in interventions aimed
at increasing ART adherence among Latinx MSM with HIV

Aim 3: Compare interventions to determine which interventions are the most effective for
increasing ART adherence among Latinx MSM with HIV

Research Design

The systematic review followed Muka et al.'s (2020) framework, which is a step-by-step
model that researchers can use to conduct a comprehensive research study. In addition, the
systematic review was organized, executed, and reported per the recommendations of the
Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines as
communicated by Moher et al. (2010) and Page et al. (2021).

Definition of Terms

• Antiretroviral Therapy (ART): A medication treatment that allows people living with
  HIV to maintain the virus under control.
EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE

- Computer Assessment & Rx Education for HIV-Positives (CARE+) Spanish: A computer-based counseling tool by Kurth et al. (2016) that was translated from its original English version known as CARE+ created by Kurth et al. (2014) to evaluate its effects on relevant outcomes such as ART adherence.

- Consolidated Standards of Reporting Trials (CONSORT): A set of guidelines as proposed by Schulz et al. (2010), which requires studies to describe the statistical methods used to analyze and report the outcomes of interest and the estimated effect size, specifically those in randomized controlled trials.


- Men Who Have Sex with Men (MSM): A term established by Glick et al. (1994) to illustrate the sexual behavior between men regardless of sexual orientation, gender identity, or other pertinent characteristics.

- Participants, Intervention, Comparison, Outcome (PICO): Essential components as discussed by Richardson et al. (1995) and Counsell (1997) to construct a well-built research question for a systematic review.

- People living with HIV (PLWH): An individual who has been tested and diagnosed as HIV positive.

- Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA): A set of guidelines, as proposed by Moher et al. (2010) and Page et al. (2021), used by systematic reviews and meta-analyses to organize their methodology, execute their plan, and report their findings.
EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE

- Risk of Bias Tool for Randomised Trials 2 (RoB 2): An assessment tool developed by Sterne et al. (2019) that is used by systematic reviews to evaluate, justify, and classify the risk of bias in randomised trials.

- Risk of Bias in Non-Randomised Studies of Interventions (ROBINS-I): An assessment tool developed by Sterne et al. (2016) that is used by systematic reviews to evaluate, justify, and classify the risk of bias in non-randomised studies.

- Template for Intervention Description and Replication (TIDieR): A set of guidelines developed by Hoffman et al. (2014) that studies can use to describe and report an intervention.
EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE

LITERATURE REVIEW

Brief History of HIV and Early Preventions

The acquired immunodeficiency syndrome (AIDS), which is the last and most severe stage of an untreated HIV infection, came into existence in the U.S. at the beginning of the 1980s. Gottlieb et al. (1981) initially classified the disease as pneumocystis carinii pneumonia (PCP), as it was a medical condition seldom seen in patients with no prior history of weakened immune systems. The development of PCP was proposed to be associated with a patient’s homosexual lifestyle or transmitted through sexual contact (Gottlieb et al., 1981). According to the CDC (2021), the U.S. had approximately 20,000 new infections by the end of 1981. In 1982, AIDS was officially coined by the CDC (1982) as an immunity disease and other methods of transmission became more apparent such as intravenous drug use, childbirth, and exposure to contaminated blood (CDC, 2021). Eventually, the CDC (1985) recognized HIV as the causal agent for AIDS, national response and prevention efforts surged, and new HIV infections soared to 84,200. Approximately 683,000 people were living with the virus by the end of the decade (CDC, 2021).

By the early 1990s, the CDC (1993) declared HIV as the leading cause of death in the U.S. for men between the ages of 25 to 44. The overall death rate among this age group rose from 0.6 to 52.8 per 100,000 people between 1982 and 1992. Men of color were particularly impacted by HIV and AIDS. The death rate among African American men (136.0 per 100,000) was roughly three times higher than their White counterparts (42.1 per 100,000) in 1992 (CDC, 1993). Data for Hispanic men became available in 1991, as reported cases in this group were previously enlisted in the White and African American racial categories. Hispanic men between the ages of 25 and 44 accounted for 24.1% of AIDS-related deaths in 1991 compared to 17.8%
EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE

reported among White men (CDC, 1993). Subsequently, greater prevention measures both nationally and in local communities rapidly emerged to combat the AIDS epidemic.

For instance, *Hermanos de Luna y Sol* was a group intervention developed in 1995 for a predominantly Spanish speaking population by Díaz (1998) and the Mission Neighborhood Health Center. The aim of the intervention was to reduce risky sexual behavior among Latino gay men from mostly low socioeconomic status (SES) in San Francisco. The intervention entailed structured sessions to improve self-esteem, social support, and sexual self-regulation. Additional components included recruitment activities, an ongoing peer-support group, group communality and safety, activities to maintain safer sex behavior, awareness of the impact of AIDS on sexual activity, construction of skills, and access to case management services. One year after its inception, *Hermanos de Luna y Sol* conducted 9 small-group meeting cycles, 8 monthly meetings for ongoing social support and education, and 24 weekly social support meetings. Data gathered from 78 participants highlighted the intervention’s strong impact on people’s lives related to HIV and safer sex (Díaz, 1998).

Greater prevention efforts, as reported by the CDC (1998), partially contributed to the overall HIV death rate decline of 5.9 per 100,000 in 1997 compared to 15.6/100,000 in 1995 and 12.6/100,000 in 1992. In addition, clinical advancements on AIDS research and the development of ART in the late 1990s helped decrease the number of infections and deaths. Compared to the previous decade, the estimated number of people living with HIV (PLWH) increased to 863,000 whereas new HIV infections decreased to about 58,400 in 1999 compared to 84,200 in 1989 (CDC, 2021). However, racial disparities continued to expand. The number of HIV infections among African American men, as reported by the CDC (1999), was about 6,746 followed by
EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE

5,484 cases among White men. Hispanic men continued to remain the second highest minority group with 1,670 infections.

The 21st century gave rise to a new initiative by the CDC to address the ongoing HIV concern in the U.S. and the disparities among racial and ethnic minorities. The CDC’s (2001) five-year strategic plan sought to diminish new HIV infections from an estimated rate of 40,000 to at least 20,000 cases per year by increasing voluntary testing, implementing more HIV prevention measures, and assessing the efficacy of these interventions. More specifically, structural and community interventions placed an emphasis on cultural competency to address the myriad of factors pertaining to people of color, such as race and socioeconomic status, to reduce discrimination, stigma, and HIV infections (CDC, 2001). Despite these efforts, the CDC (2007) reported an estimated increase from 38,398 to 44,084 HIV diagnoses between 2004 and 2007, cases among racial and ethnic minorities steadily rose during this time period, and the estimated diagnoses of HIV infection by 2009 equaled 45,748 (CDC, 2021).

Hall et al. (2008) corroborated the racial disparities highlighted by the CDC (2007) between 2001 and 2005 among Blacks/African Americans (incident rate, 83.7/100,000) and Hispanics (29.3/100,000) compared to Whites (11.5/100,000). In addition, MSM continued to be highly susceptible to HIV as they accounted for 56% of the estimated 55,500 new infections every year between 2003 and 2006 (Hall et al., 2008).

Consequently, between 2010–2019 HIV prevention guidelines were modified to diminish new HIV infections and abate racial disparities by expanding coverage to targeted populations. For instance, the CDC’s (2011) Link to High Impact HIV Prevention framework underlined the importance of integrating evidence-based interventions, such as HIV testing, ART, and sexually transmitted infection (STI) screening, in a cost-effective, feasible, and efficient manner in
EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE

Communities with at-risk populations across the nation. Vulnerable populations included MSM, Blacks/African Americans, and Hispanics/Latinos as they accounted for 61%, 44%, and 20% of new HIV infections in 2009, respectively (CDC, 2011). To address the needs of Latinos, the CDC’s (2013) Reasons/Razones campaign entailed national and local advertising, online resources, and social media outreach to promote HIV testing among Latino gay and bisexual men in major cities like Los Angeles. In 2019, the CDC’s Let’s Stop HIV Together campaign website was revamped to communicate the current status on HIV testing, treatment, and stigma, whereas the recent HIV Nexus website developed by the CDC offers up-to-date treatment and prevention resources for clinicians to use when working with patients.

The State of Preexposure Prophylaxis

Amid the ongoing HIV disparities among MSM and racial minorities, 2010 gave rise to a promising antiretroviral medication for preventing HIV transmission called preexposure prophylaxis (PrEP). In their systematic review and meta-analysis, Fonner et al. (2016) found that PrEP effectiveness (risk ratio = 0.30, 95% confidence interval: 0.21 – 0.45, P < 0.001) was associated with greater medication adherence and highlighted the relationship as a vital component to curb subsequent HIV infections. The relationship was validated by Riddell et al. (2018) as the results of their review illustrated a positive correlation of at least 90% between daily tenofovir disoproxil fumarate/emtricitabine and adherence. In addition, the CDC guaranteed that PrEP is approximately 99% effective in the presence of a comprehensive prevention plan, such as ongoing follow-up assessments every 3-6 months, sustained adherence, and behavioral risk reduction support. To further emphasize its potential, the mathematical models created by Jenness et al. (2016) illustrated that approximately one-third of new HIV
EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE

Infections could be prevented in the next ten years if CDC PrEP guidelines and interventions for MSM are implemented accordingly by providers, which may help lessen subsequent disparities.

Although PrEP is a highly efficacious HIV prevention measure, racial disparities continue to persist even among U.S. consumers. The analysis performed by Huang et al. (2018) highlighted a 470% increase in the annual number of PrEP users between 2014-2016. However, in a subgroup of 32,853 of PrEP users, 68.7% were White while only 11.2% were Black/African American and 13.1% were Hispanic/Latino (Huang et al., 2018). Similarly, PrEP awareness rose from 60% to 90% from 2014-2017 among MSM as specified by Finlayson et al. (2019), but PrEP usage continued to be low among Black (26%) and Hispanic (30%) MSM in 2017. The low percentages support the findings by Mayer et al. (2018) as they indicated that roughly 10% of beneficiaries in the U.S. have initiated PrEP treatment and Kanny et al. (2019) concluded that White MSM continue to surpass their racial counterparts in the areas of PrEP awareness, PrEP use, and health care provider attentiveness. Although PrEP awareness has risen, more work is needed to better address the needs of racial and ethnic MSM. Monitoring trends and understanding PrEP barriers (Huang et al., 2018), creating diverse models of delivery (Mayer et al., 2018), and expanding state-level PrEP coverage as suggested by Smith et al. (2020), are among several solutions that the U.S. can further implement to reduce HIV infections and disparities.

Current HIV Prevalence Rates

Recent prevalence rates as communicated by the CDC (2022) demonstrate that HIV and racial disparities in the U.S. continue to be an enduring public health problem. Estimated HIV diagnoses have ranged from 36,000 to 41,000 in the last seven years with 30,403 cases identified in 2020, which is the lowest it has been since 2016 (CDC, 2022). However, more than 1.1
EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE

Million people are now living with HIV (CDC, 2021) as a result of annual diagnoses and, according to Fauci et al. (2019), HIV/AIDS has taken the lives of more than 700,000 people since 1981. Furthermore, MSM continue to be the largest subgroup affected by HIV as they accounted for more than 50% of new cases even though the number of diagnoses has diminished from 25,948 to 20,572 between 2016 and 2020 (CDC, 2022).

In terms of racial differences between 2016–2020, HIV diagnoses steadily declined for Whites and Blacks/African Americans, but these two groups continue to have the largest disparity as illustrated by their estimated respective diagnoses of 7,843 and 12,856 in 2020 (CDC, 2022). In contrast to their racial counterparts, Hispanics/Latinos in 2020 had approximately 8,008 HIV diagnoses, which is a number that has marginally decreased since 2016, and the disparity is narrow compared to the disparity amongst Whites and Blacks/African Americans (CDC, 2022). It is evident that more work is needed to alleviate the impact of the HIV crisis, especially among at-risk populations.

Current Initiatives to Reduce HIV Infections

To combat the epidemic on a national level, the U.S. Department of Health and Human Services (HHS) set forth a new plan in 2019 to reduce HIV infections by 90% in the next 10 years with the assistance and interdependence of several collaborators such as the CDC and the Substance Abuse and Mental Health Services Administration (SAMHSA) (Fauci et al., 2019). The initiative encompasses four goals, which include greater HIV testing after exposure, rapid treatment, prevention measures for at-risk populations, and identifying clusters of HIV incidences to abate further transmissions. Compared to previous initiatives, the HHS described the role that each collaborator will play to achieve these four goals. For instance, the successful HIV treatments and level of care offered at the Ryan White HIV/AIDS Program (RWHAP) will
EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE

serve as a template that can be adopted by local health departments whereas the Health Resources and Services Administration (HRSA) will expand PrEP services for at-risk groups across the country.

Although the HHS recognizes the disparities among MSM Hispanics/Latinos and Blacks/African Americans (Fauci et al., 2019), it does not specify how exactly it will address the needs of these groups to achieve the 90% HIV reduction rate or narrow the disparities. Furthermore, it does not mention the mental health implications of HIV, the role that psychological interventions can play to combat the epidemic, or how to best serve PLWH as most of the emphasis is on curbing infections. Therefore, the rest of the literature review will focus on the interventions being offered to assist PLWH and Latinx MSM in the U.S., identify the most commonly used interventions, the mental health implications, treatment challenges, and depict gaps in the literature pertaining to this area.

Compendium of Interventions for HIV Prevention

Becoming acquainted with the CDC’s HIV Intervention Research is an essential starting point when searching for scientifically-based interventions. The CDC (2021) supports the usage of cost-effective and scalable high-impact prevention measures, better known as Effective Interventions, that providers can use when assisting HIV patients in their respective communities. Such interventions were systematically compiled, thoroughly reviewed, endorsed, and are listed under the CDC’s Compendium of Evidence-Based Interventions and Best Practices for HIV Prevention.

These interventions have been classified as Evidence-Informed Interventions (EIs) or Evidence-Based Interventions (EBIs); the latter group is more rigorous as comparison groups were used in the original studies. Nonetheless, EIs and EBIs have been shown to work with HIV
EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE

populations, the compendium is regularly updated, and one can learn more about these interventions on the CDC website. The EIs and EBIs are separated into five chapters based on targeted objectives, yet only four chapters pertain to PLWH. These chapters entail Structural Interventions (SI), Linkage to, Retention in, and Re-engagement in HIV Care (LRC), Medication Adherence (MA), and Risk Reduction (RR).

**Structural Interventions**

The SI chapter, as listed in the CDC’s (2023) website, illustrates 42 EBIs and 40 EIs with the focus on augmenting the effectiveness of interventions by altering pertinent external infrastructures, which may subsequently change or affect individual behavior. Structural components highlighted in these interventions include access to a product or service, capacity-building, physical structure, mass media, community mobilization, and social determinants of health that could improve HIV quality of care (CDC, 2023).

For instance, the *Mpowerment Project* conducted by Kegeles et al. (1996) reduced sexual risk behaviors among young gay men residing in Western regions of the U.S. through ongoing publicity campaigns, community mobilization, socialization, education on safe-sex practices, and outreach. On a nation-wide level, the structural components to reduce external stigma as highlighted in the *Intensive Client-Centered Intervention* by Maskay et al. (2018) entailed increasing access to HIV care, implementing behavioral health services into medical care, and building partnerships with local establishments to address the housing needs among HIV homeless patients. As hypothesized, participants reported lower perceived external HIV stigma related to homelessness and substance use disorders at 6- and 12-months, and the team emphasized the importance of combating HIV stigma on a broader level through ongoing education, advocacy, and policy changes (Maskay et al., 2018).
Two EI interventions in the SI chapter specifically targeted the Hispanic/Latino population. The *Strength Through Livin’ Empowered* (STYLE) intervention by Hightow-Weidman et al. (2011) aimed to improve retention in HIV care for young Black/African American and Hispanic/Latino MSM in North Carolina through an ongoing social marketing campaign, a coordinated medical-social support network, outreach, case management, support group meetings, and comprehensive structural assessments. Significant findings revealed that STYLE participants had a greater proportion of scheduled HIV medical visits by 80% during the 24-month period of the intervention compared to 67% displayed by pre-STYLE participants (Hightow-Weidman et al., 2011). Similarly, Davila et al.’s (2013) *Centralized HIV Services* intervention sought to improve retention in HIV care for young Black/African American and Hispanic/Latino patients by providing multidisciplinary services at a local clinic in Houston, Texas. During the three-year period of the intervention, centralized participants exhibited adequate visit constancy as indicated by 56.7% compared to their decentralized counterparts who had a 30.6% constancy during a two-year period prior to the intervention (Davila et al., 2013).

*Linkage to, Retention in, and Re-engagement in HIV Care Interventions*

In contrast to the external features of SI, LRC interventions seek to address individual factors to support patients across the continuum of care and reduce attrition rates (CDC, 2023). The LRC chapter contains a total 34 EBIs and 25 EIs, and several of these interventions are also considered SI as they contain relevant outcomes such as viral loads, CD4 counts, and medical visits. The *Antiretroviral Treatment Access Study* (ARTAS) led by Gardner et al. (2005) used a strengths-based, case-management approach to connect and sustain recently diagnosed HIV-infected people in medical care. Compared to the control group who was not assisted by a case manager, 78% and 64% of ARTAS participants visited an HIV clinician at least once within
EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE

the first 6 months and at least twice within 12 months, respectively (Gardner et al., 2005).

Similar findings were communicated by Craw et al. (2008) as 79% of ARTAS participants
visited an HIV clinician at least once within the first 6 months. A social media intervention by
Tanner et al. (2018) called weCARE was designed to increase viral suppression and retention in
HIV care for young MSM and transgender women by delivering tailored messages to each
participant via social media platforms. At the end of 12 months, missed appointments among 75
participants diminished from 68% to 53.3% whereas viral suppression for 80 participants
increased from 61.3% to 88.8% (Tanner et al., 2018).

Centralized HIV Services (Davila et al., 2013) and STYLE (Hightow-Weidman et al.,
2011) are two of three interventions that focused on Hispanic/Latino groups in the LRC chapter
and relevant findings of these studies were mentioned above. The third EI intervention by
Enriquez et al. (2008) used the support of a Bilingual/Bicultural Care Team consisting of a nurse
practitioner, case manager, and peer educator to improve retention rates and other HIV-health
related outcomes among Hispanic/Latino patients. Pre- and post-results observed during a
12-month period showed a significant mean increase from 2.81 to 5.30 for scheduled and kept
HIV clinic visits, and suppressed HIV viral loads of < 50 copies/ml among 43 participants
(Enriquez et al., 2008).

Medication Adherence Interventions

The MA interventions, classified as having best- or good-evidence, aim to improve viral
load suppression and medication adherence among PLWH (CDC, 2023). The MA chapter
contains 25 EBIs with good-evidence and 2 EBIs containing best-evidence. Some of these
interventions are also found in the LRC chapter as they contain pertinent MA outcomes, while
others are found in both the SI and LRC chapters.
EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE

The Managed Problem Solving (MAPS) is an individual-level intervention developed by Gross et al. (2013) aimed at improving ART adherence among HIV clinic patients through in-person sessions using a problem-solving approach and telephone calls for continued support and encouragement. Compared to the usual care group, those randomly assigned to MAPS were more likely to have greater adherence and undetectable viral loads across four assessments conducted between 3 to 12-months post-initiation of MAPS (Gross et al., 2013). Simoni et al. (2009) conducted a randomized controlled trial to assess the effects of the Peer Support intervention on highly active ART adherence, HIV viral load, and CD4 cell count among HIV clinic patients via group meetings and weekly peer phone calls. The comparison group received usual care or pager messaging only whereas the intervention group was offered peer support only or peer support with pager messaging. Participants in the intervention group were more likely to report 100% adherence compared to those in the comparison during the course of 3-months. However, adherence was not maintained at 6 or 9 months and no significant effects were observed on viral load or CD4 counts (Simoni et al., 2009). In light of the promising results highlighted in these two studies, no interventions listed in the MA chapter were specifically developed for Latinx populations.

Risk Reduction Interventions

Interventions possessing best- or good-evidence in the RR chapter seek to diminish the transmission and infection of HIV (CDC, 2023). The chapter contains 40 best-evidence and 17 good-evidence interventions, and these 57 EBIs are broken into three groups based on the intervention level of interest. Several of these interventions are also found in the SI, MA, or LRC chapter.
EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE

Eaton et al. (2011) implemented the *Think Twice* intervention in Atlanta, Georgia to
decrease the number of sexual partners, diminish unprotected sex, and form accurate beliefs and
perceptions of HIV risk among MSM. The intervention entailed a 40-minute guided discussion
and education session led by a peer counselor who assisted participants in developing their
sexual network diagram and a risk-reduction plan. *Think Twice* participants reported fewer male
sex partners and instances of unprotected sex at 1-month follow-up and fewer male sex partners
at 3-month follow-up compared to the control group, thus reducing the risk of HIV infections
among MSM (Eaton et al., 2011). The *Young Men's Health Project* directed by Parsons et al.
(2014) consisted of four, 1-hour motivational interviewing (MI) sessions to decrease risky sex
and drug use among a high-risk group of young gay and bisexual men in New York City.
Unprotected anal intercourse decreased by 24% and drug use declined by 18% in the intervention
group compared to those in the content-matched education condition demonstrating the effects of
a brief MI intervention on reducing risky behavior (Parsons et al., 2014).

The RR chapter contains 8 interventions that specifically targeted the Hispanic/Latino
population, most of which are group-level interventions and classified as best-evidence. A
community-based intervention known as *HoMBReS* was designed by Rhodes et al. (2009) to
increase HIV testing and condom use among Latino men in rural North Carolina. Thirty out of
89 soccer teams were randomly selected to partake in the study. Each team in the intervention
group received support from an elected teammate who served as a lay health adviser, opinion
leader, and community advocate. In contrast to the comparison group, intervention participants
were more likely to report greater condom use, HIV testing, self-efficacy, and knowledge about
transmission and prevention (Rhodes et al., 2009).
Similarly, O’Donnell et al. (2014) adapted O’Donnell et al.’s (1995) video intervention to develop No Excuses/Sin Buscar Excusas, a single 45-min video session and group discussion intervention led by a peer counselor aimed at reducing risky sex behaviors and increase condom use among Latino MSM. Participants in Sin Buscar Excusas reported fewer instances of unprotected sex, greater condom use, and increased HIV testing compared to the comparison group who was only offered an HIV test (O’Donnell et al., 2014). Significant findings were also communicated by Rhodes et al. (2017) as Hispanic/Latino participants in the HOLA en Grupos group-level intervention were more likely to report consistent condom use and HIV testing. The intervention delivered four interactive modules on HIV transmission and prevention, skills building, group discussions, and addressed cultural values such as machismo and fatalism, whereas the comparison group received information on general health topics among Hispanic/Latino MSM (Rhodes et al., 2017).

**Mental Health Approaches**

A few interventions in the CDC’s Compendium for HIV Prevention focused on psychological constructs or mental health approaches such as motivational interviewing by Miller (1983) to further assist PLWH. For instance, the Intensive Client-Centered Intervention detected that a higher risk for depression was associated with higher HIV stigma scores, and relied on strategies such as strengths-based counseling and MI to reduce stigma (Maskay et al., 2018). Another intervention led by Miller et al. (2018) integrated MI into their brief psychosocial counseling approach to facilitate ART initiation and medication adherence among participants. Furthermore, social workers and case managers in the Centralized HIV Services intervention used MI to enrich self-efficacy among young Black/African American and Hispanic/Latino patients (Davila et al., 2013).
EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE

The *Access NY Patient Navigation Program* directed by Messeri et al. (2020) relied on patient navigators trained in MI to reduce time to engagement or re-engagement and increase retention in HIV care. Strategies from Cognitive Behavioral Therapy (CBT) and MI were incorporated in *Project nGage* developed by Bouris et al. (2017) to improve retention in HIV care, ART adherence, and viral load suppression among young Black MSM. A linkage coordinator used a strengths-based approach in the *Modified Antiretroviral Treatment Access Study* implemented by Neduzhko et al. (2020) to enhance linkage and retention in HIV care by addressing depression, stigma, barriers, and substance use disorders. Similarly, a strengths-based counseling approach was used by care facilitators in the *Point of Care CD4 Count Testing* intervention by Hoffmann et al. (2017) to increase ART initiation by highlighting uncertainties and concerns about HIV stigma, linkage to care, and disclosure.

Cognitive remediation strategies along with stress management, coping with stigma and grief, and improving emotional health were applied by trained facilitators in the *Adapted Holistic Health Recovery Program* led by Attonito et al. (2020) to improve ART adherence and viral suppression. In their quest to assist HIV clinic patients, Kurth et al. (2014) incorporated theoretical frameworks such as the stages of change by Prochaska et al. (1994) and MI into their *CARE+* intervention to reduce HIV transmission risk and support ART adherence. Lastly, the *Health Living Project* developed by Johnson et al. (2007) used a cognitive behavioral approach to improve ART adherence and integrated physical, mental, and sexual components to enhance the quality of life of trial participants.

*Psychosocial Concerns*

Psychosocial concerns, such as depression and stigma, have been widely documented in the HIV/AIDS literature since the 1980s. For instance, Faulstich (1987) highlighted that
EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE
depression was a common psychiatric concern among patients with AIDS during a period when approximately 70% of all AIDS cases entailed homosexual and bisexual men as reported by the CDC (1985). Internal and external factors that heightened psychosocial stress and depression included ambivalence, negative societal reactions, discrimination, social isolation, and guilt about sexual practices (Faulstich, 1987). The interplay of depression was further emphasized by Ostrow et al. (1989) as they found an association between higher scores on the Center for Epidemiological Studies Depression (CES-D) Scale and self-reported physical symptoms of AIDS or HIV in a sample of 4,954 homosexual men. More recently, O’Cleirigh et al. (2015) communicated that more than 22% of 503 HIV gay/bisexual men met the screen-in criteria for a depressive mood disorder and asserted that psychiatric symptoms continue to be prevalent among HIV-infected men.

Roberts (1981) illustrated an early prevalence of depression among the Hispanic/Latino community of approximately 18–20%, falling near the National Comorbidity Survey estimate of 17.7% as reported by Bernal and Reyes (2008). However, as highlighted in the review by Sáez-Santiago and Bernal (2003), the prevalence of various Latino groups varied between 27.8% and 44%, which was higher than the 10.8% obtained by Alegría et al. (2008). In light of these differences, the literature agrees that depression is a mental health problem in the Hispanic/Latino population.

Zea et al. (2005), De Santis et al. (2012), Dang et al. (2012), Wohl et al. (2013), and De Santis et al. (2016) emphasized that depression is also common among Hispanic men with HIV due to a myriad of factors such as disclosure of HIV status, HIV and MSM stigma, poverty, low education, low SES, substance abuse, and adult physical violence. Moreover, prevalence rates between 69.2% and 74.8% revealed greater risk for depression among Latino sexual minority
EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE

men as conveyed by Rhodes et al. (2013), while Sun et al. (2016) proposed that higher levels of depressive symptoms in this group are linked to ethnic/racial and sexual discrimination. Sherr et al. (2011) underscored that about 60% of PLWH will experience depression and, therefore, it is imperative to provide adequate mental health treatments to support patients along the course of HIV infection.

A systematic review of interventions on HIV and depression containing a predominantly heterosexual, gay, and bisexual men sample size found that psychological interventions, especially those containing a cognitive-behavioral element, were effective whereas interventions that combined therapy with drugs were more effective than therapy or drug alone (Sherr et al. 2011). However, the results by Markowitz et al. (1998) favored interpersonal psychotherapy (IPT) over CBT due to its emphasis on psychosocial factors such as role transitions, disputes, bereavement, and interpersonal deficits. The review by Collado et al. (2016) identified CBT, IPT, and Problem-Solving Therapy (PST) as effective psychotherapeutic treatments for depression among Latinos. Although limited, adaptations of CBT and IPT have been implemented by Muñoz et al. (2000) and Markowitz et al. (2009) to better assist Hispanic/Latinos with depression by addressing cultural values and themes. Evidently, psychological treatments for depression such as CBT, IPT, and PST may also be appropriate interventions to implement when working with Hispanic/Latino MSM groups with HIV.

If left untreated, psychiatric symptoms like depression can interfere with HIV disease management (O’Cleirigh et al., 2015) and may continue to serve as a contributing factor to the high rates of HIV infection among Hispanic men (De Santis et al., 2016). More specifically, Crim et al. (2020) found that self-reported ART adherence was lower among HIV-positive Hispanic/Latino MSM with depression. Therefore, it is imperative to treat depression across the
EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE
continuum of HIV care to reduce HIV infections and improve the health of Hispanic/Latino MSM.

HIV-related stigma is a societal factor that impacts PLWH and places Hispanics/Latinos at a higher risk (CDC, 2021). Goffman (1963) described stigma as the process by which groups are viewed as socially undesirable and, consequently, are devalued by society. The HIV Stigma Framework (HSF) proposed by Earnshaw and Chaudoir (2009) views HIV as a stigma accompanied by three distinct mechanisms that can impact behavioral, psychological, and health outcomes of infected individuals. The HSF mechanisms include enacted, anticipated, and internalized stigma.

According to Scambler (1998), enacted or otherwise viewed as external stigma refers to the unfair treatment by others, which may result in withdrawal and restriction of social support. Discrimination, devaluation, and prejudice are three common examples of enacted stigma (Earnshaw & Chaudoir, 2009). Initially described by Markowitz (1998), anticipated stigma is the future expectation of rejection, discrimination, and prejudice from others. Lastly, internalized stigma entails an individual’s beliefs and feelings resulting in self-devaluation and fear of rejection as reported by Link (1987).

Turan et al. (2017) summarized that enacted stigma can hypothetically predict physical health whereas health care behaviors and interpersonal outcomes are predicted by anticipated stigma. Furthermore, affective, cognitive, health care behaviors, and mental health outcomes are hypothetically predicted by internalized stigma (Turan et al., 2017). These statements are consistent with the findings by Vanable et al. (2006) as they asserted that HIV-related stigma was associated with poorer medication adherence, depressive symptoms, greater HIV-related symptoms, and psychological adjustment. In terms of care, Pearson et al. (2021) found that
EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE

greater internalized HIV stigma was correlated with lower retention in care. Therefore, it is imperative to address HIV-related stigma to reduce the impact of these multiple factors and improve the well-being of PLWH.

Multiple forms of stigma are also prevalent in the Hispanic/Latino community. For instance, Ortiz-Sánchez et al. (2017) assessed various expressions of stigma among HIV-positive gay, bisexual, and other men who have sex with men (GBMSM) in Puerto Rico. The team found that nearly half of the participants endorsed moderate to severe perceived gay stigma, 68.4% indicated moderate to severe hidden-gay stigma, and moderate to severe HIV-felt stigma was reported by 30.6% of participants (Ortiz-Sánchez et al., 2017). Levison et al. (2017) communicated that HIV related stigma and homophobia were related to retention in HIV primary care in Latino communities, which is consistent with the findings by Rajabiun et al. (2008) as Latinos were more likely to report stigma surrounding disclosure of HIV status and sexual orientation as perceived barriers to engagement in care.

Considering that stigma is a prominent barrier to Hispanic/Latino engagement in HIV care as elucidated by Levison et al. (2018), Martinez (2019) presented a list of programs and interventions aimed at reducing HIV-related stigma and disparities among sexual and gender minority Latinx groups. Ortiz-Sánchez et al. (2015) developed Contacto to increase stigma management and reduce HIV transmission. The intervention used MI techniques to assist Hispanic/Latino MSM with HIV in identifying obstacles and a plan for change to overcome stigma when using healthcare services. Martinez et al. (2018) created Connecting Latinos en Parejas, which is a bio-behavioral prevention and treatment intervention to assist Latino men and their same-sex partners in areas such as routine HIV testing and adherence to HIV treatment. SOMOS by Vega et al. (2011) and the Trans Equity Project by Martinez et al. (2019) are
individual- and group-level interventions that encourage community activism and provide leadership opportunities to decrease stigma. *HOLA en Grupos* is a risk reduction group-level intervention also found in the CDC’s Compendium that provides information on HIV transmission and prevention, and addresses cultural values to increase condom use and HIV testing among Hispanic/Latino MSM (Rhodes et al., 2017). However, more interventions are needed to combat stigma and ensure that Latinx MSM receive adequate care along the continuum of HIV infection.

*The Role of Syndemic Theory and Conditions*

The social determinants of health among Latinx MSM with HIV align closely with the premise of Singer’s (2009) Syndemics Theory. Originally coined by Singer (1994), the term syndemic and principles of the theory refer to the interactions, co-existence, and dynamic interplay of multiple epidemics, adverse social conditions, and individual factors that continue to impact the same group of people (Singer, 2009). In their quest to observe the syndemic effects of four psychosocial health problems in approximately 3,000 urban MSM, Stall et al. (2003) found that high risk sexual behavior and HIV infection was positively associated with greater amounts of health problems such as polydrug use, depression, childhood sex abuse, and partner violence. Remarkably, the percentage of high-risk sexual behavior steadily increased from 7.1% among MSM with none of the four health problems to 22.5% for those impacted by 3 or 4 problems, which underscores the syndemic interplay between psychosocial factors and HIV risk. Similarly, Mustanski et al. (2007) examined the additive effects of mental health, substance abuse, and exposure to violence on HIV risk among 310 ethnically diverse young MSM. Findings revealed that the amount of psychosocial health problems increased a person’s HIV risk and the addition of each problem increased the probability of an HIV-positive status by 42%, while being the
EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE

victim of violence and substance use demonstrated the strongest association to HIV risk and sexual health (Mustanski et al., 2007).

González-Guarda et al. (2011) presented the Syndemic Model of Substance Abuse, Intimate Partner Violence, HIV Infection, and Mental Health among Hispanics to foster the development of comprehensive interventions focusing on eradicating health disparities. The framework is an extension of Singer’s (1996) syndemic model, which highlights the interaction of substance abuse, violence, and AIDS (SAVA). However, the updated model takes into the account the heterogeneity that exists in the Hispanic community in regards to acculturation, the epidemiology of HIV, SES, and risk/protective factors.

Substance abuse, intimate partner violence, HIV infection, and mental health are displayed in the inner layer of the model and represent four syndemic conditions that are more likely to affect the Hispanic community (González-Guarda et al., 2011). The outer layer contains risk and protective factors consisting of individual, cultural, relationship, and socio-environmental factors that influence each other and link the four syndemic conditions. Individual factors are broken into intrinsic and extrinsic variables such as self-esteem and education. Cultural factors encompass acculturation, Hispanic stress, familism, traditional gender norms, and religion. Connection to community organizations/institutions, relationship conflict, and family conflict are three examples of relationships factors whereas discrimination, poverty, and access to culturally sensitive services operate as socio-environmental factors.

Wilson et al. (2014) accentuated the interaction between structural, social, behavioral, and biological factors that can make Latino and Black men more susceptible to acquiring HIV. They proposed a syndemic model to illustrate four epidemics that affect Black and Latino men, and contribute to poor health outcomes. The epidemics entail substance abuse, trauma,
EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE

incarceration, and poverty, and are located in the inner layer of the model. The outer layer
contains the dynamic interplay of behavioral, social, and structural factors, which also interact
with the four epidemics. The proposed syndemic models and the body of evidence advocate for
the development of comprehensive, interdisciplinary, and tailored interventions to reduce health
disparities among Hispanics and marginalized groups rather than focusing on individual
conditions (González-Guarda et al., 2011; Wilson et al., 2014; Mustanski et al., 2007; Singer,
1996).

However, Walkup et al. (2008) communicated a few barriers that can impede the fruition
of comprehensive interventions to address syndemic conditions. Some of these barriers include
fragmentation of services, different regulations and licensing requirements encountered by health
care providers, funding sources per sector, and various approaches to care. Despite these
limitations, the syndemic field can give rise to a new wave of treatments and interventions to
fully assist the Latinx MSM community and reduce the number of HIV infections.

The Importance and Challenges of Medication Adherence

The advent of ART is a major accomplishment in the HIV community as it allows people
to maintain the virus under control. Although there is no cure for HIV, the CDC (2021)
communicates that ART can reduce the quantity of HIV in a person’s body and recommends
treatment for everyone living with the virus regardless of where they are in the continuum of
HIV infection. Delaying treatment can harm the immune system, increase a person’s risk of
transmitting HIV to others, and place a person at a higher risk for developing AIDS or other
opportunistic infections (CDC, 2021). Lymphoma, tuberculosis, and Kaposi’s sarcoma are three
common examples of opportunistic infections that a person with HIV can develop if left
untreated (CDC, 2021). Paterson et al. (2000) reported that 95% or greater adherence is optimal
EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE
to ensure superior virologic outcome, higher CD4 lymphocyte count, and lower hospitalizations.
It is recommended for a person to work closely with a health care provider to maintain a viral suppression of 200 copies of HIV per milliliter of blood, manage any side effects, and develop an adequate treatment plan (CDC, 2021).

Adherence facilitators and barriers have been noted among the Latinx MSM community. Carey et al. (2019) identified 15 factors associated with taking ART after conducting 84 semi-structured interviews with Black/African American and Hispanic/Latino MSM with HIV. The factors appeared under four overarching themes. Precursors to Taking ART included denial of HIV diagnosis, feeling sick, and not taking ART based on the recommendation of their doctor. Encouragement from others, having an HIV treatment plan, increased motivation after seeing improvements, keeping ART medication visible, and finding ways to suppress side effects were illustrated as Patient-level Factors. Positive experiences with providers, especially providers who are “straightforward” and provide a clear description of HIV treatment, and the ability for a patient to understand the information and ask questions fell under Provider-Patient Interaction Factors. Lastly, Care Facility Factors entailed a convenient location of HIV care facility and a “one-stop shop” care facility (Carey et al., 2019).

The report by Crim et al. (2020) evaluated ART adherence and barriers among 1,673 Hispanic/Latino MSM with HIV between 2015–2019. Predictors of lower ART adherence included poverty, younger age, recent drug use, depression, and unmet needs for ancillary services, and forgetting (63.1%) was the common factor for missing ART doses. Furthermore, it was suggested that increasing access to ancillary services such as financial support, assistance with housing and food, and counseling for mental health and substance use disorders, may enhance clinical outcomes among Hispanic/Latino MSM (Crim et al., 2020). These findings are
EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE
consistent with the clinical implications proposed by syndemics theory and relevant syndemic models for Hispanic/Latino groups (Singer, 2009; González-Guarda et al., 2011; Wilson et al., 2014). Other challenges that can impede access to prevention and treatment services as reported by Guilamo-Ramos et al. (2020) and Chen et al. (2012) include language barriers, immigration status, acculturation, social norms surrounding health care seeking and utilization, lack of health insurance, and stigma.

The National Center for HIV/AIDS, Viral Hepatitis, STD, and TB prevention (2016) indicated that in 2015 60% of Hispanics/Latinos with HIV received care whereas 1 in 5 were not retained in care. More recently, the CDC (2020) reported that for every 100 Hispanics/Latinos with HIV in 2018, 61 received some HIV care, 49 were retained in care, and 53 were virally suppressed. In fact, Hispanic/Latinos have lower viral suppression rates compared to the rest of the population with HIV (CDC, 2020). Therefore, Hispanic/Latinos may not be fully benefiting from ART and may be at a higher risk of transmitting HIV to others. Access to ART and sustained medication adherence is vital to improve health outcomes, allow people to live longer, and reduce HIV infections. However, there are no medication adherence interventions in the CDC’s Compendium that were developed for Latinx groups. Relevant interventions might exist in the field but perhaps they have not met the criteria to be included in the CDC’s Compendium or considered to be evidence-based. Nonetheless, the body of evidence revealed that interventions are needed to address the needs of Latinx MSM with HIV as they are the largest group in the Latinx community affected by the virus.

**Justification of the Current Project**

Reducing HIV stigma, enhancing treatment accessibility, developing tailored behavioral interventions, and recognizing community diversity are essential areas needed to enhance
EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE

national HIV efforts specifically for Hispanics/Latinos (Guilamo-Ramos et al., 2020). The proposed study focused on ART adherence interventions as considerable support is needed in the field. In light of the available interventions to increase medication adherence (CDC, 2023), interventions that targeted or were designed specifically for Latinx MSM with HIV in the U.S. warrant a systematic review to highlight the state of the literature and guide future research. Considering that Latinx MSM continue to be disproportionately affected by HIV, the study examined the effects of interventions on ART adherence to assist people in controlling the virus, remain healthy, and protect others from contracting HIV.
EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE

METHOD

Overview of the Methodology

Uman (2011) explained that a systematic review entails an extensive plan and search strategy to identify, appraise, and synthesize all relevant studies in a given topic. The review can ultimately illustrate what tends to work or not work (Uman, 2011), and help facilitate the development of future interventions. Morling (2015) defined a meta-analysis as a quantitative technique that averages the results of multiple studies and produces a single mathematical estimate to highlight the magnitude or the effect size of a relationship. More specifically, a meta-analysis can communicate the strength of the association between two variables (Uman, 2011) and derive conclusions about a set of interventions.

The systematic review followed the framework by Muka et al. (2020), which is a step-by-step model to assist healthcare professionals and researchers in formulating a methodology. In addition, the systematic review was organized, executed, and reported per the recommendations of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines by Moher et al. (2010) and Page et al. (2021).

Research Question and Aims

The systematic review aimed to answer the following research question, which included essential components of PICO (Population, Intervention, Comparison(s), and Outcome) as discussed by Richardson et al. (1995) and Counsell (1997): What are the effects of interventions aimed at improving ART adherence for the treatment of adult Latinx MSM with HIV? The following aims helped answer the research question:

Aim 1: Identify interventions designed to increase ART adherence among Latinx MSM with HIV in the U.S.
EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE

Aim 2: Review the extent of cultural adaptations or modifications in interventions aimed at increasing ART adherence among Latinx MSM with HIV

Aim 3: Compare interventions to determine which interventions are the most effective for increasing ART adherence among Latinx MSM with HIV

The Research Team

Dr. David Martinez, Ph.D. was originally the chair of the systematic review. Due to Dr. Martinez’s leave of absence, Dr. Dellanira Garcia, Ph.D. became the new dissertation chair and the new committee members included Dr. William Hua, Ph.D. and Dr. Michelle Montagno, Psy.D. from the University of San Francisco (USF). Claire Sharifi, a Reference Librarian and the Nursing and Health Sciences liaison at USF, assisted in developing the search strategies. A third-year doctoral level student in the Doctor of Psychology (PsyD) program at USF functioned as a research assistant and helped during the coding and data extraction process.

Inclusion/Exclusion Selection Criteria

The subsequent criteria were implemented to identify eligible studies to be included in the systematic review.

Timeframe

According to the National Institute of Allergy and Infectious Diseases (2021), azidothymidine (AZT) was the first drug approved by the Food and Drug Administration (FDA) in 1987 to treat HIV. Therefore, published and unpublished studies that evaluated the effects of an intervention between 1987 and 2021 were eligible to partake in the systematic review.

Study Design of Interest

The systematic review focused on experimental quantitative studies conducted in the U.S. Randomized controlled trials (RCT), quasi-experimental designs (QED), and small-N designs
EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE

were of particular interest as they seek to establish a causal relationship between an intervention and a dependent variable. Researchers in an RCT have more experimental control to make a robust causal claim whereas the control may be limited in QED and small-N designs (Morling, 2015). Despite these differences, the three designs can provide quantitative data between an intervention and ART adherence.

Population Criteria

The population of interest entailed HIV-positive adult Latinx MSM who were ART-experienced or -naive. Participants in the studies needed to be HIV-positive regardless of the stage of disease (stage 0, 1, 2, 3 [AIDS], or unknown) (CDC, 2020). They must have been at least 18 years of age, as the diagnosis of HIV infection is much greater for Hispanic/Latino adults than younger Hispanic/Latino groups (CDC, 2022). For instance, the number of reported infections for age groups 20-24 and 30-34 in 2020 were 1,047 and 1,187 compared to 3 and 252 for age groups 13-14 and 15-19 (CDC, 2022).

English, Spanish, or bilingual speaking participants of any SES, education level, or citizenship status must have identified as Latinx of any race/ethnicity such as Latino/a, Puerto Rican, Hispanic, Hispanic American, Mexican, Mexican American, Latin/Central/South American, Spanish, or multicultural. An array of racial/ethnic identities, language differences, SES, and citizenship status were taken into account to highlight the heterogeneity among Latinx groups and to ensure cultural inclusivity. In addition, studies had to include a sizable sample of Latinx MSM or conducted analyses to determine whether this group moderated intervention results, or compared medication adherence differences between Latinx MSM and other racial/ethnic groups, or included race/ethnicity as a covariate.
EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE

The term MSM refers to the sexual behavior between men regardless of relevant identities or characteristics such as sexual orientation or gender (Glick et al., 1994). Out of 6,885 reported infections in the Hispanic/Latino male category in 2020, the Hispanic/Latino male-to-male sexual contact subcategory was the highest with 6,176 infections (CDC, 2022) demonstrating a critical need to assist the MSM population. According to Kalichman et al. (2016), ART-experienced refers to participants already receiving ART whereas ART-naive entails people who are unaware of ART or have not initiated ART as communicated by Koenig et al. (2008). The systematic review focused on both groups to encompass all study participants regardless of their ART knowledge or medication history.

**Intervention Selection Criteria**

The eligibility criteria in selecting an intervention, which represented the independent variable, was created using the Template for Intervention Description and Replication (TIDieR) guidelines developed by Hoffman et al. (2014). A study must have evaluated the effects of an intervention that contained at least one ART adherence outcome measure. Any intervention of different levels (e.g., individual, group), types (e.g., medical, social, behavioral), modalities (e.g., CBT, MI, supportive), durations (at least 1 session), adaptations (e.g., CBT, MI, supportive), modifications (e.g., language, number of sessions), modes of delivery (e.g., face-to-face, telephone, internet), materials used (e.g., physical, technological), languages (English, Spanish, or both), settings (e.g., urban, rural), and publication status (published or unpublished) were considered to obtain a comprehensive account of all available interventions delivered in the U.S.

**Comparison**

A study must have compared the results of the intervention group with a comparison group to substantiate any observed effects. The TIDieR checklist was also used to develop the
EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE

Comparison group criteria (Hoffman et al., 2014). Any intervention of different levels (e.g., individual, group), types (e.g., medical, social, behavioral), modalities (e.g., CBT, MI, supportive), durations (at least 1 session), adaptations (e.g., CBT, MI, supportive), modifications (e.g., language, number of sessions), modes of delivery (e.g., face-to-face, telephone, internet), materials used (e.g., physical, technological), languages (English, Spanish, or both), settings (e.g., urban, rural), and publication status (published or unpublished) were considered to obtain a thorough account of all available comparison groups observed in the U.S.

Comparison groups classified in a variety of ways such as control group(s), treatment as usual (TAU), care as usual, usual care, no treatment, or waiting list were also considered. For instance, a counseling control arm was used in a phone delivered support counseling intervention (Kalichman et al., 2016), the Project HEART study used a standard-of-care control group (Koenig et al., 2008), and the CARE+ study used a computerized risk-assessment only group (Kurth et al., 2014). The absence of a control group was also allowed to include eligible studies that used QED or small-N designs.

Outcomes

Castillo-Mancilla and Haberer (2018) illustrated subjective and objective ways that ART adherence has been measured in HIV research and clinical care, which represented the dependent variable of interest in the systematic review. Outcome measures, each with their unique set of advantages and disadvantages, include self-report, pill counts, pharmacy refills, HIV RNA, drug levels (plasma, urine, saliva), antiretroviral drug concentrations in hair and dried blood spots, real-time adherence monitoring, and electronic adherence monitoring such as the medication event monitoring system (MEMS) (Castillo-Mancilla & Haberer, 2018). For instance, self-report measures are easy to administer but are subject to social desirability bias, whereas drug levels
EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE
depict objective patterns of adherence yet they are expensive to perform (Castillo-Mancilla & Haberer, 2018). Nonetheless, eligible studies needed to contain quantitative measures of adherence to partake in the systematic review. Any of the subjective and objective measures mentioned above or other methods of data collection sufficed as long as they produced quantitative measures.

In addition, eligible studies must have provided pre- and post-intervention adherence outcomes, and contained follow-up assessments at 3, 6, 9, or 12 months, which have been commonly used in research. For example, the phone delivered support counseling intervention provided adherence data from baseline to 12 months post-initiation (Kalichman et al., 2016), adherence was measured monthly for 6 months post-initiation of Project HEART (Koenig et al., 2008), and adherence was measured at 3-, 6-, and 9-months post-initiation of CARE+ (Kurth et al., 2014).

**Exclusion Criteria**

Studies that did not meet the eligibility criteria were not considered for the systematic review. Other exclusion criteria included studies with non-human samples, RCTs investigating several interventions, studies with incomplete information or lack of quantitative data, systematic reviews and meta-analysis, studies conducted outside the U.S., and studies reported in other languages other than English, Spanish, or the combination of the two.

**Data Collection Form**

A codebook was created in a Microsoft Word document to extract essential data from each eligible study. Items on the codebook coincided with each element of PICO and the inclusion criteria. For instance, the intervention section in the codebook contained information on the intervention level, type, modality, duration, adaptation, modification, mode of delivery,
and materials used. The codebook was revised at least three times to ensure that it was practical and fluid to use.

An Excel spreadsheet was then created and functioned as a data collection form to visually observe the similarities and differences between the studies in the final sample. The following items were also recommended to include in the data collection form (Muka et al., 2020): (1) investigator name(s), (2) year of the study, (3) funding source, (4) number of participants, (5) characteristics of the intervention/comparison group (e.g., age, sex, ethnicity), (6) distribution in the study population, (7) outcome measures, (8) assessment method, (9) statistical analysis used, and (10) results.

**Databases and the Search Strategies**

In their quest to establish a combined list of databases to enhance a literature search, Bramer et al. (2017) found that MEDLINE, Embase, Google Scholar, and Web of Science Core Collection yielded 100% recall in 72% of systematic reviews and an overall recall of 98.3%. Cuijpers (2016) also recommended using the Cochrane Central Register of Controlled Trials database, PubMed, PsycINFO, CINAHL, Bibliomap, ProQuest, and the Database of Abstracts of Reviews of Effects. However, the following databases were considered based on the nature of the study, relevance, and research aims. The databases of interest included PubMed, PsycINFO, CINAHL, SCOPUS, ProQuest, and Google Scholar. Search terms and strings highlighting the components of PICO included boolean operators (AND, OR, and NOT), truncations (*), and search filters.

**Collecting References and Abstracts, and Removing Duplicates**

Zotero was used to import and store all collected references and abstracts gathered from each database. Duplicated sources were removed and the final list in Zotero was transferred to an
EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE

Excel spreadsheet titled, Database Search, where records were listed based on their title and author(s).

**Contacting Experts and Gathering Additional References**

Seventeen primary authors were contacted via email to inquire about ongoing or missing studies. For instance, Dr. Bogart was the primary author of the Bogart et al. (2021) study that evaluated the effects of an intervention to improve ART adherence among Latinx sexual minority men. Primary authors were also asked if their teams were willing to share the data for the Latinx participants in their sample in addition to asking how many of the adult Latinx participants identified as MSM. An Excel spreadsheet was created to keep track of the contact information, electronic responses, and follow-up emails. Rothstein and Hopewell (2009) illustrated the importance of searching the grey literature to find additional sources that are not accessible in electronic databases to increase the validity of a systematic review while diminishing publication, availability, and citation bias. Recommended grey literature strategies that were performed included backward searching and internet searching.

For example, a backward search entailed scanning the reference list of potential eligible studies to obtain more additional sources. These additional sources were transferred onto two separate Excel spreadsheets titled, Backward Search and CDC Compendium MA Chapter Backward Search, where records were listed based on their title, author, observations made, and reasons for inclusion or exclusion. The National Library of Medicine’s database found at www.clinicaltrials.gov was examined for additional sources as the database provides updated information of clinical studies being conducted in the U.S.

**Screening Titles & Abstracts and Retrieving Full Texts**
EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE

Inclusion, exclusion, and pending review folders were created in Zotero to separate articles accordingly during the screening process. Titles and abstracts were screened directly in Zotero or via an electronic copy of a study. Studies were selected if they met the inclusion criteria and elements of PICO. For instance, titles must have included aspects of the independent and dependent variable, which entailed any type of intervention and ART adherence. Abstracts should have stated the purpose, methods, and results of the study. Methods of interest included RCTs, QEDs, or small-N designs. Results needed to communicate quantitative outcome measures consisting of pre- and post-intervention data or follow-up assessments of adherence.

Studies that met the inclusion criteria and elements of PICO were placed in the inclusion folder. Ineligible studies were stored in the exclusion folder and the pending review folder contained studies with unclear information. Full texts of eligible studies in the inclusion folder were retrieved from the USF library database, the interlibrary loan service, or online.

**Screening Full Texts**

Full texts of eligible studies were screened using the extensive inclusion and exclusion criteria. Eligible studies were placed into another folder titled *Inclusion - Screening Full Texts* folder in Zotero and the *Exclusion - Screening Full Texts* folder contained ineligible studies. The codebook was used to extract pertinent information from eligible studies. The data gathered from the coding process was then transferred to an Excel spreadsheet.

**Final Selection of Full Texts Using the PRISMA Flow Diagram**

The four categories of the PRISMA flow diagram by Page et al. (2021) were completed to justify the final selection of full texts. The number of articles obtained through database searching and other sources were listed in the *Identification* category. Removal of articles based on titles, abstracts, duplicates, and full texts were highlighted in the *Screening* category. The
EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE

Eligibility category contained the number of records assessed for eligibility and a list of reasons why certain articles were excluded. Lastly, the total number of full texts eligible to partake in the systematic review were listed in the Included category.

Assessing Study Quality and Risk of Bias

Quality illustrates how a study was designed and conducted whereas risk of bias describes the “weak spots” of a study (Cuijpers, 2016; Muka et al., 2020). Poor quality and high risk of bias are not ideal in a systematic review as it may lead to faulty or biased results. Cuijpers (2016) recommended to assess risk of bias more than quality as there are no set guidelines to ascertain what is high quality. Thus, it is important to assess risk of bias to disseminate confident conclusions (Muka et al., 2020).

The seven domains of the Risk of Bias in Non-Randomised Studies of Interventions (ROBINS-I) by Sterne et al. (2016) were used to classify the overall risk of non-randomized studies. The domains constituted: (1) bias due to confounding; (2) bias in selection of participants into the study; (3) bias in classification of interventions; (4) bias due to deviations from intended interventions; (5) bias due to missing data; (6) bias in measurement of outcomes; and (7) bias in selection of the reported result (Sterne et al., 2016).

The five domains of the Revised Tool for Assessing Risk of Bias in Randomised Trials (RoB 2) by Sterne et al. (2019) was used to classify the overall risk of RCTs. The domains included: (1) bias arising from the randomisation process; (2) bias due to deviations from intended interventions; (3) bias due to missing outcome data; (4) bias in measurement of the outcome; and (5) bias in selection of the reported result (Sterne et al., 2019). An in-depth explanation and justification of the results of the ROBINS-I and RoB 2 are communicated in the results section.
EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE

**Descriptive Synthesis**

According to Page et al. (2021), it is recommended to include a concise summary of the study characteristics and their risk of bias in the results section. Hence, the three aims of the systematic review, elements of PICO (Richardson et al., 1995; Counsell, 1997) per study, the risk of bias judgments, and general results were used to synthesize the findings. The following synthesis also helped answer the proposed research question: What are the effects of interventions aimed at improving ART adherence for the treatment of adult Latinx MSM with HIV?

**Meta-Analysis**

A meta-analysis was preplanned based on the number of studies in the final sample and similarities across studies. Quantitative data was planned to be transferred to SPSS to perform subsequent analyses. Analyses of interest included effect sizes, a pooled effect size, statistical heterogeneity, and a random effects model to synthesize the data (Muka et al., 2020).

The essence of a meta-analysis is to standardize the effect sizes from multiple studies and calculate the pooled effect size. Pooling consists of calculating the mean of the effect sizes to obtain an approximate “true” effect size of the final sample (Cuijpers, 2016). Effect sizes of interest included odds ratio (OR), risk difference (RD), mean difference (MD), and the standardized mean difference (SMD) (Muka et al., 2020). Depending on the nature of the effect sizes, Cohen’s $d$, Hedges’ $g$, or Glass’s $\Delta$ for continuous outcomes, or relative risk (RR), OR, or RD for dichotomous outcomes were going to be considered as they are commonly used in research to standardize effect sizes (Cuijpers, 2016). After standardizing the effect sizes into one measure, the degree of statistical heterogeneity was going to determine whether or not to calculate the pooled effect size (Muka et al., 2020).
EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE

Statistical heterogeneity is a central issue as it highlights the variability in the effect sizes, and a forest plot and Higgins’ $I^2$ were preplanned to evaluate this type of variability (Cuijpers, 2016; Muka et al., 2020). A random effects model was going to be used as the statistical technique to synthesize the evidence. The assumptions of a random effects model are that studies are not identical, heterogeneity exists, and effect sizes will vary among studies (Cuijpers, 2016; Muka et al., 2020).
EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE

RESULTS

The PRISMA guidelines (Moher et al., 2010; Page et al., 2021) were used to communicate the results of the systematic review. The results section contains the following items: 1) Study selection; 2) Study characteristics; 3) Intervention characteristics; 4) Risk of bias within studies; 5) Results of the ROBINS-I; 6) Results of the RoB 2; 7) Results of individual studies; and 8) Descriptive synthesis of the results.

Study Selection

The search strategies were developed and finalized using the components of PICO and the inclusion criteria. The databases of interest included PubMed, PsycINFO, CINAHL, SCOPUS, ProQuest Theses & Dissertations, and Google Scholar. The search strategies were tailored to each database and contained suitable search terms and strings. The search process was executed and the results were recorded in Table 1, which can be found under Tables and Figures. The PRISMA flow diagram of the study selection process is depicted in Appendix A as illustrated under Appendices.

A total of 724 records were acquired through database searching, which consisted of 140 records from PubMed, 51 from PsycINFO, 67 from CINAHL, 117 from SCOPUS, 17 from ProQuest Theses & Dissertations, and 332 from Google Scholar. A total of 107 additional records were gathered through other sources. For instance, a backward search was performed by scanning the reference list of published studies and 59 records were selected. The Medication Adherence (MA) chapter of the CDC Compendium of Evidenced-Based Interventions and Best Practices for HIV prevention was scrutinized and 19 records were obtained. Experts in the field were contacted via email to inquire about additional studies and 29 records were gathered. An
EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE

expert in the field suggested to peruse the NIH RePorter, but no pertinent records or current ongoing studies were found.

Zotero was used to import the records obtained during the search process. A grand total of 831 records collected through database searching and other sources were imported to Zotero. Duplicated items were removed from Zotero after records were merged and screened. A total of 598 records remained in Zotero after duplicates were removed.

Titles and abstracts of the 598 records in Zotero were screened for eligibility. The records were screened by taking into account the Population, Intervention, Comparison(s), and Outcome (PICO) (Richardson et al., 1995; Counsell, 1997) and the inclusion criteria. For instance, titles and abstracts had to include key items such as Latinx of any race/ethnicity, HIV+ MSM samples, relevant study designs, aspects of an intervention conducted in the U.S. to improve ART adherence, and a comparison group. A total of 74 records met most of these elements, and were placed in the Inclusion Articles Screening Titles & Abstracts folder in Zotero. A total of 524 records did not meet the components of PICO or the inclusion criteria, and were placed in the Exclusion Articles Screening Titles & Abstracts folder in Zotero.

The full-text articles of the 74 records in the Inclusion Articles Screening Titles & Abstracts folder were gathered to further assess for eligibility. Full-text articles were obtained primarily from database or online searching. The Interlibrary Loan service offered through USF was also used to gather full-text articles that were not easily accessible online. Once gathered, the 74 full-text articles were fully read and scrutinized using the components of PICO and the inclusion criteria. Full-text articles were excluded if they did not contain a sample of Latinx HIV+ individuals or quantitative data to substantiate improvements in ART adherence. A total of 18 full-text articles met elements of PICO and the inclusion criteria, and were placed in the
EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE

Inclusion Screening Full-Texts folder in Zotero. A total of 56 full-text articles records did not meet the components of PICO or the inclusion criteria, and were placed in the Exclusion Screening Full-Texts folder in Zotero.

The 18 full-text articles were read meticulously using the components of PICO and the inclusion criteria. Upon careful consideration, 8 articles were excluded as the researchers were unable to provide the dataset for the Hispanic/Latino HIV+ MSM or male subsample in their study, nor was it possible to extract the data for the population of interest directly from the articles. The 8 articles consisted of Horvath et al. (2019), Gwadz et al. (2015), Cunningham et al. (2018), Hightow-Weidman et al. (2021), Rotheram-Borus et al. (2004), Ellsworth et al. (2021), Wagner et al. (2006), and Milam et al. (2005). Four articles were excluded as the main authors did not reply to the emails, and it was not possible to extract the data for the population of interest directly from the articles. The 4 articles included Wohl et al. (2006), Cunningham et al. (2017), Brantley et al. (2018), and Arnold et al. (2021). The article by LeGrand et al. (2018) was excluded as the aim of the article was to describe the study protocol of the RCT, and the article did not contain a results section with quantitative data. The article by Wohl et al. (2009) was excluded as the study was an extension of the original RCT conducted by Wohl et al. (2006), and it did not contain new data.

Although 3 articles contained 100% Latinx samples and the majority were identified as male, the articles were marked as pending for further review and approval as the samples contained other gender identities. The outcome of the 3 pending articles is explained below. Only one article, Bogart et al. (2021), fully met the components of PICO and the inclusion criteria as it entailed a medication adherence intervention facilitated via an RCT, and 100% of their sample consisted of HIV+ Latinx sexual minority men. Dr. Bogart was contacted via email to inquire
EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE

about additional articles on the subject matter and to share this provisional finding. Dr. Bogart mentioned she did not know of other studies, and emphasized that there is a general tendency in the field to test one-size-fits-all interventions for adherence without cultural tailoring, which was consistent with the results observed during the search process.

Given these circumstances, the 18 full-text articles were revisited and screened once more before finalizing the search process. The Bogart et al. (2021) article continued to remain in the final sample after the second round of screening. The 3 pending articles were reassessed to be included in the final sample based on the following key elements.

The first article by van Servellen et al. (2003) described the effects of a health literacy and treatment enhancement program on ART adherence, which represents the independent and dependent variables of interest. The study also contained an intervention group, comparison group, and all participants identified as Latino HIV-infected adults. Although the sample contained Latino women, 87.8% of 41 participants in the intervention group and 92.5% of 40 participants in the comparison group were male, which is a substantive number of Latino male participants compared to the low percentages found in the 14 excluded articles. In spite of the minor differences, the van Servellen et al. (2003) article aligned well with the components of PICO and the inclusion criteria of the systematic review, and the data was able to be extracted directly from the article.

The second article by van Servellen et al. (2005) was a follow-up analysis of the original study by van Servellen et al. (2003) and it provided an essential aspect of the pilot sample. For instance, the study communicated that more than two thirds of the sample endorsed male to male encounters as the only potential cause of their HIV infection (Servellen et al., 2005), which alludes to the MSM term of interest. The study also provided more extractable data on adherence
EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE

measures. Although the van Servellen et al. (2005) is not a new study, it is worth noting the information in the systematic review as it contains relevant components of the inclusion criteria and it further justifies the importance of including the van Servellen et al. (2003) article into the final sample.

The third article by Kurth et al. (2016) described the effects of an adaptive, computer-based counseling tool on HIV-1 viral load, ART adherence, and sexual risk transmission, which coincide with the independent and dependent variables of the inclusion criteria. The study contained an intervention group, a control group, and all participants identified as Latino HIV-infected adults. Although the sample contained other gender identities, 68.0% of 153 participants in the intervention group and 69.4% of 207 participants in the control group were male, which is also a robust number of Latino male participants in contrast to the low percentages found in the 14 excluded articles. Amid the minor differences, the Kurth et al. (2016) article aligned well with the components of PICO and the inclusion criteria of this study, and the data was able to be extracted directly from the article.

Four articles were sufficient to proceed with the systematic review, but insufficient to conduct a meta-analysis due to the lack of studies and variability across the studies based on their methodologies and intervention characteristics. After much consideration, the systematic review and the final sample were approved by the dissertation committee, which culminated the study selection phase. The approved final sample consisted of van Servellen et al. (2003), van Servellen et al. (2005), Kurth et al. (2016), and Bogart et al. (2021).

Study & Intervention Characteristics

Table 2 highlights general characteristics of each study such as PICO and study design. The content in Table 3 followed the TIDieR guidelines (Hoffman et al., 2014) to describe
EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE

pertinent characteristics of the interventions. Tables 2 and 3 can be found under Tables and Figures. The following sections provide an in-depth account of each study and its respective intervention.


The study by van Servellen et al. (2003) was financially supported by a grant, the authors did not state whether or not there was a conflict of interest, and it was published in the journal of AIDS Patient Care and STDs. A quasi-experimental repeated measures design was executed to assess the acceptability and effectiveness of a group-level intervention titled Es Por La Vida on HIV health literacy and treatment adherence. The study was conducted in Los Angeles, CA and Latino participants were recruited from HIV community-based not-for-profit clinics. Participants were eligible to partake in the study if they identified as male or female and were at least 18 years of age. Other eligibility criteria entailed being monolingual Spanish-speaking or bilingual, and either self-reported or were identified by a clinician to have problems with medication adherence.

Participants were randomly assigned to either the intervention or the standard clinic care only comparison group using a table of random numbers. The study communicated the results of the final sample size after attrition consisting of 81 participants. Forty-one people were in the intervention group and 40 were in the comparison group. The intervention and comparison group contained 87.8% and 92.5% male participants respectively. The remainder of the participants in each group identified as female. The mean age, standard deviation (SD), and range of the intervention group was 41.90(8.47) [31–65]. The mean (SD) and range of the comparison group was 39.55(9.32) [21–78]. At least 78% of the participants reported having an education less than
EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE

12 years. At least 33% of the participants had an income less than or equal to $500 per month.

All participants were currently taking ART and they spoke Spanish.

The study outcomes included changes in healthy literacy, quality of provider-patient communication, adherence mastery, and medication adherence. Self-reported medication adherence was measured using the Adult AIDS Clinical Trials Group (ACTG) Adherence Baseline Questionnaire, which was modified for the purposes of this study. Participants were asked if they had taken their medications yesterday, 2 days ago, 3 days ago, and 4 days ago. The total amount of doses missed was considered the measure of level of adherence. Data analysis was conducted via univariate, descriptive, and comparison statistics including chi-squared analyses, means, and analysis of variance (ANOVA). Bivariate linear regression analyses and McNemar tests were applied to assess the effectiveness of Es Por La Vida. Data was collected at baseline and at 6-weeks.

A follow-up study was conducted by van Servellen et al. (2005) to communicate subsequent data analyses and results of Es Por La Vida obtained at baseline, 6 weeks, and 6 months. The van Servellen et al. (2005) article contained the exact study characteristics as those communicated by van Servellen et al. (2003) with the exception of a few items. For instance, participants were eligible to partake in the study if they had been on antiretroviral medications for at least 3 months and had a detectable viral load as elucidated in chart reviews. The team communicated that more than two thirds of the sample endorsed male to male encounters as the only potential cause of their HIV infection (van Servellen et al., 2005). Assessment measures for all participants were obtained via self-report and medical records at baseline, 6 weeks, and 6 months. Pertinent data extracted from medical records included CD4 counts, viral loads, and viral log changes. The team generated dichotomous variables to classify those with greater than
EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE

90% and greater than 95% medication adherence in the past 4 days. In addition to McNemar tests, the team relied on pooled \( t \) tests and Satterthwaite \( t \) tests to evaluate the effectiveness of Es Por La Vida on the outcomes of interest.

**Intervention Characteristics - van Servellen et al. (2003) & (2005)**

The intervention, Es Por La Vida, was developed by van Servellen et al. (2003) to enhance HIV health literacy and treatment adherence. The team conducted a literature review on ethnic minority populations and adherence, and proposed that interventions aimed at increasing HIV health literacy have the ability to improve antiretroviral treatment adherence and quality disease management. The team highlighted the need for more tailored programs specifically for low-income HIV-infected minority populations, such as Latinos, that can also help address multiple complexities affecting the population to intervene more effectively. Therefore, Es Por La Vida was developed and tailored to meet the needs of monolingual Spanish-speaking, Latino clients. Community experts, patients, health care providers from various disciplines, and the study’s research staff assisted in the creation of the program. The intervention included salient cultural themes such as simpatía, familialism, family roles, machismo, and marianismo.

The program was conducted at a community-based HIV clinic in Los Angeles where the participants were recruited. Bilingual treatment advocates and a nurse practitioner led the program. The study did not provide information on the provider’s expertise, background, or if they were given any specific training. The program consisted of five weekly instructional support module sessions scheduled during the week and a single 6-month follow-up. The study did not specify the time duration of each session or the follow-up. The instructional modules were delivered face-to-face in a group setting. Participants met with the nurse practitioner individually at the 6-month case management follow-up either on the phone or face-to-face.
EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE

The instructional support modules relied on cognitive-behavioral educational strategies to broaden participants’ knowledge and skills, improve HIV health literacy, increase treatment regimen confidence, and to teach assertive communication. Topics entailed barriers and facilitators of adherence management, quality of life, stress management, managing substance use, HIV transmission risk reduction, social support, effective family systems, and basic information on HIV/AIDS. Materials were written at the sixth-grade level. The study did not describe specific physical materials provided to the participants or used during the program delivery.

The instructional support modules were conducted in small groups. Materials were read during the sessions followed by a detailed, interactive group discussion. Participants met with the nurse practitioner if they had missed a session to cover the material and content before joining the next session. In accordance with the cultural theme of familialism, family members of the participants were encouraged to partake in the first and fifth session. The nurse practitioner relied on cognitive, behavioral, affective, and motivational interviewing strategies to minimize barriers to adherence during the 6-month follow-up case management session with each participant. Participants completed a baseline assessment and follow-ups at 6-weeks post-baseline. The study did not state whether the intervention was modified during the course of the study. Lastly, the study did not communicate if the intervention fidelity was assessed or if the intervention was delivered as planned.

Study Characteristics - Kurth et al. (2016)

The study by Kurth et al. (2016) was financially supported by an NIMH grant, the authors reported no conflict of interest, and it was published in the Journal of Medical Internet Research. A 12-month, longitudinal RCT design was applied to assess the impact of an
EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE

individual-level, computer-based counseling intervention titled CARE+ Spanish on ART adherence, sexual transmission risk behaviors, and HIV-1 viral loads. The study was conducted in New York, NY and Latino participants were recruited from three HIV clinic sites. Participants were eligible to partake in the study if they were monolingual Spanish-speaking or multilingual, at least 18 years of age, and on antiretrovirals.

Participants were randomly assigned by the CARE+ Spanish software to either the intervention or the standard clinical care control group. The study communicated the results of the final sample size after attrition consisting of 433 participants. Two hundred twenty-six participants were in the intervention group and 207 were in the control group. Approximately 68% of the final sample size identified as male. The remainder of the participants identified as female (~25%), unknown (~3%), or transgender (~2%). The mean age and SD of the intervention group was 46.8(9.7). The mean (SD) of the control group was 48.9(9.1). About 32% of the participants reported to have a high school diploma. Alcohol abuse was endorsed by at least 19% of the participants, which was the highest substance use related behavior followed by crack/cocaine (~11%) and methamphetamine use (~5%). All participants were currently taking ART and they spoke Spanish.

Relevant primary study outcomes included ART adherence, sexual transmission risk behaviors, and HIV-1 viral loads. Adherence to medications was measured using a 30-day visual analog scale (VAS) while HIV-1 viral loads were extracted from chart reviews. Although the study did not provide a description of the VAS system, Finitsis et al. (2016) explained that the VAS is a rating system used in HIV research which asks participants to mark their adherence typically on a scale of 0 and 100% during the past 30 days. Data analysis was facilitated using Fisher exact, Wilcoxon rank sum tests, and odds ratios. Linear and generalized mixed linear
EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE

effects models were applied to assess differences between the groups in relation to the primary outcomes. Cohen’s $f^2$ was used to illustrate effect sizes for group differences on viral load and 30-day VAS. At least 3 data points were collected from participants at 0, 3, 6, 9, and 12 months.

**Intervention Characteristics - Kurth et al. (2016)**

The Computer Assessment & Rx Education for HIV-positives (CARE+) was initially developed for an English-speaking population and it was found to be effective at reducing sexual transmission risk behaviors and improving medication adherence (Kurth et al., 2014). The intervention content aligned with theoretical frameworks such as social cognitive role modeling, information-motivation-behavior, motivational interviewing, and principles of chronic HIV disease self-management. Subsequently, CARE+ was translated into Spanish by Kurth et al. (2016) using the Technology Acceptance Model, and was adapted for Latinos as a form to close the gap in health promotion delivery.

The team relied on the forward-back translation method and consulted with various members during the development of CARE+ Spanish. Some of the members included a master’s level translator, an expert panel consisting of bilingual and bicultural clinical experts, a panel of bilingual HIV health care providers, and a local expert advisory panel composed of HIV providers and a Spanish-speaking person living with HIV. The computer-based counseling tool was piloted with HIV-positive Spanish-speaking individuals to evaluate its acceptability, usability, and feedback before conducting the RCT.

The intervention and the standard clinical care were conducted at HIV clinics in New York City where the participants were recruited. Participants received a $20 gift card for each session attended to cover transportation costs. Five intervention sessions were executed at 0, 3, 6, 9, and 12 months. The timeframe of each session was about 45 to 60 minutes. Intervention
EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE

sessions were arranged to occur during scheduled clinic visits. Each participant selected an avatar on the screen who guided them individually during the intervention. The intervention content was illustrated through audio narrations via a touchscreen computer located at the HIV clinic. Spanish-speaking peers, who also received care at the HIV clinics and had experience working with Spanish-speaking people living with HIV, were hired as study staff to support and assist participants navigate CARE+ Spanish.

A session included skill-building videos, a health plan, and a printed health plan. The video content consisted of healthy behaviors, provider relationships, and discussions about HIV. Participants also had the option to watch additional videos. A risk reduction health plan associated with ART adherence or safer sex practices tailored to each participant was printed at the end of the session. Participants had the option to share their plan with their health care provider. The intervention conducted a risk assessment and case managers conducted follow-ups and referrals for those experiencing severe depression, intimate partner violence, or suicidal ideation. Intervention participants also received standard clinical care. Outcome measures were gathered at 0, 3, 6, 9, and 12 months. The study did not state whether the intervention was modified during the course of the study. Lastly, the study did not communicate if the intervention fidelity was assessed or if the intervention was delivered as planned.

Study Characteristics - Bogart et al. (2021)

The study by Bogart et al. (2021) was also financially supported by an NIMH grant, the authors reported no conflict of interest, and it was published in the journal of AIDS and Behavior. A RCT design was implemented to assess whether a group-level, CBT intervention titled Siempre Seguiré would improve coping with intersectional discrimination and stigma, reduce medical mistrust, and increase ART adherence. The study was conducted within the
EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE

County of Los Angeles and Latinx sexual minority men (SMM) were recruited from a community-based organization that provides HIV social services. Participants were eligible to partake in the study if they were HIV positive, ever had sex with another man, biologically male, at least 18 years of age, and on or not currently taking ART.

Participants were randomly assigned to either the intervention or the wait-list control group using blocked one-to-one randomization. The study communicated the results of 76 participants at baseline and a final sample size after attrition at 7 months consisting of 64 participants. Thirty-eight people were in the intervention group and 38 were in the comparison group. The intervention and comparison group contained 100% Latinx SMM participants. The mean age and standard deviation (SD) of the total sample was 52.9(12.9). About 46% of the participants reported having less than a high school diploma. At least 27% of the participants had an annual income less than $5000. All participants were HIV+ and they spoke Spanish.

The study outcomes included ART adherence, coping with discrimination, medical mistrust, and internalized stigma. Adherence to ART was measured via self-report and electronically using a Medication Event Monitoring System (MEMS) bottle cap, which recorded the time and date each time the bottle was opened during a 7-month period. Participants were asked to estimate their adherence during the last month using VAS. Data analysis was facilitated via descriptive and comparison statistics including Fisher’s exact tests and t-tests. An intention-to-treat, repeated-measures regressions was applied to assess the effects of Siempre Seguiré on adherence. Data was collected at baseline, 4- and 7-months.

*Intervention Characteristics - Bogart et al. (2021)*

The community-based CBT group intervention, *Siempre Seguiré*, was developed to improve coping with intersectional discrimination and stigma, reduce medical mistrust, and
EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE

increase ART adherence. The team conducted a literature review focused on Latinx SMM and barriers to HIV treatment. The study proposed that stigma, discrimination, and medical mistrust can have a negative impact on health and influence ART non-adherence. The team highlighted the need for more tailored interventions specifically for HIV Latinx SMM to help address multiple factors affecting this population. Hence, *Siempre Seguiré* was developed and tailored to meet the needs of Spanish-speaking, Latinx SMM clients. The intervention relied on intersectionality theory and minority stress theory to address stigma and discrimination as means to build effective coping and improve ART adherence.

A community-based participatory research (CBPR) approach was implemented across all study phases composed of formalized structures and community participation. The community-academic team met with the organization’s Community Advisory Coalition composed of clients during the creation and development of the intervention, which is an essential aspect of CBPR. Salient intervention themes addressed via CBT and DBT techniques and psychoeducation included stigma due to HIV and related intersectionalities, discrimination in healthcare settings, and medical mistrust. The intervention was conducted in Spanish.

The intervention sessions and study activities were conducted at Bienestar Human Services Inc. in Los Angeles, which is a community-based social services organization that provides education and support programs to Latinx and LGBTQ+ populations. Employed staff at the organization were trained by the academic partners for this study. Two peer facilitators, who also identified as Latinx SMM and immigrants, were trained to lead the intervention sessions. One of the peer facilitators had group therapy expertise with Latinx SMM. A clinical social worker provided weekly supervision to the peer facilitators in areas such as general therapy skills and use of CBT. The senior author of the study supervised the clinical social worker. Participants
were recruited from within and outside the organization, and received a $20 gift card for each session attended to cover transportation costs.

Three sets of group sessions were executed during the course of 2 months. The program consisted of eight, face-to-face, approximately 90 minute weekly sessions. Seven sessions were content based and a graduation ceremony took place during the last session. The study did not specify the time duration of the graduation ceremony. A MEMS bottle cap was distributed to each participant at baseline. Psychoeducation on discrimination, HIV disparities, treatment adherence, ineffective coping, internalized stigma, and medical mistrust was delivered. Participants learned how to create a functional, chain analysis of a discrimination event, its consequences, and to recognize problematic links in the chain. Participants also completed an “Identity Pie” focusing on the whole person. Vignettes and take home activities allowed participants to practice their skills. Each intervention session included refreshments.

The intervention was interactive as discussions were guided by the experiences of group members. Participants shared personal healthcare-related examples and discrimination experiences. The intervention also relied on group discussions to build awareness on stigma, discrimination, disparities, medical mistrust, and syndemic conditions affecting communities of color. In addition, participants brainstormed ways to cope effectively and combat medical trust. The peer facilitators met with participants if they missed a session to cover the material and essential content. Participants completed a baseline assessment and follow-ups at 2-, 4-, 5- and 7-months post-baseline. Participants' electronic adherence data were downloaded by research assistants during post-baseline encounters. The study did not state whether the intervention was modified during the course of the study.
EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE

Compared to the other studies in the final sample, the authors of *Siempre Seguiré* provided information on how intervention fidelity was assessed. Standardized forms were completed by the peer facilitators individually after each session. The facilitators rated their protocol fidelity and if they had covered the necessary content. A clinical social worker, who also provided weekly supervision to the facilitators, listened to the recorded sessions and completed fidelity ratings. Results revealed high fidelity to intervention session content during the study as evidenced by an 88.4% rating agreement. In terms of whether the intervention content was covered during the sessions, the facilitators and the clinical social worker selected either 1-not at all, 2-somewhat covered, or 3-completely covered. Results indicated a 93.7% rating of 3 [M (SD) = 2.93 (0.28)] across the sessions.

*Risk of Bias within Studies*

Assessing risk of bias within studies helps to establish transparency of the results and findings obtained in a systematic review. The ROBINS-I and RoB 2 were utilized as both tools are meant to assess a study’s internal validity by evaluating pertinent domains (Sterne et al., 2016). The ROBINS-I assesses the risk of bias in non-randomized studies, which is why the tool was used to evaluate the van Servellen et al. (2003) study as it followed a quasi-experimental design. The RoB 2 evaluates the risk of bias in randomized trials. Hence, the RoB 2 was utilized to assess the studies by Kurth et al. (2016) and Bogart et al. (2021) since both followed an RCT design. Tables 4 and 5, as highlighted under Tables and Figures, illustrate the risk of bias evaluation per domain and the overall risk of bias for the non-RCT study and the two RCT studies, respectively. The subsequent sections provide a summary of the domains and justifications to substantiate each rating.

*Results of the ROBINS-I - van Servellen et al. (2003)*
EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE

Seven domains are present in the ROBINS-I (Sterne et al., 2016) and each domain was assessed to attain a study’s overall risk of bias. The seven domains include bias due to confounding, bias in selection of participants into the study, bias in classification of interventions, bias due to deviations from intended interventions, bias due to missing data, bias in measurement of outcomes, and bias in selection of the reported results. Rating options for each domain include low, moderate, serious, and critical risk of bias. An additional rating of no information is available in the event there is insufficient data to support one’s judgment.

A rating on one particular domain is able to determine the overall risk of bias. For instance, if a domain was observed to possess critical risk of bias while the other six were assessed as either low or moderate, then a study’s overall risk of bias will be at the critical level of risk. Therefore, the detailed guidance and the signaling questions provided by the ROBINS-I were used to appropriately assess each domain.

Bias due to confounding is the first domain in the ROBINS-I where confounding is defined as a pre-intervention prognostic factor or variable at baseline that anticipates whether a participant receives a particular intervention or may influence treatment decisions (Sterne et al., 2016). Overall, the bias due to confounding domain was assigned a moderate risk of bias classification because confounding was expected and confounding domains were controlled for and measured adequately with reliable and valid measures. For example, the van Servellen et al. (2003) study obtained baseline measures of CD4 counts, viral load, treatment indicators, level of health literacy, perceived adherence mastery, and adherence behaviors from participants. Hence, there was a potential for baseline confounding, which is likely to be an area of concern in most or all non-randomized studies of interventions (Sterne et al., 2016). Nonetheless, the study implemented an appropriate analysis method such as standardization, chi-squared analyses,
EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE

ANOVA, bivariate linear regression analyses, and McNemar tests to control for all the confounding domains.

The study also measured the confounding domains via self-report questionnaires and medical chart data. For instance, medical records were used to gather data on disease progression whereas self-reported medication adherence was measured using a modified version of the Adult AIDS Clinical Trials Group (ACTG) Adherence Baseline Questionnaire originally developed by Chesney et al. (2000). The authors shared remarks on the validity and reliability for almost all measures with the exception of an assessment that was created for the study to measure comprehension of instructions on prescription bottles. Lastly, there was no need to assess time-varying confounding as *Es Por La Vida* was the only intervention provided in the study, the intervention did not change over time, and participants were unable to be switched between interventions based on post-baseline prognostic factors.

Bias in selection of participants into the study is the second domain in the ROBINS-I where selection bias is concentrated on biases that are internal to the study such as the effect estimate of an intervention or outcome (Sterne et al., 2016). The second domain was assigned a low risk of bias classification because all eligible participants were included in the study, and the start of follow-up and commencement of the intervention coincided for all participants. For example, 85 participants were randomly assigned at baseline to receive *Es Por La Vida* or standard care only. None of the participants had prior experience with *Es Por La Vida* since it was a pilot study. No additional participants were assigned to either group based on characteristics detected after the start of *Es Por La Vida*. Baseline and 6-week follow-up data of 81 participants after attrition was analyzed suggesting that all participants initiated and completed the study at the same time.
EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE

The third domain in the ROBINS-I, bias in classification of interventions, focuses on biases that could arise if the intervention status is misclassified (Sterne et al., 2016). The third domain was assigned a low risk of bias classification because the intervention status was well-defined and its definition was based on the data collected at the time of the intervention. The intervention, *Es Por La Vida*, was developed using a collaborative multistep process involving the research staff, community experts, health care providers, treatment advocates, and patients to assess its impact on health literacy and treatment adherence. The research team also conducted a literature review to identify vital components to include in the intervention as it was tailored to meet the needs of Spanish-speaking clients. Thus, *Es Por La Vida* was clearly defined and recorded at the outset of the study. All eligible participants were screened by the clinical trial staff and had an equal chance to be assigned to the intervention group. No aspects of *Es Por La Vida* were modified before or after the randomization process.

An aim of this systematic review was to assess the effects of interventions to improve ART adherence, which may have important implications for subsequent health strategies such as whether to recommend an intervention to a specific health system. This coincides with the *effect of assignment to intervention* component under the fourth domain in the ROBINS-I, bias due to deviations from intended interventions, as it centers on biases that may occur in the presence of additional aspects of care offered to the intervention and comparison groups beyond the assigned intervention (Sterne et al., 2016). The fourth domain was assigned a low risk of bias classification as deviations from *Es Por La Vida*, if any, were unlikely to influence the outcomes of interest in the study. All participants had been enrolled in the HIV community clinic for at least 3 months. Standard clinical care was offered to the comparison group, which is a usual practice, while *Es Por La Vida* was delivered to the intervention group. The study did not state
EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE

whether additional services were provided to each group after the start of the intervention. As previously mentioned, no aspects of *Es Por La Vida* were altered or modified during the study that would indicate potential deviations.

Bias due to missing data is the fifth domain in the ROBINS-I, which focuses on biases that may arise from missing data due to attrition, missed appointments, exclusions, or incomplete data collection (Sterne et al., 2016). The fifth domain was assigned a low risk of bias classification because the van Servellen et al. (2003) study completed their data collection and the proportion of missing data was similar across both groups. While 85 eligible participants were recruited and randomized, baseline and 6-week follow-up data was collected from 81 participants as 2 members in each group were lost to follow-up. Thus, 95% of the data in each group was available for data analysis, which is consistent with the 90-95% range as suggested by the ROBINS-I (Sterne et al., 2016). The participants lost to follow-up were not excluded due to missing data on intervention status or on other variables required for the data analysis. For instance, one participant terminated ART, the team was unable to locate two participants, and one participant was held at an immigration detention facility.

The sixth domain in the ROBINS-I, bias in measurement of outcomes, pertains to biases that may occur due to measurement error or misclassification of outcomes (Sterne et al., 2016). A moderate risk of bias classification was assigned to the sixth domain as no blinding occurred in the study and outcome assessors also included the participants themselves, which may have influenced outcome measures due to their knowledge of being in the intervention group. The facilitators in the study were also aware that participants in their group belonged in the intervention group as they guided the participants through the program, and this further justifies the fact that neither the facilitators nor the participants were blinded. Participants completed the
EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE

ACTG Adherence Baseline Questionnaire, which is a self-report measure of adherence mastery and medication adherence. Thus, the participants were the outcome assessors as they reported their adherence through a questionnaire. The method of outcome assessment was comparable between the intervention and comparison group as they completed the same self-reported measures and data collection was standardized. Although the participants were the outcome assessors, the study reported no significant differences between the groups on measures of adherence, which reduces the likelihood of measurement error.

Bias in selection of the reported result is the seventh domain in the ROBINS-I and it concentrates on biases that may arise due to selective reporting (Sterne et al., 2016). A low risk of bias classification was assigned to this domain as the study proposed and executed a statistical analysis plan to report the outcome results of the intervention and control group. The study used the ACTG Adherence Baseline Questionnaire as their only measure of medication adherence. Hence, the study did not use multiple outcome measurements to gather information on adherence behaviors, which reduces the risk of selective reporting. The study relied and reported effect estimates using bivariate linear regression analyses, which also reduces the risk of selective reporting as no other methods were applied. Lastly, the study was unable to select and report effect estimates from other subgroups as the intervention and comparison group were the only two groups in the study, and 95% of the data in each group after attrition was reported.

Five out of seven domains in the ROBINS-I received a low risk of bias classification while the remaining two, bias due to confounding and bias in measurement of outcomes, were given a moderate risk of bias. Therefore, the overall risk of bias for the van Servellen et al. (2003) study was assigned a moderate risk of bias because at least one domain received a moderate risk classification. A moderate risk of bias assigned to the overall study or a particular
EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE

domain suggests that the van Servellen et al. (2003) study is considered to be a reasonable
non-randomized study, but it is definitely not comparable to a well-executed RCT. On the
contrary, a low risk of bias classification indicates that a study is comparable to an RCT whereas
a serious or critical risk of bias suggests that a study has few or too many important problems to
provide adequate evidence on the effects of an intervention (Sterne et al., 2016). A serious or
critical risk of bias would also negatively impact the transparency and validity of the results
obtained in this systematic review as it would encourage readers to proceed with caution while
interpreting the results of the review.

Results of the RoB 2 - Kurth et al. (2016) & Bogart et al. (2021)

The RoB 2 (Sterne et al., 2019) contains five domains and each domain was evaluated to
inform a study’s overall risk of bias. The domains include bias arising from the randomization
process, bias due to deviations from intended interventions, bias due to missing outcome data,
bias in measurement of the outcome, and bias in selection of the reported result. Rating options
for each domain include low, some concerns, and high risk of bias. Similar to the ROBINS-I, a
rating assigned to a particular domain in the RoB 2 has the ability to determine the overall risk of
bias. For instance, if a domain was observed to possess high risk of bias while the other four
were assessed as either low or some concerns, then a study’s overall risk of bias would be
considered high risk. Compared to the other two classifications, a high risk of bias would
substantially diminish confidence in the results of a study (Sterne et al., 2019) and, consequently,
affect the results of a systematic review. Hence, the detailed guidance and the signaling questions
provided by the RoB 2 were used to appropriately assess each domain. The following sections
present the risk of bias judgments for each domain and the overall risk of bias obtained from the
studies by Kurth et al. (2016) and Bogart et al. (2021).
EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE

Bias arising from the randomization process is the first domain in the RoB 2 and it focuses on biases that may arise from the presence of prognostic factors, as these factors can influence how participants are assigned (Sterne et al., 2019). The first domain was assigned a low risk of bias classification in the Kurth et al. (2016) study because the allocation sequence contained a random component, the sequence was concealed until participants were enrolled and assigned to a group, and baseline differences between groups did not suggest a problem with the randomization procedure. For instance, participants were randomized after an anonymous study log-in to either the intervention or control group by the CARE+ Spanish software. The study found no significant differences between the groups at baseline that may have affected the randomization process.

The first domain was also assigned a low risk of bias classification in the Bogart et al. (2021) study because the allocation sequence entailed a random component, the sequence was also concealed until participants were enrolled and assigned to a group, and baseline differences between groups did not suggest a problem with the randomization procedure. For example, the allocation sequence consisted of blocked one-to-one randomization, and participants and the study team were unaware of the assigned condition until after the baseline was completed. The study also reported no significant differences between the intervention and control group at baseline.

As previously mentioned, the aim of this systematic review coincides with the effect of assignment to intervention component, which is an important aspect under the second domain in the RoB 2. Risk of bias due to deviations from intended interventions centers on biases that may arise from unintended interventions offered to the participants or the failure to provide the proposed intervention as planned (Sterne et al., 2019). The second domain was assigned a low
EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE

Risk of bias classification in the Kurth et al. (2016) study as participants were blinded to the intervention, and an adequate analysis was executed to approximate the effect of assignment to the intervention. The CARE+ Spanish software randomized the participants and it also delivered the content as planned to those in the intervention and control group. Based on the allocation sequence, the participants were unaware of their assignments during the trial. The study reported the RCT in accordance with the Consolidated Standards of Reporting Trials (CONSORT) guidelines as proposed by Schulz et al. (2010), which requires studies to describe the statistical methods used to analyze and report the outcomes of interest and the estimated effect size. Per these guidelines, linear and generalized mixed linear effects models were utilized in the study to analyze primary outcomes such as ART adherence and to evaluate differences between the groups after attrition.

Bias due to deviations from the intended interventions in the Bogart et al. (2021) study was also classified as low risk since no deviations occurred during the trial even though the participants and facilitators were not masked, and an acceptable analysis was implemented to approximate the effect of assignment to the intervention. Participants in the intervention group were aware of their allocation in Siempre Seguiré after baseline. Similarly, the facilitators delivering the intervention knew they were engaging with the intervention group and completed fidelity ratings. High fidelity ratings as illustrated by the study suggested that the content in Siempre Seguiré was covered by the facilitators as expected. No other interventions were offered to the intervention or the wait-list control group during the trial. The study included a CONSORT diagram and resorted on repeated-measures regressions in their analysis after attrition to assess primary outcomes and intervention efficacy.
EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE

The third domain, bias due to missing outcome data, is concerned with biases that may arise as a result of missing measurements including how missing data was handled by a study (Sterne et al., 2019). A low risk of bias classification was assigned to the third domain in the Kurth et al. (2016) study because outcome data was available for nearly all randomized participants. Four hundred ninety-four participants were randomized, 253 were assigned to the intervention group, and 241 were allocated to the control group. Data analysis after attrition entailed outcome data from 226 participants in the intervention group and 207 in the control group. Missing data was accommodated through the usage of linear and generalized mixed linear effect models as, per the study’s report, these models do not require exclusion of participants with insufficient data (Kurth et al., 2016).

The third domain received a low risk of bias classification in the Bogart et al. (2021) study since outcome data was available for nearly all randomized participants. Seventy-six participants were randomized, 38 were assigned to the intervention group, and 38 were allocated to the control group. Based on the study’s CONSORT diagram, an intention-to-treat analysis during the first follow-up at 4 months included 31 participants in the intervention group and 34 in the control group. An intention-to-treat analysis during the second follow-up at 7 months included 31 participants in the intervention group and 33 in the control group. The study relied on nonresponsive weights to account for missing outcomes based on the recommended procedures for clinical trials by Little et al. (2012).

Bias in measurement of the outcome is the fourth domain in the RoB 2. The domain focuses on differential measurement errors associated with the intervention assignment and these errors are unlikely to occur when outcome assessors are blinded (Sterne et al., 2019). A low risk of bias classification was assigned to the fourth domain in the Kurth et al. (2016) study as it used
EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE

an appropriate method to measure the outcomes, measurements did not differ between groups, and the outcome assessors were blinded. The study contained pre-specified outcomes and a description of how these outcomes were going to be measured. For instance, the study used 30-day VAS as the only assessment to measure medication adherence, which is a common self-reported measure used in research. As planned, outcome measures were obtained at 0, 3, 6, 9, and 12 months, and the measurement methods remained the same. Hence, the outcome measures were comparable between groups throughout the study. The outcome assessors on self-reported measures were the participants and they were masked, which reduces the likelihood of differential measurement errors related to the intervention assignment.

The risk of bias in measurement of the outcome in the Bogart et al. (2021) study was found to have some concerns. Although the study used an appropriate method to measure the outcomes and the measurements did not differ between groups, the outcome assessors were not blinded. Thus, the outcome result may have been influenced by the participants’ knowledge of their assignment to the intervention group. The likelihood of this occurring is considered to be low as evidenced by the high fidelity ratings reported by the study suggesting the content was delivered as planned and no other interventions were offered to the groups that would have further influenced the outcome results. The study contained pre-specified outcomes and how they were going to be measured. For example, the study used VAS and MEMS as the two common measures to assess ART adherence. As planned, outcome measures were obtained at baseline, 4, and 7 months, and the measurement methods remained the same. Therefore, the outcome measures were comparable between groups. The outcome assessors on self-reported measures were the participants and they were not blinded, which increases the likelihood of
EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE
differential measurement errors related to the intervention assignment. Yet, the study illustrated a
statistical analysis method and plan to adjust for standard errors.

Bias in selection of the reported result is the fifth domain in the RoB 2 and it concentrates
on biases that may arise due to selective reporting (Sterne et al., 2019). Both studies received a
low risk of bias classification on this domain because they contained a pre-specified data analysis
plan before the outcome was available for analysis and the outcome results were not likely to be
selected from various outcome measurements or data analyses. As proposed in their statistical
analysis plan, the Kurth et al. (2016) study used linear and generalized linear mixed effect
models, while the Bogart et al. (2021) study implemented an intention-to-treat,
repeated-measures regressions to analyze adherence. No other statistical analyses for adherence
were conducted by the studies, which reduces the risk of selective reporting. As planned, the
Kurth et al. (2016) study relied on 30-day VAS and the Bogart et al. (2021) study used VAS and
MEMS as their only measures of adherence, which also reduces the risk of selective reporting as
no other outcome measures were applied.

All five domains in the RoB 2 received a low risk of bias classification in the Kurth et al.
(2016) study suggesting that the overall risk of bias is also categorized as low. According to
Viswanathan et al. (2012), a study with low risk of bias indicates that study results can be
considered valid and biases were unlikely to influence the results. In addition, a low risk of bias
would not negatively impact the transparency and validity of the results obtained in this
systematic review. Four of five domains in the RoB 2 were classified as low risk in the Bogart et
al. (2021) study whereas the risk of bias in measurement of the outcome domain indicated some
concerns. Thus, the overall risk of bias for the Bogart et al. (2021) study was considered to have
some concerns because at least one domain received this type of rating. An overall risk of bias
EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE
classified at this level suggests partial confidence that study results are valid and, although the
study was subjected to biases, these factors were not enough to undermine the results
(Viswanathan et al., 2012). A rating of some concerns for a study’s overall risk of bias would
also not impact the transparency and validity of the results conveyed in this systematic review.

Results of Individual Studies

An aim of this systematic review was to survey the effects of any type of intervention on
ART adherence among adult Latinx MSM with HIV in the U.S. Therefore, the following results
are based on the outcome data for ART adherence as illustrated by each study. Table 6 provides a
summary of the results highlighting the outcome and how it was measured along with the
statistical method used by each study to assess the intervention efficacy and the results. Table 6
can be found under Tables and Figures. The subsequent sections provide a narrative account of
the results.

Antiretroviral medication adherence was a relevant outcome in the van Servellen et al.
(2003) study and it was measured using a modified version of the Adult AIDS Clinical Trials
Group (ACTG) Adherence Baseline Questionnaire. Pre- and post-intervention self-reported data
was based on doses missed during the last 24 hours and 4 days between baseline and 6-weeks.
The results were conveyed using means and standard deviations. Although the study relied on
bivariate linear regression analyses and McNemar tests to assess for effectiveness and
significance, results of these measures were not reported for medication adherence as the study
found no significant differences between groups or changes for either group.

The intervention group’s adherence during the last 24 hours at baseline was 0.56 (1.45)
and it decreased to 0.29 (0.96) at 6-weeks. This suggests the intervention group endorsed fewer
doses missed during the last 24 hours post-intervention, which implies greater adherence.
EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE

Similarly, doses missed during the last 4 days at baseline for the intervention group was 2.38 (4.55) and it declined to 1.26 (3.02) post-intervention also suggesting better adherence. In contrast, the comparison group’s adherence during the last 24 hours at baseline was 0.29 (1.21) and it increased to 0.32 (0.96) at 6-weeks. Hence, the comparison group were less adherent as they endorsed greater doses missed during the last 24 hours at 6-weeks. The comparison group was also less adherent during the last 4 days based on their results of 1.82 (4.86) at baseline and 2.16 (3.23) at 6-weeks.

The van Servellen et al. (2005) study was a follow-up report of the original study published in 2003. It analyzed self-reported data gathered from the same adherence measures and sample groups at baseline, 6-weeks, and 6-months. Concurrently, the study relied on bivariate linear regression analyses and McNemar tests to assess for effectiveness and significance. Adherence data was illustrated and reported in multiple ways. Categories included 2 or doses missed during the last 24 hours and 4 days reported as percentages, average proportion of doses missed during the last 4 days via means and standard deviations, proportion greater than 90% adherence during the last 4 days illustrated as percentages, and proportion greater than 95% adherence during the last 4 days also reported as percentages.

The percentages of the intervention group under the 2 or more doses missed during the past 24 hours category entailed –4.1% from baseline to 6-weeks and –0.34% from baseline to 6-months. A negative percentage suggests the intervention group endorsed missing fewer dosages, which implies better adherence. However, the largest decrease of missing fewer dosages was observed from baseline to 6-weeks. Similar results were noted under the 2 or more doses missed during the last 4 days category for the intervention group based on their results of –15.34% from baseline to 6-weeks and –5.69% from baseline to 6-months. Overall, the
EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE

The intervention group had better adherence in the short-term but not as much in the long-term. None of the differences or changes observed in the intervention group were found to be significant.

The outcomes of the comparison group under the 2 or more doses missed during the past 24 hours category were 5.66% from baseline to 6-weeks and 18.21% from baseline to 6-months. A positive percentage suggests the comparison group reported missing more dosages indicating less adherence. The largest increase of missing more dosages was observed from baseline to 6-months, which was found to be a significant change (McNemar = 3.60, p = 0.06). The comparison group also reported less adherence during the last 4 days based on their results of 14.61% from baseline to 6-weeks and 6.79% from baseline to 6-months. Hence, the comparison group were less adherent to the medications compared to the intervention group during the two time frames.

Adherence was also calculated as an average proportion of doses missed during the last 4 days. The results for the intervention group consisted of −0.01 (0.13) from baseline to 6-weeks and 0.02 (0.14) from baseline to 6-months. A negative result suggests the intervention group endorsed missing fewer dosages during the last 4 days and thus better adherence. However, they were less likely to be adherent in the long-term based on the positive average proportion result from baseline to 6-months. The comparison group was less likely to be adherent based on their positive results of 0.01 (0.19) from baseline to 6-weeks and 0.04 (0.13) from baseline to 6-months. None of the differences or changes in this category were found to be significant.

The proportion greater than 90% adherence during the last 4 days for the intervention group entailed 11.62% from baseline to 6-weeks and −0.49% from baseline to 6-months. Hence, the intervention group reported greater adherence in the short-term but not in the long-term. Results of −11.32% from baseline to 6-weeks and −11.47% from baseline to 6-months for the
EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE

Comparison group indicated less adherence during the two time frames. The proportion greater than 95% adherence during the last 4 days for the intervention group consisted of 8.03% from baseline to 6-weeks and 1.71% from baseline to 6-months indicating greater adherence in the short-term. In contrast, the comparison group was less adherent as illustrated by their results of −11.97% from baseline to 6-weeks and −4.85% from baseline to 6-months. None of the differences or changes in this category were found to be significant.

A pertinent outcome in the Kurth et al. (2016) study was ART adherence and it was measured using 30-day VAS. The outcome data from VAS was based on self-reported adherence obtained at 0, 3, 6, 9, and 12 months. However, the data at 0, 3, 6, and 9 months was reported in the study since the control group was assigned to the intervention at the 12-month session. Data analysis entailed linear and generalized mixed linear effects models to assess differences between groups. Self-reported adherence data of the total sample and those with detectable viral load at baseline were conveyed through means and mean differences along with their respective 95% confidence intervals (CIs). The study did not provide actual means, mean differences, or 95% CIs values on the graphs. Therefore, the following interpretations are based on estimated values.

The average self-reported adherence of the total sample for those in CARE+ Spanish was approximately 87 (85, 90) at baseline, about 87 (85, 89) at 3 months, around 86 (84, 88) at 6 months, and roughly 86 (83, 88) at 9 months. Hence, the mean adherence of the total sample slightly decreased throughout the study for those in the intervention group. The mean self-reported adherence of the total sample for those in the control group was roughly 88 (86, 92) at baseline, approximately 87 (85, 90) at 3 months, about 86 (83, 88) at 6 months, and around 84
EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE

(82, 87) at 9 months. Compared to the intervention group, the average adherence of the total sample for those in the control group decreased more over time.

The mean self-reported adherence for those in CARE+ Spanish with a detectable viral load at baseline was about 77 (73, 82) at baseline, roughly 77 (74, 82) at 3 months, around 78 (75, 83) at 6 months, and approximately 79 (75, 84) at 9 months. Thus, the mean adherence increased over time for those with a detectable viral load at baseline in CARE+ Spanish. The average adherence for those in the control group with a detectable viral load at baseline was approximately 77 (74, 83) at baseline, around 76 (73, 80) at 3 months, roughly 75 (71, 78) at 6 months, and about 73 (67, 77) at 9 months. The average adherence for those with a detectable viral load at baseline in the control group decreased throughout the study compared to those in the intervention group.

The mean adherence difference of the total sample contrasting the intervention and control group was approximately −2 (−5, 3) at baseline, about 0 (−4, 3) at 3 months, around 1 (−3, 4) at 6 months, and roughly 3 (−3, 6) at 9 months. Mean differences increased over time among the total sample. The average adherence difference of the total sample in regards to the control change was approximately −5 (−7, −2) whereas the CARE+ Spanish change was higher at −2 (−4, 2). The average adherence difference for those with a detectable viral load at baseline was roughly −1 (−7, 5) at baseline, approximately 2 (−4, 7) at 3 months, about 4 (−2, 9) at 6 months, and around 6 (0, 13) at 9 months. Average differences also increased over time among those with a detectable viral load. The mean difference for those with a detectable viral load at baseline in regards to the control change was about −5 (−11, 0) while the CARE+ Spanish change was higher at 3 (−3, 6).
EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE

The team used Cohen’s $f^2$ to illustrate the effect sizes of group differences in change on VAS of the total sample and those with detectable viral load at baseline. Effect size benchmarks, as proposed by Cohen (1992), are interpreted as small ($f^2 = 0.02$), medium ($f^2 = 0.15$), and large ($f^2 = 0.35$). The effect size for group differences in change on VAS for the total sample was $f^2 = 0.002$ and for those with detectable viral load at baseline was $f^2 = 0.005$. Thus, the effect size for both group differences was small. Although the intervention group’s adherence was higher than those in the control group among the total sample and from those with detectable viral loads at baseline, no differences in change or at the follow-up marks were statistically significant (Kurth et al., 2016).

The primary outcome in the Bogart et al. (2021) study was ART adherence and it was measured using MEMS and VAS. The outcome data from MEMS was based on daily adherence during the course of 7 months and it was conveyed as a percentage of total scheduled doses taken (Bogart et al., 2021). Data collection occurred monthly and the data was adjusted for a more valid appraisal. The results of MEMS were displayed on a graph to illustrate average adherence over a 7-month period. The study did not provide actual percentage values on the graph. Hence, the following interpretations are based on estimated percentage values.

Average electronic adherence pre-intervention for those in the intervention group was about 89% whereas the control group’s adherence was approximately 82%. Post-intervention results were listed as monthly increments. At 4-5 months post-intervention, the adherence for both groups decreased to approximately 87% for the intervention group and about 79% for the control group. The intervention group’s adherence rose to about 92% at 5-6 months while the control’s group adherence declined to approximately 76%. However, the intervention group’s adherence decreased to about 85% during the last post-intervention mark at 6-7 months whereas
EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE

The adherence for the control group increased to approximately 79%. Despite these variations, the intervention group’s adherence was greater than the control group’s adherence between 0-7 months.

The outcome data from VAS was based on self-reported monthly adherence and it was illustrated through means and standard deviations. The results were obtained at baseline and at two follow-up marks post-intervention. The study provided actual means and standard deviations. Self-reported adherence for those in the intervention group was 94.61 (6.62) versus 91.08 (8.97) for the control group at baseline. At the 4-month follow-up, self-reported adherence rose to 97.48 (5.42) for the intervention group and 94.57 (6.56) for the control group. Self-reported adherence in the intervention group increased to 99.17 (1.51) at the 7-month follow-up whereas the control group’s adherence declined to 92.91 (16.78). Overall, the intervention group’s adherence was consistently higher compared to the control group’s adherence, and it steadily rose throughout the different timeframes.

The Bogart et al. (2021) study applied an intention-to-treat, repeated-measures regressions method as their statistical approach to assess for intervention efficacy on ART adherence. The team relied on survey data and electronic-monitored adherence during this procedure. In accordance with the standards by Cohen (1988), effect sizes were interpreted as small ($d = 0.2$), medium ($d = 0.5$), and large ($d = 0.8$).

A repeated-measures regression for electronic-monitored adherence after 3-months post-intervention resulted in 9.24 ($-0.55, 19.03$) [b (95% CI)], $p = 0.06$ illustrating a marginally significant effect (Bogart et al., 2021). This means that, on average, the intervention group’s adjusted adherence was more than 9% greater than the control group indicating a medium effect size ($d = 0.44$) as communicated by the team (Bogart et al., 2021). However, an effect size of
EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE

0.44 would technically be considered small per Cohen’s standards. In light of this difference, the data indicates that the intervention group’s improved electronic-monitored adherence was higher than the control group’s adherence as a result of the intervention. *Siempre Seguiré* also significantly improved the intervention group’s self-reported adherence as evidenced by a repeated-measures regression outcome of 4.50 (0.70, 8.30) [\( b \) (95% CI)], \( p = 0.02 \) alongside a small effect size of 0.26 (Bogart et al., 2021).

**Descriptive Synthesis of the Results**

An aim of this systematic review was to identify interventions designed to increase ART adherence among Latinx MSM with HIV. The studies conducted by van Servellen et al. (2003), van Servellen et al. (2005), Kurth et al. (2016), and Bogart et al. (2021) were selected because they all included adult Latinx participants with HIV, an intervention, a comparison group, and quantitative results of medication adherence in their published report. The Bogart et al. (2021) study was the only one that met the full population criteria of the systematic review as their sample entailed adult, HIV-positive Latinx SMM who were not taking or taking ART. The other 3 studies contained 100% Latinx samples and, although the majority of the sample identified as male, there was no indication whether the male participants identified as MSM. Nonetheless, the three studies provided quantitative data to describe the impact of interventions on ART adherence among Latinx adults with HIV.

A second aim of the systematic review was to examine the extent of cultural adaptations or modifications made to an intervention. *Es Por La Vida* was created by van Servellen et al. (2003) to enhance HIV health literacy and adherence, and it was tailored for monolingual Spanish-speaking Latino participants by including relevant themes such as familialism into the intervention. The study’s research staff relied on the assistance of community experts, patients,
EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE

and health care providers to create the intervention. The program, led by bilingual treatment advocates and a nurse practitioner, entailed five instructional module sessions held weekly in a group setting and a 6-month follow-up. The intervention consisted of cognitive-behavioral strategies, motivational interviewing, and pertinent materials were written at the sixth-grade level.

The computer-based counseling tool, CARE+ Spanish, was translated from its original English version by Kurth et al. (2014) to evaluate its effects on relevant outcomes such as ART adherence. The translation from English to Spanish was the only adaptation made by the team to fit the needs of Spanish-speaking people living with HIV. An avatar guided the participants individually during the course of 45 to 60 minute sessions, which included audio narrations, videos, and a health plan. The intervention content encompassed theoretical frameworks such as information-motivation-behavior, social cognitive role modeling, motivational interviewing, and principles of chronic HIV disease self-management. Spanish-speaking peers were available to support and help participants navigate the computer-based counseling tool.

Lastly, Siempre Seguiré was created by Bogart et al. (2021) using a CBPR approach to improve coping with intersectional discrimination and stigma, reduce medical mistrust, and increase ART adherence among Spanish-speaking Latinx SMM. The intervention aligned with intersectionality theory and minority stress theory to address salient themes such as stigma and discrimination. Two peer facilitators, who also identified as Spanish-speaking Latinx SMM, co-facilitated the weekly group sessions in Spanish during the course of 2 months. The content included aspects of CBT and DBT techniques and psychoeducation. Compared to CARE+ Spanish, Siempre Seguiré and Es Por La Vida were developed to meet the needs of a particular
EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE

Spanish-speaking Latinx sample in Los Angeles, CA as evidenced by the themes and topics included in their respective programs.

The van Servellen et al. (2003) study utilized a quasi-experimental repeated measures design whereas the Kurth et al. (2016) and Bogart et al. (2021) studies were both RCTs. Hence, all of the studies executed a randomization sequence to assign eligible participants into the intervention or control group. The Kurth et al. (2016) study had the most participants as their sample after attrition included 226 participants in CARE+ Spanish and 207 in the control group. In contrast, the sample sizes in the van Servellen et al. (2003) and Bogart et al. (2021) studies ranged from 31 to 41 participants per group. The control groups in the van Servellen et al. (2003) and Kurth et al. (2016) received standard clinical care whereas the control group in the Bogart et al. (2021) were wait-listed. Participants in the Kurth et al. (2016) study, regardless of their assignment, received a follow-up or referral if they reported severe depression, intimate partner violence, or suicidal ideation. Aside from these additional services, no other interventions were provided to the control groups in all of the studies.

The final aim of this systematic review was to assess which interventions were most effective at increasing ART adherence, which was the outcome of interest. Assessing risk of bias for each study was conducted prior to addressing the last aim of the review. This essential step provides information on a study’s internal validity and, most importantly, transparency, confidence, and validity of the results. The risk of bias judgments gathered during this process consequently informs the transparency, confidence, and validity of the results obtained in this systematic review.

The ROBINS-I was used to assess the risk of bias for the van Servellen et al. (2003) study because it implemented a quasi-experimental design, whereas the RoB 2 was utilized for
EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE

The Kurth et al. (2016) and Bogart et al. (2021) studies because they were both RCTs. The van Servellen et al. (2003) study had moderate risk of bias and the Bogart et al. (2021) study received a risk of bias judgment of some concerns. The overall risk of bias for the studies by van Servellen et al. (2003) and Bogart et al. (2021) indicated partial confidence because the studies were subjected to biases. However, these factors are insufficient to weaken the confidence and validity of the results. In contrast, the Kurth et al. (2016) study had low risk of bias suggesting greater confidence and validity of the results. The overall risk of bias judgments ranged from low to some concerns and moderate risk, and no high, serious, or critical risks were noted. As mentioned, a judgment of some concerns or moderate risk for a study’s overall risk of bias would not impact the transparency, confidence, and validity of the results conveyed in this systematic review.

A primary outcome in the studies by Kurth et al. (2016) and Bogart et al. (2021) was ART adherence, whereas medication adherence was secondary to the primary outcome of HIV health literacy in the van Servellen et al. (2003) study. The follow-up study by Servellen et al. (2005) was included to further interpret the original study’s results as it contained outcome data from baseline to 6-weeks and baseline to 6-months. The studies by van Servellen et al. (2003) and Kurth et al. (2016) relied on self-reported measures of adherence such as the ACTG Adherence Baseline Questionnaire and 30-day VAS. The Bogart et al. (2021) study used MEMS and VAS, and it was the only study that contained objective and subjective measures of adherence. Statistical analyses varied across the studies, yet the studies by van Servellen et al. (2003) and van Servellen et al. (2005) were the only ones that did not contain an effect size to assert whether Es Por La Vida was effective at improving medication adherence.
EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE

The intervention group in the van Servellen et al. (2003) study reported better adherence than the comparison group from baseline to 6-weeks. However, no significant differences between groups or changes were found for either group. These findings were consistent with the results observed by van Servellen et al. (2005) from baseline to 6-weeks. Although the intervention group was more adherent than the comparison group over time, the intervention group’s adherence was greater in the short-term than in the long-term. The only significant change found by the van Servellen et al. (2005) study pertained to the comparison group’s adherence of 2 or more doses missed during the past 24 hours from baseline to 6-months.

Outcome results were mixed for the Kurth et al. (2016) study. In general, the CARE+ Spanish group was more adherent than the control group over time. Similar to the van Servellen et al. (2005) study, the adherence of the total sample in the CARE+ Spanish group under 30-day VAS decreased over time. However, those with detectable viral load at baseline under 30-day VAS in the CARE+ Spanish group increased from baseline to 9 months. When looking at the data gathered from the mean differences under 30-day VAS, the adherence for both the total sample and those with detectable viral load at baseline in the CARE+ Spanish group increased over time. The effect sizes for group differences in change on VAS for the total sample and for those with detectable viral load at baseline were small. No differences in change or at the follow-up points were statistically significant (Kurth et al., 2016).

The intervention group was also more adherent than the control group in the Bogart et al. (2021) study. Similar to the trends observed in the studies by van Servellen et al. (2005) and Kurth et al. (2016), the intervention group’s adherence under MEMS decreased over time. However, this pattern was not noted under VAS as the intervention group’s adherence increased from baseline to 7-months. Adherence between the intervention and control group after 3-months
EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE

post-intervention under MEMS conveyed a marginally significant effect along with a medium effect size. A significant improvement was also observed for self-reported adherence, yet the effect size was small. Despite these results, the data indicates that the intervention group’s adherence improved as a result of the intervention.
The current systematic review focused on ART adherence interventions among adult Latinx MSM with HIV. The objective of the systematic review was to evaluate the effects of interventions aimed at improving ART adherence among this sample. A comprehensive search was conducted, and the final sample contained four studies and three interventions. The four studies included van Servellen et al. (2003), van Servellen et al. (2005), Kurth et al. (2016), and Bogart et al. (2021). The three interventions were *Es Por La Vida* (van Servellen et al., 2003; van Servellen et al., 2005), *CARE+ Spanish* (Kurth et al., 2016), and *Siempre Seguiré* (Bogart et al., 2021). All of the interventions were tailored and delivered in Spanish, and the studies targeted Spanish speaking Latinx groups. Lastly, the interventions were examined to determine which interventions were effective at increasing ART adherence among Latinx MSM. Improvements in ART adherence among the participants were observed in all three interventions. However, *CARE+ Spanish* (Kurth et al., 2016) and *Siempre Seguiré* (Bogart et al., 2021) were the only interventions that reported small to moderate effect sizes to substantiate their findings. General implications and limitations of four major findings across the interventions, limitations of the systematic review, and recommendations about future directions are provided below.

*General Implications of the Four Major Findings*

**First Finding - One ART adherence intervention for Latinx MSM**

The first major finding is that one of three interventions in the final sample, *Siempre Seguiré* (Bogart et al., 2021), was exclusively tailored to improve ART adherence among adult Latinx MSM with HIV. Based on the most recent cumulative HIV surveillance data up to the year 2020, more than 250,000 Latinx MSM are living with HIV/AIDS, and approximately 7,000 new HIV infections have been reported annually among this group between 2015–2020 (CDC,
EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE

One published intervention is not sufficient to ensure that all Latinx MSM can adhere to their antiretroviral medication, manage or cope with the virus, or reduce the likelihood of subsequent HIV infections.

The unforeseen finding of one intervention, *Siempre Seguiré* (Bogart et al., 2021), was likely to be expected based on the ART adherence interventions available in the U.S. and those reported in other systematic reviews. Currently, there are 27 interventions listed in the Medication Adherence chapter of the CDC’s Compendium of Evidence-Based Interventions and Best Practices for HIV prevention aimed at improving adherence among people with HIV (CDC, 2023). Yet, none of these 27 interventions were designed for Latinx MSM. The systematic reviews by Mbuagbaw et al. (2015), Spaan et al. (2020), and Zuge et al. (2020) found 64 interventions published in the U.S., but none of these interventions were developed for Latinx MSM. Although plenty of interventions exist to improve ART adherence among people living with HIV, these findings confirm the scarcity of interventions tailored for Latinx MSM.

Secondly, ART was initiated in several developed countries in 1996 as illustrated by Forsythe et al. (2019), whereas published ART adherence interventions, such as those listed in the CDC’s Compendium, have been available since the early 2000s (CDC, 2023). Hence, the field of ART adherence interventions is still emerging in the U.S., but it has not grown rapidly to address the needs of Latinx MSM. Although an emerging field, the historical availability of ART and the lack of published studies for Latinx MSM can also justify the unforeseen finding of one intervention.

**Second Finding - All three interventions delivered in Spanish**

The second major finding is that all three interventions highlighted in the systematic review were developed and delivered in Spanish. The three interventions consisted of *Es Por La*
EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE

*Vida* (van Servellen et al., 2003; van Servellen et al., 2005), *CARE+ Spanish* (Kurth et al., 2016), and *Siempre Seguiré* (Bogart et al., 2021). All interventions regardless of language differences were considered during the search process and, although an unforeseen finding, it was reasonable to obtain Spanish interventions since the review focused on Latinx MSM.

The three Spanish interventions fulfilled the second aim of the systematic review, as they contained information to describe how the research teams culturally adapted or modified the interventions. For instance, the interventions entailed components relevant to Latinx populations such as HIV health literacy and machismo (van Servellen et al., 2003), language usability (Kurth et al., 2016), and intersectional discrimination and stigma (Bogart et al., 2021) as means to improve ART adherence. Most importantly, the interventions were tailored to meet the language needs of Spanish-speaking Latinx populations who are an underrepresented group in the HIV literature.

The three Spanish interventions also met the efforts to improve treatment accessibility by developing tailored HIV behavioral interventions (Guilamo-Ramos et al., 2020), which are exceedingly needed. Although three interventions are insufficient, they are a good starting point to identify and examine essential components to improve ART adherence among Latinx MSM and inform future interventions. For instance, *Siempre Seguiré* (Bogart et al., 2021) was the only Spanish intervention that was consistent with the literature by addressing stigma, which is a prominent barrier associated with poorer adherence and lower retention in care, and can impede Latinx groups from seeking HIV services (Vanable et al., 2006; Guilamo-Ramos et al., 2020; Levison et al., 2018).

The three Spanish interventions were conducted within the context of multidisciplinary HIV clinics where the participants received care, aligning well with the recommendations posed
EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE
by the literature (Guilamo-Ramos et al., 2020). For example, syndemic models and recent
analyses have advocated for comprehensive and interdisciplinary interventions to reduce
healthcare disparities among marginalized groups including Latinx MSM (Singer, 1996;
Mustanski et al., 2007; González-Guarda et al., 2011; Wilson et al., 2014; Crim et al., 2020).
Although the interventions did not incorporate ancillary services, the setting allowed
Spanish-speaking Latinx participants to learn, engage, and benefit from other opportunities at the
HIV clinics, such as primary care, social services, and substance abuse treatments.

There are several advantages to having three Spanish ART adherence interventions in the
field. The interventions removed the language barrier for monolingual and predominantly
Spanish-speaking Latinx MSM from accessing HIV care. Hence, future participants are more
likely to understand the content, engage in discussions, ask questions, watch videos, and obtain
clarifications offered by the interventions. *Es Por La Vida* (van Servellen et al., 2003; van
Servellen et al., 2005) and *Siempre Seguiré* (Bogart et al., 2021) are group-level interventions,
which can promote a sense of community and collaboration among the participants and
providers. In contrast, *CARE+ Spanish* (Kurth et al., 2016) is a computer-based program that can
promote privacy for participants who may feel uncomfortable disclosing their HIV status in a
group setting. A computer-based program can also benefit participants who may have time or
transportation constraints to attend a weekly intervention.

Aside from improving ART adherence, the Spanish interventions can potentially enhance
medical trust, increase retention rates, and diminish attrition rates in HIV care among Latinx
MSM. The interventions in the CDC’s Compendium and those presented in previous systematic
reviews (Mbuagbaw et al., 2015; Spaan et al., 2020; Zuge et al., 2020) were designed for
English-speaking populations, leaving monolingual or predominantly Spanish-speaking Latinx
EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE
MSM at a disadvantage from receiving these benefits. Although limited in number, the three
Spanish interventions can assist a much needed demographic and potentially reduce healthcare
disparities among MSM with HIV.

**Third Finding - ART adherence is not sustained over time**

The third major finding is that ART adherence increased in the short-term and diminished at the 6-month follow-up among the Latinx participants in the three intervention studies. For example, the intervention group’s self-reported adherence in *Es Por La Vida* (van Servellen et al., 2003; van Servellen et al., 2005) increased from baseline to 6 weeks and it decreased at the 6-month follow-up. Self-reported adherence for the participants in *CARE+ Spanish* (Kurth et al., 2016) was higher from baseline to 3 months and lower at the 6- and 9-month follow-ups. Lastly, the intervention group’s electronic adherence in *Siempre Seguiré* (Bogart et al., 2021) increased from baseline to 6 months and it decreased at the 7-month follow-up.

The third major finding is consistent with the systematic review by Musayón-Oblitas et al. (2019) on ART adherence interventions which found that intervention effectiveness was noticeable in the first months but not over time. The systematic review did not specify the exact number of months due to the lack of consistency and heterogeneity between the interventions and methodologies (Musayón-Oblitas et al., 2019). Nonetheless, it is noteworthy to examine why improvements in adherence are more noticeable in the short-term and why it declines at 6 months.

The three interventions in the systematic review were short-term interventions. For instance, *Es Por La Vida* (van Servellen et al., 2003; van Servellen et al., 2005) consisted of five weekly sessions, *CARE+ Spanish* (Kurth et al., 2016) conducted five intervention sessions spread throughout one year, and *Siempre Seguiré* (Bogart et al., 2021) entailed eight weekly
EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE

sessions. Within this time frame, as highlighted in the literature, participants are more likely to
have encouragement from others, increased motivation after seeing improvements, create an HIV
treatment plan, and engage in positive experiences with providers (Carey et al., 2019). As such,
*Es Por La Vida* (van Servellen et al., 2003; van Servellen et al., 2005) and *Siempre Seguiré*
(Bogart et al., 2021) were group-level interventions that helped promote these benefits as
activities included interactive discussions and topics on HIV adherence management and
education led by trained facilitators. Although *CARE+ Spanish* (Kurth et al., 2016) was not a
group-level intervention, it encouraged participants to share their risk reduction health plan with
their provider, which may have the potential to enhance patient-provider rapport and trust.

Secondly, having a convenient “one-stop shop” care facility is associated with taking
ART among Latinx MSM with HIV (Carey et al., 2019), which was an essential feature in all
three interventions as their activities were held at HIV clinics. Participants in the intervention
groups attended the clinic more regularly, thus potentially increasing their familiarity and
connection with clinic staff, ancillary services, and providers. For instance, intervention sessions
in *CARE+ Spanish* (Kurth et al., 2016) occurred during scheduled clinic visits, making it
convenient for participants to obtain more services and interact with providers, resonating well
with the “one-stop shop” care facility feature.

According to the literature, long-term adherence can be challenging for several reasons.
For instance, Latinx MSM reported multiple factors for missing ART such as changes in daily
routine or travel, denial of HIV diagnosis, feeling sick, forgetting or not wanting to take ART,
oversleeping, feeling depressed or overwhelmed, recent drug use, poverty, and accessibility to
medication prescriptions or refills (Carey et al., 2019; Crim et al., 2020). Latinx MSM may also
feel alone without ongoing support or encouragement from peers and providers.
EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE

post-intervention. Consequently, it may become more difficult to manage the side effects of ART medications, such as nausea, vomiting, fatigue, and headaches (CDC, 2021), making it easier for a person to become nonadherent.

The complexity and interaction of various factors on adherence have also been documented in the literature. A recent systematic review on ART adherence interventions illustrated additional barriers related to non-adherence such as the amount of prescribed pills taken per day known as pill burden and socioeconomic status (Spaan et al., 2020; Langebeek et al., 2014). Iacob et al. (2017) highlighted the difficulty of maintaining adherence over time due to multiple factors including individual motivation, depression, and consumption of illicit drugs. The aforementioned evidence is consistent with the factors associated with non-adherence among Latinx MSM (Carey et al., 2019; Crim et al., 2020). Maintaining adherence over time is challenging and complex due to various factors, but it is a crucial component to improve health outcomes among this population. Therefore, future research teams of ART adherence interventions for Latinx MSM will need to brainstorm ways to help participants sustain their adherence in the long-term.

Fourth Finding - No examination of depressive symptomatology

The fourth major finding is that none of the interventions included the examination of depressive symptomatology, which is comorbid among men with HIV in the U.S. (Faulstich, 1987; Ostrow et al., 1989; O’Cleirigh et al., 2015). Depressive symptomatology also affects Latinx men and Latinx sexual minority men due to a myriad of factors including disclosure of HIV status, HIV and MSM stigma, poverty, low education, low SES, substance abuse, adult physical violence, and racial, ethnic and sexual discrimination (Zea et al., 2005; De Santis et al., 2012; Dang et al., 2012; Rhodes et al., 2013; Wohl et al., 2013; De Santis et al., 2016; Sun et al.,
EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE

2016). A study on psychosocial and cultural correlates of depression among Hispanic men with HIV found that 65% of the participants experienced depression (De Santis et al., 2012) and, more recently, 24.2% of Latinx MSM with HIV in the U.S. reported symptoms of depression (Crim et al., 2020). Therefore, future studies need to address depressive symptomatology in their interventions due to its comorbidity among Latinx men.

Whereas Es Por La Vida (van Servellen et al., 2003; van Servellen et al., 2005) made no references to depressive symptomatology, the facilitators in Siempre Seguiré (Bogart et al., 2021) recognized and discussed the role of discrimination on mental health issues with the participants. Although depression was not an outcome in CARE+ Spanish (Kurth et al., 2016), their risk assessment identified participants with severe depression and the team notified case managers for an appropriate follow-up and referral. All of the interventions relied on aspects of cognitive behavioral or social cognitive models to inform their content. However, these models were not intended to treat mental health symptoms, diagnose participants with a depressive disorder, or to address the effects of depressive symptomatology on HIV care.

The three interventions also diverged from the literature regarding the role of depressive symptomatology on ART adherence. For instance, the review and meta-analysis by Gonzalez et al. (2011) found that non-adherence to ART was associated with depression, which is consistent with the findings by Langebeek et al. (2014) as they too communicated in their meta-analysis that depressive symptoms were associated with lower rates of adherence. In terms of Latinx MSM in the U.S., it was found that ART adherence was lower among Latinx MSM who reported a recent history of depression compared to those who did not (Crim et al., 2020). If left untreated, psychiatric symptoms like depression can interfere with HIV disease management.
EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE (O’Cleirigh et al., 2015) and can further exacerbate the high rates of HIV infection among Latinx men (De Santis et al., 2016).

Psychosocial interventions that include counseling, motivational interviewing, or CBT components have been shown to improve medication adherence among people with HIV (Spaan et al., 2020), yet none have been developed or tailored for Latinx MSM placing them at a disadvantage for improving their mental health. Nonetheless, psychoeducation on depressive symptomatology is essential in order to address the significance of this mental health condition and its impact on ART adherence. It is important to note that depressive symptomatology may manifest differently among Latinx MSM based on their cultural background and lived experiences, and may not align with the symptomatology that is captured in the Diagnostic and Statistical Manual of Mental Health Disorders. Thus, depressive symptomatology needs to be approached in a manner that is conducive to the mental health needs and experiences of Latinx MSM. Lastly, depressive symptomatology may not be a presenting concern to all Latinx MSM, yet addressing this topic with Latinx MSM participants is imperative because they can share this information with other Latinx MSM who may not have equal access to HIV care.

Limitations of the Findings

Siempre Seguiré (Bogart et al., 2021) was the only intervention compared to Es Por La Vida (van Servellen et al., 2003; van Servellen et al., 2005) and CARE+ Spanish (Kurth et al., 2016) that was tailored for Latinx MSM with HIV, which is a major limitation to generalizing results. A single intervention may impede subsequent systematic reviews or meta-analyses on the exact subject matter to be conducted due to the lack of quantitative interventions. In addition, one intervention limits HIV clinics and healthcare providers from selecting culturally adapted or modified ART adherence interventions to assist Latinx MSM. The scarcity of interventions place
EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE

Latinx MSM at a greater disadvantage in reducing their HIV viral load by improving their adherence or benefitting from evidence-based interventions.

*Es Por La Vida* (van Servellen et al., 2003; van Servellen et al., 2005), *CARE+ Spanish* (Kurth et al., 2016), and *Siempre Seguiré* (Bogart et al., 2021) were developed and delivered in Spanish, which pose several limitations. First, the interventions do not recognize the diversity among Latinx groups (Guilamo-Ramos et al., 2020) such as language and cultural differences. Hence, they are not inclusive of monolingual or predominantly English-speaking MSM who may also need assistance with their adherence. Whereas cultural themes such as familialism, machismo, and stigma (van Servellen et al., 2003; Bogart et al., 2021) benefitted Spanish speaking Latinx groups, these factors may not apply to all Latinx MSM. Secondly, the three interventions were delivered in Spanish, which requires HIV clinics to have Spanish-speaking or bilingual providers in their teams to facilitate the activities. The lack of providers may reduce the likelihood of replicating these interventions in other parts of the country and continue to place Latinx MSM with HIV at a disadvantage.

Another limitation speaks to the regional differences where Latinx MSM reside. *Es Por La Vida* (van Servellen et al., 2003; van Servellen et al., 2005) and *Siempre Seguiré* (Bogart et al., 2021) were conducted in Los Angeles, whereas *CARE+ Spanish* (Kurth et al., 2016) was conducted in New York City, which are two distinct urban cities with diverse Latinx populations. Although similar in their Latinx ethnic background, the participants in *CARE+ Spanish* (Kurth et al., 2016) varied in their racial identity as some identified as White or African American. In contrast, 75% of the sample identified as Mexican in *Siempre Seguiré* (Bogart et al., 2021) and more than 90% of the sample in *Es Por La Vida* (van Servellen et al., 2003; van Servellen et al., 2005) were born outside the U.S.
EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE

Because these interventions were tailored to meet the needs of the participants in Los Angeles and New York City, they may not be generalizable to other cities such as San Francisco, Miami, or Chicago where there are large Latinx populations. For instance, Latinx groups of various nationalities, disabilities, SES, religious affiliations, citizenship status, gender identities, and sexual orientations live in these cities but may not relate to the content or cultural themes offered by *Es Por La Vida* (van Servellen et al., 2003; van Servellen et al., 2005), *CARE+ Spanish* (Kurth et al., 2016), and *Siempre Seguiré* (Bogart et al., 2021). In addition, dialects and language differences exist within Spanish-speaking ethnic groups and the Spanish content may not make sense to Latinx MSM residing in Florida or even within Latinos in New York City. Therefore, ART adherence interventions need to be tailored to address the language needs of all Latinx MSM groups with HIV.

*Es Por La Vida* (van Servellen et al., 2003; van Servellen et al., 2005), *CARE+ Spanish* (Kurth et al., 2016), and *Siempre Seguiré* (Bogart et al., 2021) improved adherence from baseline to about 6 months. However, an intervention can make participants susceptible to social desirability bias as proposed by Edwards (1957). Consequently, participants are more likely to report positive outcomes and undermine their non-adherence during the course of an intervention. All interventions contained at least one self-reported measure of adherence, which may also increase the risk of social desirability bias, misrepresentation of adherence patterns, and perhaps better adherence in the short-term.

The three interventions were not designed to be comprehensive by integrating ancillary services to increase ART adherence, which may explain why improvements in adherence were not retained long-term. Furthermore, the interventions were not equipped to address the complexity and interplay of various factors related to non-adherence such as depression, drug
EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE

use, poverty, and individual motivation (Iacob et al., 2017; Crim et al., 2020). Lastly, all three interventions were conducted at HIV clinics where the participants received care. Thus, the intervention effects on ART adherence may not be observable in other settings, especially those that do not provide wrap-around services.

Limitations of the Systematic Review Process

The first limitation is that a meta-analysis was not conducted due to the heterogeneity of the methodologies and intervention characteristics, and the lack of studies. For instance, Es Por La Vida (van Servellen et al., 2003; van Servellen et al., 2005) was a quasi-experimental study and it focused on HIV health literacy to improve adherence. CARE+ Spanish (Kurth et al., 2016) was a computer-based counseling intervention aimed at enhancing ART adherence and it was conducted via an RCT. Siempre Seguiré (Bogart et al., 2021) focused on stigma and discrimination to improve ART adherence and the study was also an RCT. Although the three interventions observed improvements in adherence, the overall effectiveness of these findings on ART adherence among Latinx MSM with HIV cannot be statistically substantiated without a meta-analysis.

The second limitation is that the systematic review was performed independently, which may have affected the screening process. For example, at least two independent reviewers are needed to screen titles, abstracts, full texts, and assess risk of bias (Muka et al., 2020). Due to the lack of additional reviewers, titles, abstracts, full texts, and the risk of bias of each study in the final sample were assessed autonomously, thus increasing the risk of selection and reporting bias. To combat this challenge, the inclusion criteria and the detailed guidance of the ROBINS-I (Sterne et al., 2016) and RoB 2 (Sterne et al., 2019) were used to ensure that all sources were being judged fairly. Consultations also took place as needed to decide whether or not to consider
EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE

specific studies based on the inclusion criteria. Although meticulous precautions were taken, it was not sufficient to guarantee the complete absence of selection or reporting bias.

**Recommendations for Future Initiatives, Funding, and Interventions**

Policymakers, stakeholders, researchers, HIV clinics, Latinx MSM, and HIV advocates need to be aware of the lack of interventions aimed at improving ART adherence among Latinx MSM. The ART adherence interventions available in the field are insufficient to ensure that all Latinx MSM achieve viral suppression and improve their health outcomes. The following recommendations provide guidance for those who are interested in assisting the Latinx MSM population who are HIV positive.

Federal, state, and local policy makers need to understand that reducing HIV rates among the Latinx population does not eradicate HIV completely. Although reducing HIV rates is paramount, greater initiatives are needed to help those already living with HIV. First and foremost, policymakers need to hear the narratives of Latinx MSM across the country and ask what services they need to manage their HIV. Secondly, policymakers are encouraged to consult with HIV healthcare providers from various disciplines and community members assisting Latinx MSM and find out what they need to better assist this population. Thirdly, policymakers should meet with HIV researchers and inquire what they need to develop more ART adherence interventions for Latinx MSM. Furthermore, future bills need to be written with the needs of Latinx MSM with HIV at the forefront.

Federal, state, or local governments need to offer ongoing financial support to HIV clinics who may not have the resources to create multidisciplinary teams or offer long-term care services. Once established, the multidisciplinary team can collaborate and tailor comprehensive plans for Latinx MSM patients to ensure long-term adherence. Building rapport and trust is an
ever evolving facet between HIV clinics and patients. However, it is an important feature that can potentially increase patient buy-in and decrease skepticism about HIV care. Thus, having more HIV clinics across the country or within a U.S. state can provide greater options for Latinx MSM to find a clinic where they can feel comfortable to receive long-term care.

Funding is also needed to develop ART adherence interventions for Latinx MSM. The CDC and the NIMH are encouraged to provide ongoing funding to researchers in order to hire more staff, cover expenses, and create effective interventions. The NIMH funded CARE+ Spanish (Kurth et al., 2016) and Siempre Seguiré (Bogart et al., 2021), thus it has the potential to fund subsequent studies. Bilingual and English ART adherence interventions are also needed to ensure inclusion of all Latinx MSM from various backgrounds and language differences.

Since mental health is a crucial component for the NIMH, it can also encourage researchers to address symptoms of depression or include a depression outcome into their proposed interventions. Depression is essential to treat because it is associated with lower ART adherence (Gonzalez et al., 2011; Langebeek et al., 2014), and it is also a contributing non-adherence factor among Latinx MSM (Crim et al., 2020). Therefore, the NIMH is encouraged to fund grants, and advocate for mental health content to be included in future ART adherence interventions.

Remarkably, the three Spanish interventions reported in this systematic review are not listed in the CDC’s Compendium. The CDC has its own efficacy criteria to determine whether an intervention is evidence-based (CDC, 2023). For instance, there has to be strong or sufficient evidence to assert whether an intervention was able to improve adherence to antiretroviral medication (CDC, 2023). Perhaps the CDC is unaware of these interventions, which may explain their absence in the CDC’s Compendium. If so, the three Spanish interventions are worth getting
EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE

assessed by the CDC to ensure inclusivity, diversity, and presence among the current list of interventions in the compendium, which none have been tailored for Latinx MSM.

More ART adherence interventions tailored for Latinx MSM are warranted. Researchers are encouraged to engage in community based participatory research (CBPR) as it allows several groups, such as the research team, HIV health care providers, and patients to collaborate and create a more appropriate intervention. Similar to the three interventions in the systematic review, research teams should consider conducting their intervention at an HIV clinic. This can allow researchers to make referrals or encourage participants to partake in ongoing and long-term care post-intervention. For instance, the HIV clinic staff can attend to the biopsychosocial needs of each participant, and diminish any challenges that can interfere with long-term adherence.

Lastly, it is important for Latinx MSM and HIV advocates to recognize the importance of taking ART in order to improve health outcomes and diminish the risk of transmitting HIV onto others (Crim et al., 2020). Latinx MSM and HIV advocates are encouraged to visit their local HIV clinic, ask questions, and inquire about the available services. Secondly, Latinx MSM and HIV supporters can also contact the CDC and the NIMH directly to advocate for more interventions and services. Spreading and sharing the findings of this systematic review with other people can also increase awareness and potentially create a nationwide movement. Overall, policymakers, stakeholders, researchers, HIV clinics, Latinx MSM, and HIV advocates need to collaborate to end the HIV crisis among Latinx MSM and help them live healthier lives, which is long overdue.

Clinical Implications
Clinical psychologists and mental health providers are also encouraged to partake in the development of ART adherence interventions for Latinx MSM. It is essential for these providers to get acquainted with the body of literature pertaining to ART adherence interventions, the impact of HIV on mental health, and Latinx MSM with HIV to identify the many ways they can contribute to an intervention. For example, the body of literature as communicated in this systematic review revealed that symptoms of depression affect Latinx MSM with HIV and it is also a factor impacting non-adherence (Gonzalez et al., 2011; De Santis et al., 2012; Langebeek et al., 2014; Crim et al., 2020). Hence, mental health providers can share their expertise by identifying and integrating individual-level or group-level strategies into an intervention to reduce symptoms of depression among Latinx MSM and improve their levels of adherence. In addition, a mental health provider can share ideas on how to include aspects of various treatments into an intervention such as CBT, interpersonal psychotherapy, and problem-solving therapy, which have been shown to be effective treatments for depression among Latinx groups (Collado et al., 2016). A mental health provider can also serve as a consultant and offer feedback to an HIV clinic or a particular setting on how to alleviate depressive symptoms and other mental health concerns among Latinx MSM to promote long-term adherence post-intervention.

Furthermore, clinical psychologists and mental health providers can share their knowledge and expertise on how to create accessible ART adherence interventions for all Latinx MSM with HIV. For instance, ART adherence interventions can be offered via a hybrid model or virtually to potential participants who may have transportation constraints or live far away from a particular setting. As hybrid and virtual services continue to expand in the digital age, mental health providers are more likely to be equipped to meet this demand and can play a significant role in ensuring intervention effectiveness regardless whether a program is offered in-person or
EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE virtually. Mental health providers can also collaborate with a research team to create a virtual ART adherence intervention that participants can use post-intervention in case they need support in managing their depressive symptoms. Providing free mental health tools or additional resources to participants post-intervention can perhaps increase the likelihood of sustaining long-term ART adherence, especially to participants who may not have access or the financial means to obtain mental health services. Overall, in-person, hybrid, or virtual ART adherence interventions are needed to address the needs of all Latinx MSM with HIV and mental health providers can make a positive contribution in order to meet this goal.
EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE

REFERENCES


EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE

Project nGage: Results from a randomized controlled trial of a dyadic network support intervention to retain young black men who have sex with men in HIV care. *AIDS and Behavior, 21*(12), 3618–3629.


Centers for Disease Control and Prevention. (1985). Provisional public health service inter-
EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE


https://www.cdc.gov/media/pressrel/r981007.htm.


EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE

approach to reducing HIV infections in the United States.


Center for Disease Control and Prevention. (2021, April 5). HIV and AIDS timeline.

Center for Disease Control and Prevention. (2021, April 5). Effective interventions.


U.S. Department of Health and Human Services.

Centers for Disease Control and Prevention. (2023, March 5). Structural interventions (SI) review methods.

Centers for Disease Control and Prevention. (2023, March 5). Linkage to, retention in, or
EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE

re-engagement in HIV care (LRC) chapter background.


Centers for Disease Control and Prevention. (2023, March 5). Medication adherence (MA) review methods.


Centers for Disease Control and Prevention. (2023, March 5). Risk reduction (RR) review methods.


EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE


EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE


EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE


Finlayson, T., Cha, S., Xia, M., Trujillo, L., Denson, D., Prejean, J., Kanny, D., Wejnert, C., &
EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE


EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE


Hall, H. I., Song, R., Rhodes, P., Prejean, J., An, Q., Lee, L. M., Karon, J., Brookmeyer, R.,
EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE


EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE


EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE


EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE

sex with men and young transgender women who have sex with men: Protocol for a randomized controlled trial. *JMIR Research Protocols, 7*(4).


EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE


EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE

patient navigation program: Engaging HIV positive individuals in primary medical care.

*Journal of HIV/AIDS & Social Services, 19*(1), 55 – 73.


EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE


EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE


Page, M. J., Moher, D., Bossuyt, P. M., Boutron, I., Hoffman, T. C., Mulrow, C. D., Shamseer,
EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE


EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE


EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE

Valentine (Eds.), *The handbook of research synthesis and meta-analysis* (p. 103-125). Russell Sage Foundation.


EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE


Sun, C. J., Ma, A., Tanner, A. E., Mann, L., Reboussin, B. A., Garcia, M., Alonzo, J., & Rhodes,
EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE


Tanner, A. E., Song, E. Y., Mann-Jackson, L., Alonzo, J., Schafer, K., Ware, S., Garcia, J. M., Hall, E. A., Bell, J. C., Van Dam, C. N., & Rhodes, S. D. (2018). Preliminary impact of the weCare social media intervention to support health for young men who have sex with men and transgender women with HIV. *AIDS Patient Care and STDs*, 32(11), 450–458.


EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE


EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE

antiretroviral therapy and adherence case management intervention. *Clinical Infectious Diseases, 42*(11), 1619–1627.


### Table 1

**Search Strategies**

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Table 1 continued

**Search Strategies**

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*Search Strategies*

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### Table 2

**Study Characteristics**

<table>
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<tr>
<th>Study</th>
<th>Study Design</th>
<th>Participants</th>
<th>Intervention/Comparison</th>
<th>Outcome/Measure</th>
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<tbody>
<tr>
<td>van Servellen et al. (2003)</td>
<td>Quasi-experimental</td>
<td>100% Latinos</td>
<td>Intervention n = 41  87.8% male</td>
<td>Self-reported medication adherence</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Comparison n = 40  92.5% male</td>
<td>AIDS Clinical Trials Group (ACTG) Adherence Baseline Questionnaire</td>
</tr>
<tr>
<td>van Servellen et al. (2005)</td>
<td>Quasi-experimental</td>
<td>100% Latinos</td>
<td>Intervention n = 43  88.4% male</td>
<td>Self-reported medication adherence</td>
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<td>Comparison n = 42  92.9% male</td>
<td>AIDS Clinical Trials Group (ACTG) Adherence Baseline Questionnaire</td>
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<tr>
<td>Kurth et al. (2016)</td>
<td>Randomized Controlled Trial</td>
<td>94.5% Latino ethnicity</td>
<td>Intervention n = 226  68.0% male</td>
<td>Self-reported ART adherence</td>
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<td>Comparison n = 207  69.4% male</td>
<td>30-day visual analog scale (VAS)</td>
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<tr>
<td>Bogart et al. (2021)</td>
<td>Randomized Controlled Trial</td>
<td>100% Hispanic or Latino sexual minority men</td>
<td>Intervention n = 38</td>
<td>ART adherence</td>
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<td>Comparison n = 38</td>
<td>VAS Medication Event Monitoring System (MEMS)</td>
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</table>
EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE

Table 3

*Intervention Characteristics*

<table>
<thead>
<tr>
<th>Study</th>
<th>Intervention</th>
<th>Modalities</th>
<th>Topic/Theme</th>
<th>Duration</th>
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<tr>
<td>van Servellen et al. (2003) &amp; (2005)</td>
<td>Es Por La Vida</td>
<td>Cognitive-behavioral</td>
<td>HIV health literacy</td>
<td>5 weekly sessions 6-month follow-up</td>
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<td></td>
<td>Motivational interviewing</td>
<td>Cultural themes</td>
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<td></td>
<td></td>
<td></td>
<td>Barriers &amp; facilitators of adherence management</td>
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<td>Kurth et al. (2016)</td>
<td>CARE+ Spanish</td>
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<td>Risk reduction health plan</td>
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<td>Motivational interviewing</td>
<td>Healthy behaviors</td>
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<td>Information-motivation-behavior</td>
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<td>Bogart et al. (2021)</td>
<td>Siempre Seguiré</td>
<td>CBT</td>
<td>Stigma</td>
<td>8 weekly sessions</td>
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<td>DBT techniques</td>
<td>Intersectional discrimination</td>
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<td></td>
<td></td>
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<td>Medical mistrust</td>
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*Note.* CARE+ = Computer Assessment & Rx Education for HIV-Positives. CBT = Cognitive Behavior Therapy. DBT = Dialectical Behavior Therapy. HIV = Human Immunodeficiency Virus.
Table 4

Results of the ROBINS-I - van Servellen et al. (2003)

<table>
<thead>
<tr>
<th>Domain</th>
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<tr>
<td>Bias due to confounding</td>
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<tr>
<td>Bias in selection of participants into the study</td>
<td>Low risk</td>
</tr>
<tr>
<td>Bias in classification of interventions</td>
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<tr>
<td>Bias due to deviations from intended interventions</td>
<td>Low risk</td>
</tr>
<tr>
<td>Bias due to missing data</td>
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<td>Bias in measurement of outcomes</td>
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<td>Bias in selection of the reported result</td>
<td>Low risk</td>
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<tr>
<td>Overall risk of bias</td>
<td>Moderate risk</td>
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*Note. ROBINS-I = Risk of Bias in Non-Randomised Studies of Interventions.*
## EFFECTIVENESS OF INTERVENTIONS TO INCREASE ART ADHERENCE

### Table 5

*Results of the RoB 2*

<table>
<thead>
<tr>
<th>Study</th>
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<tr>
<td>Kurth et al.</td>
<td>Bias arising from the randomization process</td>
<td>Low risk</td>
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<tr>
<td>(2016)</td>
<td>Bias due to deviations from intended interventions</td>
<td>Low risk</td>
</tr>
<tr>
<td></td>
<td>Bias due to missing outcome data</td>
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</tr>
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<td>Bias in measurement of the outcome</td>
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<td>Overall risk of bias</td>
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<tr>
<td>Bogart et al.</td>
<td>Bias arising from the randomization process</td>
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<tr>
<td>(2016)</td>
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*Note.* RoB 2 = Revised Tool for Assessing Risk of Bias in Randomised Trials.
### Table 6

**Results of Individual Studies**

<table>
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<tr>
<th>Study</th>
<th>Outcome/Measure</th>
<th>Statistical Method</th>
<th>Results</th>
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<tr>
<td>van Servellen et al. (2003)</td>
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<td>Baseline: 0.56 (1.45)</td>
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<td>6 weeks: 0.29 (0.96)</td>
</tr>
<tr>
<td>AIDS Clinical Trials Group</td>
<td>Adherence</td>
<td>McNemar tests</td>
<td>Control group, M (SD)</td>
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<td>(ACTG)</td>
<td>Baseline Questionnaire</td>
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<td>Baseline: 0.29 (1.21)</td>
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<td>6 weeks: 0.32 (0.96)</td>
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<td>McNemar tests</td>
<td>Comparison group</td>
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<td>Baseline-6-weeks: 5.66%</td>
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<td>Baseline-6-months: 18.21%*</td>
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<td></td>
<td>*McNemar = 3.60, p = 0.06</td>
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<td></td>
<td>Intervention group</td>
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<td>2 or more doses missed, last 4 days</td>
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<td></td>
<td>Baseline-6-weeks: −15.34%</td>
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<td>Baseline-6-months: −5.69%</td>
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Results of Individual Studies

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<td>2 or more doses missed, last 4 days</td>
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<td>Baseline-6-weeks: 14.61%</td>
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<td>Baseline-6-months: 6.79%</td>
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<td>Intervention group, M (SD)</td>
<td>Avg. proportion missed doses last 4 days</td>
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<tr>
<td></td>
<td>Baseline-6-weeks: −0.01 (0.13)</td>
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<td>Baseline-6-months: 0.02 (0.14)</td>
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<td>Comparison group, M (SD)</td>
<td>Avg. proportion missed doses last 4 days</td>
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<td></td>
<td>Baseline-6-weeks: 0.01 (0.19)</td>
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<td>Baseline-6-months: 0.04 (0.13)</td>
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<td></td>
<td>Intervention group</td>
<td>Proportion &gt; 90% adherence, last 4 days</td>
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<tr>
<td></td>
<td>Baseline-6-weeks: 11.62%</td>
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<tr>
<td></td>
<td>Baseline-6-months: −0.49%</td>
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<td>Proportion &gt; 90% adherence, last 4 days</td>
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<td></td>
<td>Baseline-6-weeks: −11.32%</td>
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<td>Baseline-6-months: −11.47%</td>
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<td>Intervention group</td>
<td>Proportion &gt; 95% adherence, last 4 days</td>
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<td></td>
<td>Baseline-6-weeks: 8.03%</td>
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<td>Baseline-6-months: 1.71%</td>
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<td></td>
<td>Comparison group</td>
<td>Proportion &gt; 95% adherence, last 4 days</td>
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### Table 6 continued

#### Results of Individual Studies

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<th>Results</th>
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<td>Baseline-6-weeks: −11.97%</td>
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<td>Baseline-6-months: −4.85%</td>
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<td>Kurth et al. (2016)</td>
<td>Self-reported</td>
<td>Linear and generalized mixed linear effects</td>
<td>Total Sample</td>
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<td></td>
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<td>models</td>
<td>CARE+, M (95% CI)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Baseline: ~ 87 (85, 90)</td>
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<td></td>
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<td></td>
<td>3 months: ~ 87 (85, 89)</td>
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<td>6 months: ~ 86 (84, 88)</td>
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<td></td>
<td>9 months: ~ 86 (83, 88)</td>
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<td>30-day VAS</td>
<td>Effect size</td>
<td>(Cohen’s $f^2$)</td>
<td>Total Sample</td>
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<td>Control group, M (95% CI)</td>
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<td>Baseline: ~ 88 (86, 92)</td>
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<td></td>
<td></td>
<td>3 months: ~ 87 (85, 90)</td>
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<td>6 months: ~ 86 (83, 88)</td>
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<td></td>
<td>9 months: ~ 84 (82, 87)</td>
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<td>Detectable viral load</td>
<td></td>
<td></td>
<td>Total Sample</td>
</tr>
<tr>
<td>at baseline</td>
<td></td>
<td></td>
<td>CARE+, M (95% CI)</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Baseline: ~ 77 (73, 82)</td>
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<td></td>
<td></td>
<td>3 months: ~ 77 (74, 82)</td>
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<td>6 months: ~ 78 (75, 83)</td>
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<td></td>
<td>9 months: ~ 79 (75, 84)</td>
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<td>Detectable viral load</td>
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<td>Total Sample</td>
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<tr>
<td>at baseline</td>
<td></td>
<td></td>
<td>Control group, M (95% CI)</td>
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<td></td>
<td></td>
<td>Baseline: ~ 77 (74, 83)</td>
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<td></td>
<td>3 months: ~ 76 (73, 80)</td>
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<td>6 months: ~ 75 (71, 78)</td>
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<td>9 months: ~ 73 (67, 77)</td>
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<td>M Difference</td>
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<td></td>
<td>Total Sample</td>
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<td>M Difference (95% CI)</td>
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<td></td>
<td>Baseline: ~ −2 (−5, 3)</td>
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<td></td>
<td>3 months: ~ 0 (−4, 3)</td>
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<td></td>
<td>6 months: ~ 1 (−3, 4)</td>
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<td></td>
<td>9 months: ~ 3 (−3, 6)</td>
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<td>Control change: ~ −5 (−7, −2)</td>
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<td>CARE+ change: ~ −2 (−4, 2)</td>
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### Table 6 continued

**Results of Individual Studies**

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<thead>
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<th>Study</th>
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<th>Statistical Method</th>
<th>Results</th>
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<tr>
<td>Detectable viral load at baseline</td>
<td>M Difference (95% CI)</td>
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<tr>
<td>Baseline: ~ −1 (−7, 5)</td>
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<td>3 months: ~ 2 (−4, 7)</td>
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<td>6 months: ~ 4 (−2, 9)</td>
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<td>9 months: ~ 6 (0, 13)</td>
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<tr>
<td>Control change: ~ −5 (−11, 0)</td>
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<td>CARE+ change: ~ 3 (−3, 6)</td>
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<tr>
<td>Group differences in change</td>
<td>on VAS - Total Sample</td>
<td>Effect size (Cohen’s $f^2$) = 0.002</td>
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<td>Detectable viral load at baseline</td>
<td>Effect size (Cohen’s $f^2$) = 0.005</td>
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<td><strong>Bogart et al. (2021)</strong></td>
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<td>Intention-to-treat repeated-measures regressions</td>
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<td>Intervention group, average</td>
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<td>0-1 month: ~ 89%</td>
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<td>4-5 months: ~ 87%</td>
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<td></td>
<td>5-6 months: ~ 92%</td>
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<td>6-7 months: ~ 85%</td>
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<td></td>
<td>MEMS</td>
<td>Control group, average</td>
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<td>0-1 month: ~ 82%</td>
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<td>4-5 months: ~ 79%</td>
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<td>5-6 months: ~ 76%</td>
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<td>6-7 months: ~ 79%</td>
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<td>VAS</td>
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<td>Baseline: 94.61 (6.62)</td>
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<td>4-month: 97.48 (5.42)</td>
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<td>7-month: 99.17 (1.51)</td>
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<td>VAS</td>
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### Results of Individual Studies

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<tr>
<td></td>
<td>Baseline: 91.08 (8.97)</td>
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<td>4-month: 94.57 (6.56)</td>
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<td></td>
<td>7-month: 92.91 (16.78)</td>
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<td></td>
<td>MEMS b (95% CI)</td>
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<td></td>
<td>9.24 (–0.55, 19.03), p = 0.06</td>
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<td></td>
<td>Effect size (Cohen’s d) = 0.44</td>
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<td>VAS b (95% CI)</td>
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<td>4.50 (0.70, 8.30), p = 0.02</td>
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<tr>
<td></td>
<td>Effect size (Cohen’s d) = 0.26</td>
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APPENDICES

Appendix A

PRISMA Flow Diagram

Identification
- 724 records identified through database searching:
  - PubMed = 140
  - PsycINFO = 51
  - CINAHL = 67
  - SCOPUS = 117
  - ProQuest = 17
  - Google Scholar = 332
- 107 additional records identified through other sources:
  - Backward search = 59
  - CDC Compendium = 19
  - Contacting experts = 29

Records removed before screening:
- Duplicate records removed = 233

Screening
- Records screened via Titles & Abstracts = 598
- Records screened via Full-Text Review = 74
- Records excluded as they did not meet elements of PICO and the inclusion criteria = 524
- Records excluded as they did not meet elements of PICO and the inclusion criteria = 56

Eligibility
- Records assessed for eligibility = 18

Included
- Number (n) of studies included in the systematic review: n = 4
- Reasons 14 records were excluded:
  - Reason 1: unable to extract the data or researchers were unable to provide the dataset
  - Reason 2: unable to extract the data and researchers did not respond to electronic mail
  - Reason 3: no results section with quantitative data
  - Reason 4: follow-up article of the original study