

Determinants of public health and interventions to address HIV infection among men who have sex with men in Miami-Dade County, Florida, USA

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SUMMARY

Human immunodeficiency virus (HIV) among men who have sex with men (MSM) has been recognized as a public health problem in Miami-Dade County, Florida, USA. This was found to be a significant problem in our need assessment as evidenced by the HIV incidence rate of 28.4 per 100,000 population, which is higher than the average incidence reported for the state of Florida. MSM account for the mostly affected group, reaching 59% of all the new cases. A review of the HIV determinants was conducted using an ecological framework. At the individual level, sexual abuse, alcohol, and drug consumption were identified as determinants of HIV infection in this population. Family rejection was recognized as a determinant at the interpersonal level. Connection to the gay community can function as a protective factor but it can also be possible predictor of HIV infection. Among struc-

tural factors, poverty was found to be positively associated with HIV prevalence. Additionally, we highlighted the importance of sexual health education and especially pre-exposure prophylaxis (PrEP) as protective factors. By using systems thinking tools, we designed a causal loop diagram that illustrates visually the recognized determinants of public health. Finally, we presented several studies that evaluate evidence-based interventions to improve the uptake and retention in care of PrEP in MSM. We also described existing interventions implemented in Miami-Dade County, and reported studies that may contribute to the development of new HIV preventive strategies in the future.

Keywords: HIV, public health, determinants, men who have sex with men, Miami, socio-ecological model.

INTRODUCTION

Miami-Dade County, Florida is a multifaceted region located in the southernmost point of the United States of America (USA), being intrinsically connected to the southern hemisphere of the Americas, including the Caribbean islands. According to the 2020 census, this county had a

population of 2,701,767, becoming the most populous county in Florida and the seventh-most populous county in the United States [1, 2]. Miami-Dade is home of 34 incorporated cities. The northern, central, and eastern portions of the county are heavily urbanized; on the other hand, the southern portion is sparsely populated, with agriculture as its main economic activity [2]. Miami-Dade County is destined to cultivate a plethora of diverse cultures and heritages, which houses a growing body of Hispanics (68.7% of the population) and other ethnicities [3]. The significance of diversity held in a dense area like Miami-Dade

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County can yield an intricate woven behavior that hampers the implementation of preventive interventions for public health problems like HIV infection. In this paper, we utilize a theory, known as social-ecological model, derived from Bronfenbrenner's work that can "unpack" social determinants of health intertwined in HIV transmission among MSM in Miami-Dade County, Florida [4]. Using this model, we observe the microsystem that examines this specific population that directly connects with members in the community, like family members, peers, and health care providers. The utilization of this model can shed light on the social determinants of health that are grappled by this vulnerable population negatively affecting the health outcome. As we understand the evident determinants faced among this population, we address this public health issue by showcasing an evidence-based intervention that can be implemented in this community in order to help reduce the transmission of HIV with the ultimate goal of ending the HIV epidemic.

■ REVIEW OF THE PROBLEM AND PUBLIC HEALTH SIGNIFICANCE

One of the main health problems of Miami-Dade is the high incidence of HIV [5]. The World Health Organization defines HIV as an infection that attacks the body's immune system, specifically, the white blood cells called CD4 cells. HIV destroys these CD4 cells, weakening a person's immunity against opportunistic infections, and some cancers [6]. According to the Centers for Disease Control (CDC), there were 36,801 new cases of HIV infection in 2019 in the USA and dependent areas. Florida occupies the third place in HIV incidence with a rate of 20.4 new cases per 100,000 population [7]. At the county level, Miami-Dade County reports an HIV incidence rate of 28.4 per 100,000 population, which is higher than the average incidence reported for the state of Florida [8]. However, when we consider the entire metropolitan area of Miami, this region occupies the first place in HIV incidence in the USA, reaching a rate of 32.3 cases per 100,000 population [9]. In terms of mortality, there has been a decrease of 34% since 2015; however, there is still an important number of deaths related to HIV in Miami-Dade, with 129 deaths reported in 2020 [10]. This is very concerning, especially in the era of highly active antiretro-

viral therapy, which has proven to be fully effective and has allowed people living with HIV (PLWH) to have a normal life expectancy [11]. One of the main reasons for these negative outcomes is the poor access to healthcare, in fact, of all the PLWH in Miami-Dade County, only 71.9% are linked to care, and 61.6% are on treatment resulting in full virologic suppression [9]. Although these statistics are slightly better than the national HIV continuum of care (66% linked to care and 57% of viral suppression), they indicate that there are at least 38% of PLWH with uncontrolled HIV in Miami-Dade County, who may potentially transmit the infection to their uninfected peers, perpetuating the disease in the community [12]. There is a clear need to improve these parameters in Miami-Dade County to decrease the transmission, lower the prevalence rate, and ultimately attempt full eradication of this infection in the future. The group mostly affected by this infection is MSM, which accounts for 68% of the total new cases in Miami-Dade County [13]. In terms of the continuum of care for this subgroup, the parameters are very similar to those reported for all the PLWH, with 72% of MSM living with HIV linked to care and 65% achieving viral suppression in Miami-Dade County [13].

■ MATERIALS AND METHODS

We conducted a non-systematic review of the determinants of HIV in MSM in Miami-Dade County, Florida, USA. These determinants were categorized in multiple levels according to the socio-ecological model derived from Bronfenbrenner's work [4]. We included studies that addressed determinants of HIV in MSM; however, not all these studies were applicable to Miami-Dade County. A causal loop diagram was also performed to illustrate the possible relationship between determinants.

■ DETERMINANTS OF HIV INFECTION AMONG MSM

A review of the determinants of this problem was conducted using an ecological framework [4]. At the individual level, sexual abuse has been identified as a determinant of HIV. According to Mimiga et al., there is a predicted relationship between a history of childhood sexual abuse and

subsequent HIV infection, with an increase of 30% on the HIV infection risk among MSM. Furthermore, the authors found that MSM, victims of childhood sexual abuse, were more likely to engage in unprotected anal sex, and derive less benefit from prevention programs [14]. According to the Florida Department of Health, in 2020 the rate per 100,000 of children experiencing sexual violence (aged 5-11 years) in Miami-Dade County was 20.7. Although this rate has been decreasing since 2006, it remains a public health problem as 46 cases of child abuse are still reported in Miami-Dade County in 2020 [15]. Regarding MSM, it is estimated that the prevalence of childhood sexual abuse is higher than that in the general population, with a rate that can be as high as 37% [16].

Multiple studies have associated HIV infection with individual beliefs and attitudes towards risk behaviors in MSM [17, 18]. Using the Theory of Reasoned Action, researchers have determined that attitudes towards safer sex were associated with intentions to practice lower risk behaviors, which predicted employment of HIV-risk reducing strategies [18].

Other individual level determinants that are worth mentioning are drug and alcohol consumption [19]. In recent years, club drugs (ecstasy, amphetamines, and cocaine) have received a lot of attention as potential predictors of HIV transmission. Evidence suggests that these substances have played a key role in the increase of HIV and sexually transmitted infections, particularly among young MSM [20]. Moreover, studies have shown a strong correlation between cocaine and amphetamine use and unprotected anal intercourse in young MSM [21, 22]. This phenomenon was also observed by Weatherby et al. in Miami, Florida. After conducting a data analysis of the Multicenter Study of Crack Cocaine and HIV infection in Miami, they reported that crack use was associated with increased sexual activity, trading sex for money or drugs, and sex with multiple partners. There was also a low rate of condom use in this population [23].

Unfortunately, drug abuse is still a major problem in Miami-Dade County, which has led to a continuous increase in the drug overdose death rate in the last 10 years, reaching 11.9 per 100,000 in 2020 [24]. The study conducted by Fernandez et al. in Miami-Dade revealed that the percentage of club drug use among MSM can be as high as 50%,

ecstasy and cocaine being the most prevalent drugs with a rate of 36% and 34%, respectively. The authors also observed that club drug users had significantly more sex partners in the last 12 months when compared to non-club drug users. [25]. The consumption of drugs before or during sex to stimulate or enhance sexual encounters, also known as Chemsex, has also been recognized as a serious issue in Miami-Dade County. The study conducted by Forrest et al. revealed that 18% of MSM in South Florida reported crystal methamphetamine use in the past 12 months, which is one of the highest rates in the USA. In addition, users of this drug were more likely to report high-risk sexual behaviors, increased number of non-main sex partners, and being high on drugs and/or alcohol at last sex act with a non-main partner [26].

Alcohol has also been considered as an HIV determinant by many researchers with studies showing a positive association between alcohol and sexual risk in MSM [27, 28]. Additionally, age was proposed as a moderator of this relationship, due to the greater effect of alcohol consumption on high-risk sexual behaviors in older MSM [29]. According to the Florida Behavioral Risk Factor Surveillance System, 18% of adults in Miami-Dade County have engaged in heavy or binge drinking in 2017-2019, indicating a significant increase from 10.9% in 2010, a problem that has affected mainly individuals in the age range of 18-44 years [30, 31]. Regarding MSM, multiple studies have shown a high rate of alcohol consumption in this population. In Miami-Dade County, a study conducted by the CDC in 2011 revealed that heavy drinking and binge drinking are reported by 17% and 57% of MSM respectively [32].

At the interpersonal level, family rejection was found to be a determinant of HIV. MSM, who reported higher levels of family rejection during adolescence, were 3.4 times more likely to be engaged in unprotected sexual intercourse, compared with peers from families with no or low levels of family rejection [33]. In Miami-Dade County, Mitrani et al. demonstrated that parental rejection among Hispanic MSM was associated with higher depression scores, which may lead to engagement in high-risk sexual behaviors [34]. On the other hand, parental bonding or parental communication may improve many sexual health outcomes, such as the age of sexual debut, num-

ber of sexual partners, HIV risk behaviors, and acquisition of other sexually transmitted infections. Boyd et al. also found that family social support was negatively correlated with PrEP stigma among Black and Latin MSM [35, 36]. These findings suggest that family support should be considered a valuable component in comprehensive HIV preventive interventions in MSM [37].

At the community level, connection to the LGBT (lesbian, gay, bisexual and transgender) community has been recognized as a determinant of this public health problem. According to several studies, it can raise the exposure to factors that increase the risk of contracting HIV, such as more relaxed norms around drug use, and the greater access to potential sexual partners [38]. On the other hand, being connected with the LGBT community can also function as a protective factor, because it may increase the person's exposure to HIV prevention, education, and medical care programs designed for MSM [39]. Stigma is another factor that mediates HIV infection. Among MSM, stigma due to sexual and racial prejudice have been negatively associated with awareness and intention to use preventive measures and engage in HIV testing [40]. In addition, stigma has shown a positive association with high-risk sexual behaviors [40, 41].

In terms of structural factors, sexual health education is considered a key determinant using this framework. The development of school sex education program has proven to be effective to improve the knowledge about HIV, sexually transmitted diseases, and condom use [42]. Peskin et al. have also demonstrated that the implementation of a computer based sexual education program for middle school youth can lead to positive attitudes about abstinence, condom use self-efficacy, and perceived norms about sex [43]. Sexual education also behaves as a protective factor for HIV in MSM. An analysis of Youth Risk Behavior Surveillance System data from 13 states in the USA revealed that HIV education was associated with reduced sexual risk behaviors among all students, with significant additional reductions in sexual risk behaviors among young MSM [44].

At the structural level, poverty has had a profound impact on HIV [45]. A study conducted by Denning et al. demonstrated that the annual household income is inversely associated with HIV prevalence, a relationship that was also sig-

nificant for certain socioeconomic metrics such as poverty level, and employment, and homeless status [46]. The socioeconomic status is still a disparity found in Miami-Dade County. According to the United States Census Bureau, the Miami-Fort Lauderdale metropolitan area has the second lowest median household income in the entire country. In terms of poverty, Miami-Dade County has one of the highest rates in the USA, with 16% of its population living below poverty level. Although the rate has been decreasing in Miami-Dade County since 2010, it is still higher than the average reported for the State of Florida (13.3%) and the USA (12.8%) [47]. Regarding MSM, a study conducted by Akin et al. in Hispanic MSM in Miami-Dade County revealed that 35.2% of participants had a monthly income of less than \$ 1,500/month, and 15% were unemployed. In their analysis, they also found that 44% of the participants engaged in unprotected anal intercourse and 41% used club drugs, all of which have been associated with HIV infection [48]. It is worth mentioning that poverty has been associated with drug abuse. In fact, a potential causal relationship was noted in a Swedish study, in which exposure to poverty early in life may have increased the risk of drug use problems in adulthood [49]. A similar effect has been observed with alcohol use, as poverty has been associated with light and heavy drinking, a relationship possibly mediated by chronic stress and poor social support [50].

Another determinant at the structural level is the implementation of pre-exposure prophylaxis (PrEP), which is a protective factor for HIV infection among MSM. PrEP is a pharmacologic measure that consists in taking an antiretroviral regimen (Truvada[®], Descovy[®], or Cabotegravir) to prevent HIV infection in people who are HIV negative [51-54]. If taken consistently, these medications can reduce the risk of acquiring HIV by sex in 99%, and among people who inject drugs, the efficacy can be as high as 74% [55, 56]. Despite its proven effectiveness, the use of PrEP is still low in the USA [57]. A study conducted by the Centers of Disease Control and Prevention (CDC) in 2015 revealed that from a total of 300,000 Latin people who could benefit from PrEP, only 3% were prescribed PrEP [58]. Similarly, only 1% of African Americans eligible for PrEP were prescribed this drug [58]. In Miami, several studies have examined the awareness and use of PrEP.

According to Patrick et al, PrEP awareness has increased from 19.4% in 2011 to 41.2% in 2015. However, the use of PrEP has remained very low, with only 1.4% of the eligible population that eventually took this medication [59].

Preliminary data from the CDC in 2020 showed that about 25% of the 1.2 million people for whom PrEP is recommended were prescribed it, compared to only about 3% in 2015 [60]. This is a notable improvement; however, there are still disparities affecting racial minorities. Black and Hispanic/Latino people account for the majority of people for whom PrEP is recommended but have the lowest rates of PrEP use among all racial/ethnic groups. In 2020, only 16% of Hispanic/Latino people who could benefit from PrEP received a prescription, and this percentage is even lower for African American individuals, barely reaching 9% [60]. In Miami-Dade County, according to America’s HIV Epidemic Analysis Dashboard (AHEAD), PrEP coverage was 36.6% in 2021. Although this percentage is higher than that reported for all USA, it has shown a decrease from 47.2% in 2020 [61].

There are several factors that have been identified as potential barriers for PrEP uptake among MSM in Miami-Dade County. Rogers et al. conducted a

study aimed at evaluating barriers and facilitators associated with PrEP uptake at multiple levels [62]. At the individual level, the study participants expressed concerns about taking PrEP daily and potential negative health consequences, as well as mistrust in medical providers. Another important factor at the interpersonal level was stigma, with many participants reporting concerns about the perception of their peers regarding PrEP use. Barriers at the structural level to access PrEP were also recognized and included concerns about financial costs, lack of health insurance coverage, and lack of available venues for receiving PrEP [62].

■ SYSTEMS THINKING TOOL DIAGRAM

Addressing this problem can be facilitated by using systems thinking tools, therefore we designed a causal loop diagram to illustrate visually the main determinants of HIV among MSM at the individual, interpersonal, and structural level (Figure 1). As shown in Figure 1, we theorize that connection to the LGBT community may increase the person’s exposure to HIV prevention, education, and medical care programs designed for MSM, including PrEP, which would function as a pro-

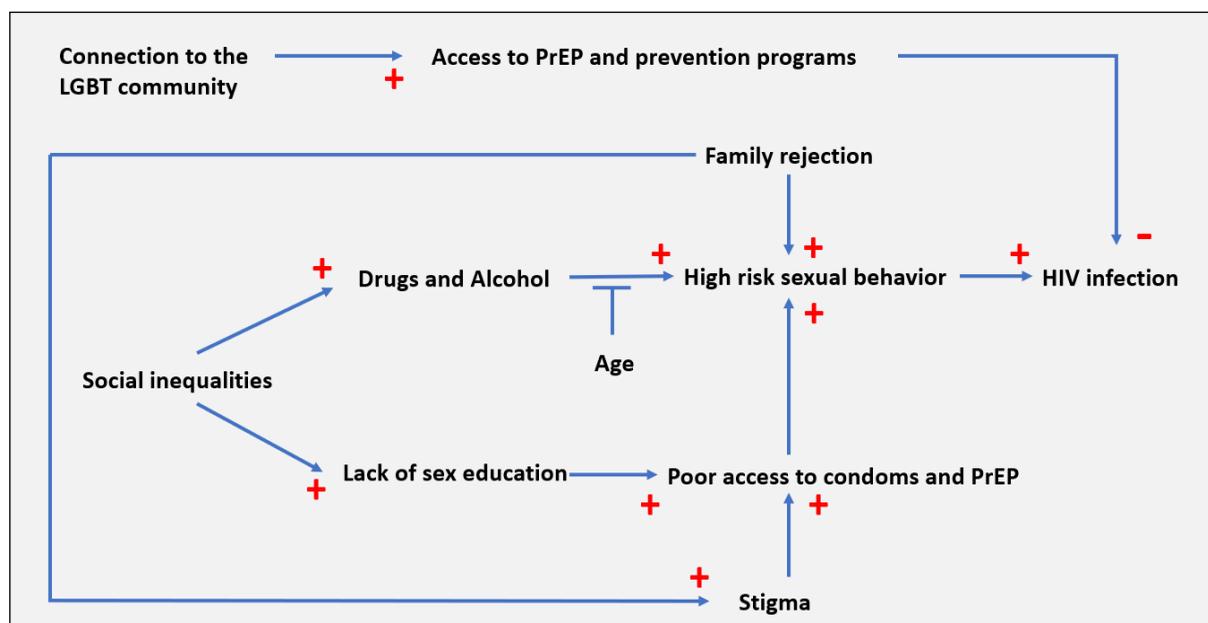


Figure 1 - Causal loop diagram between interpersonal factors, structural determinants, and HIV infection among MSM (→ causal relationship, + positive effect, - negative effect, T moderator).

tective factor and would reduce the HIV infection rate [39]. Our illustration presents social inequalities as a determinant that is linked to poor education access, which could explain the scarce knowledge about preventive measures in some individuals, and subsequently higher exposure to unsafe sexual practices [42, 45]. Social inequalities may also have a causal relationship with alcohol and drug use, which may lead to an increased exposure to high-risk sex behaviors [19]. There is some evidence that age may function as a moderator between alcohol and drugs and high-risk sexual behavior, as older MSM who drink alcohol are involved more often in unsafe sexual practices, and drug use occurs mainly in young MSM [29]. Stigma may also lead to HIV infection through mediators related to poor access to condoms and PrEP [40, 41]. Social family rejection is also a factor that is linked to HIV infection, an association that is mediated by individuals' involvement in high-risk sex behaviors [33]. Family rejection may also cause stigma and lead to HIV infection through mediators such as poor access to condoms and PrEP that result in exposure to high-risk sexual behaviors [35].

■ EVIDENCE-BASED PREVENTION INTERVENTIONS TO CONSIDER IN ADDRESSING HIV INFECTION IN MSM

One of the interventions that have had the greatest impact on HIV prevention is PrEP; however, given the low rates of PrEP coverage in Miami-Dade County, there is a need for the implementation of strategies aimed at increasing the linkage to PrEP. In this regard, Teixeira da Silva et al. conducted a randomized controlled trial to evaluate the efficacy of an individualized linkage plan based on the Information-Motivation-Behavioral Skills model [63]. The intervention was called Partner Services PrEP (PS-PrEP) and was studied in Black MSM and Black transgender women (TW) presenting to network settings in Chicago, Illinois. Network referral services, such as partner notification services (PNS) and social network strategy services (SNSS) were used to identify individuals at high risk who may benefit from PrEP. The intervention consisted of a 60-minute face-to-face session with a social work interventionist (SWI) who guided participants through 4 components of the program. In the first component, the

SWI provided interactive education on HIV and PrEP. The second component consisted in motivational interviewing techniques to assess participant's intrinsic motivation to reduce HIV risk and engage in PrEP care. In the third component, the SWI and participant developed a Linkage Roadmap, a personalized plan to navigate linkage to PrEP. In an optional fourth component, the SWI completed problem-solving exercises with participants who identified significant barriers in their Linkage Roadmap and/or decided not to engage in PrEP care linkage. Participants received up to 4 mini booster sessions via phone or text message from the SWI until they were linked to PrEP care or up to 12-week post-intervention. The participants were randomized in 2 groups: PS-PrEP intervention or treatment as usual. A total of 146 participants were included in the primary analysis. The study population was predominantly young [median =25.9 years; interquartile range (IQR) =22.5-28.5], with high school education (92%), and insurance (83%). Compared with control participants, a significantly greater proportion of the intervention participants were linked to PrEP care within 3 months (24% vs. 11%; $p = 0.04$) and initiated PrEP (24% vs 11%; $p=0.05$). Among those linked to PrEP care within the entire study period (12 months), intervention participants were linked significantly sooner than control participants [median (interquartile range) days, 26.5 (6.0-141.8) vs 191.5 (21.5-297.0); $p=0.05$]. The study results support the preliminary efficacy of PS-PrEP to improve linkage to PrEP care and PrEP initiation among Black MSM and TW [63]. Another intervention oriented to improve PrEP uptake in MSM was developed by Chan et al. In their study they offered a brief motivational interviewing intervention to people attending a sexually transmitted infection walk-in clinic. During the interview, they addressed barriers to PrEP uptake, including low risk perception, stigma, side-effects, and cost. The initial session was followed by a brief, telephone booster session that lasted <10 minutes. A total of 86 MSM who were behaviorally at risk for HIV were enrolled in the study ($N=43$ intervention; $N=43$ treatment-as-usual, "TAU"). Participants randomized to the intervention were significantly more likely to attend a clinical appointment and accept a prescription for PrEP, compared to TAU (52.3% versus 27.9%, respectively; $OR=3.6$; 95%CI: 1.5- 8.9; $p=.005$) [64].

It is important to notice that the mentioned studies were conducted mostly in young, insured, and well-educated population and the results may not be completely extrapolated to Miami-Dade County. However, we believe that these interventions could be adapted to target individuals who seek care at the Florida Department of Health, where there is a well-established system that offers sexual transmitted diseases and HIV testing at no charge. This system could serve as a network to identify high risk individuals and enroll them in the PS-PrEP program, or the motivational interview developed by Chan et al. [65]. Considering that PrEP medication (Truvada or Descovy) is also provided at no cost by the Florida Department of Health, the implementation of these programs may lead to a significant increase in PrEP uptake [66]. Given the predominant Hispanic population in Miami, Spanish speaking personnel would be highly advised to assure the success of this intervention. In Miami Dade County, one of the problems that limits the uptake and retention in care in people under PrEP is the cost generated by the follow-up clinic visits and laboratory studies, which are not covered by the Florida Department of Health, all of which represent an enormous barrier for the uninsured population. An intervention developed to overcome this problem was the PrEP Mobile Clinic, a program ran by the University of Miami Miller School of Medicine that offers HIV testing and PrEP at no cost (including follow-ups and laboratory studies) for high-risk individuals regardless of their insurance status [67]. There is certainly a need for more programs like this to improve the accessibility of PrEP in low-income communities in Miami-Dade County.

Even in ideal conditions of healthcare access, to accomplish an adequate retention in care of PrEP is incredibly challenging, with retention rates barely reaching 43% according to some studies [68]. In this regard, Liu et al. conducted a randomized clinical trial that evaluated the impact of a youth-tailored bidirectional text messaging intervention (PrEPmate) on retention and PrEP adherence. The intervention consisted in short messaging service (SMS) and interactive online content to enhance PrEP adherence among young MSM. The SMS-based adherence support component included weekly "check in" messages asking participants how PrEP is going, and daily pill-taking re-

minder messages sent at a customized time consisting of fun facts and trivia for the 2 weeks after initiating PrEP, with the option to continue reminders throughout the study. The primary outcome for retention was having a PrEP study visit completed. The primary outcome for adherence was having a visit completed and TFV-DP ≥ 700 femtomole (fmol)/punch (consistent with ≥ 4 doses/week) assessed at 4, 12, 24, and 36 weeks. The participants were randomized in a ratio of 2:1 to PrEPmate versus standard of care (SoC) delivered over 9 months. A total of 121 participants were enrolled (mean age 24; 27% Black, 36% Latino). Participants who received PrEPmate were more likely to attend study visits (86% PrEPmate vs. 71% SoC, odds ratio [OR] =2.62, 95% confidence interval [CI] 1.24-5.54) and have TFV-DP levels consistent with ≥ 4 doses/week (72% PrEPmate vs. 57% SoC, OR =2.05, 95% CI 1.06-3.94). This intervention was found to be effective in this small single-center clinical trial; however, the authors granted that more research is needed to evaluate the impact of PrEPmate in more diverse geographic setting [69]. This intervention model can serve as a start point for developing further studies targeting PrEP retention in MSM in Miami-Dade County.

As described in our socio-ecological model, a determinant of HIV that may function as a protective factor is connection to the LGBT community, because it could allow access to prevention programs designed specifically for this population. One of these existing programs is the Miami Collaborative MSM Workgroup, which was organized by the Florida Department of Health and brings together MSM and Men's Health Coordinators around Florida to serve as the link between community members in the Gay Men's Workgroup, Transgender Workgroup, and other advisory councils. This workgroup also cooperates with community partners to enhance stakeholder engagement [70]. Another intervention already implemented in Miami-Dade County is the Hispanic Initiative, which goal is to plan, develop and implement innovative strategies on HIV/AIDS education and prevention for the Hispanic community through culturally sensitive and indigenous approaches [70].

Among the determinants of HIV at the individual level described in our socioecological model, drug and alcohol use constitute a major one, for which numerous interventions have been developed.

The study conducted by Kurtz et al. is of particular interest because it targets MSM and was performed in South Florida (Miami/Fort Lauderdale). In this trial, the authors tested the efficacy of a small group sexual, and substance use risk reduction intervention based on empowerment theory and compared it to an enhanced efficacious control condition. Effect sizes for sexual risk and substance use outcomes were moderate to large in both groups: HIV transmission risk frequency, $d=0.71$ in the control vs 0.66 in the experimental group; number of anal sex partners, $d=1.04$ vs 0.98 ; substance dependence symptoms, $d=0.49$ vs 0.53 . No significant differences were observed between the two arms. The authors mentioned that although finding no difference between arms of an RCT study is often interpreted as evidence of a failed trial, it is important to point out that in this case the comparison was between an intervention with proven efficacy and a novel intervention. The similarity of effects between study arms also suggests that brief interventions, like the one tested in the trial, enable even very high risk MSM to access mechanisms to reduce risk [71]. We believe that this intervention should also be implemented in Miami-Dade County given the high rates of drug abuse and Chemsex.

An HIV prevention intervention that has been already implemented in Miami-Dade County is Familias Unidas. This program is a group-level, culturally specific, family-based intervention that includes eight group sessions of 10 to 12 parents and four family visits. These sessions focus on positive parenting, family communication, parental monitoring, and adolescent HIV risk behaviors. Familias Unidas aims to change HIV risk behaviors by improving family functioning. The original evaluation of the program took place in Miami-Dade County in 2009 and 2010. The results of the trial revealed that in comparison to the control group, Familias Unidas participants were significantly less likely to report inconsistent condom use during vaginal sex ($RR=0.61$, $95\% CI=0.39-0.87$), had fewer sex partners ($IRR=0.35$, $95\% CI=0.28-0.44$), and reported fewer days in which they had unprotected sex while under the influence of drugs or alcohol ($IRR = 0.36$, $95\% CI=0.22-0.58$). [72]. We believe that Familias Unidas should be adapted to target specifically MSM to promote family acceptance and support, which is considered a protective factor for HIV infection.

■ CONCLUSIONS

In conclusion, we highlight the importance of using the socio-ecological model to analyze the determinants of HIV infection in MSM in Miami, Florida, which could allow the identification of multiple points of intervention for prevention. In our opinion, the implementation of programs aiming to improve PrEP linkage and retention in care is feasible and may lead to a significant reduction of HIV infection among MSM in our community. We also recommend the adoption of programs oriented to reduce drug abuse and improve parental support in MSM. All of that should be accompanied by an adequate strategy to strengthen the existing HIV preventive programs with the ultimate goal of controlling the HIV epidemic in Miami-Dade County and possibly attempting full eradication in the near future.

Conflict of interest

The authors declare no competing conflict of interest.

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Authors' contributions

JAGZ conceived the study. JAGZ and LPR wrote the manuscript. RM critically reviewed the manuscript. All authors contributed and approved the final version.

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