



Pre- and Post-immigration HIV Testing Behaviors among Young Adult Recent Latino Immigrants in Miami-Dade County, Florida

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Abstract

HIV testing early in the immigration process can facilitate timely linkage to HIV prevention and treatment services for immigrants. This study aims to determine the prevalence of self-report HIV testing pre- and post-immigration and the associations between pre-immigration HIV sexual risk behaviors, access to healthcare post-immigration, and HIV testing post-immigration among young adult recent Latino immigrants. Cross-sectional data from 504 recent Latino immigrants aged 18 to 34 who immigrated to Miami-Dade County, Florida during the 12 months before assessment were analyzed using robust Poisson regression models. We found that 23.8% of participants reported HIV testing post-immigration and 56.7% reported HIV testing pre-immigration. The prevalence ratio for post-immigration HIV testing was higher for participants that had health insurance (adjusted prevalence ratio [aPR]: 1.70, 95% confidence interval [CI]: 1.21–2.38) and a regular doctor or healthcare provider after immigration (aPR: 1.43, 95% CI 1.03–2.00), and post-immigration HIV testing was higher for participants that had ever been tested for HIV before immigration (aPR: 2.41, 95% CI 1.68–3.45). Also, the prevalence ratio was lower for those who engaged in condomless sex in the three months prior to immigration (aPR: 0.65, 95% CI 0.47–0.90). These findings suggest that addressing barriers to healthcare and prevention services for young adult recent Latino immigrants is needed to scale-up HIV testing in this population early in the immigration process.

Keywords HIV testing · Healthcare access · HIV sexual risk behaviors · Latino A · Immigrants

Resumen

Obtener una prueba del VIH al inicio del proceso de inmigración puede facilitar una conexión inmediata con los servicios de prevención y tratamiento del VIH. Este estudio tiene como propósito determinar la prevalencia auto informada de las pruebas de VIH antes y después de la inmigración, y las asociaciones entre las conductas sexuales de riesgo antes de la inmigración, el acceso a los servicios médicos después de la inmigración y las pruebas de VIH realizadas después de la inmigración en

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Latinos jóvenes adultos recién llegados a los Estados Unidos. Los datos transversales de 504 inmigrantes Latinos recién llegados entre los 18 y 34 años, que inmigraron al condado de Miami-Dade, Florida, durante los 12 meses anteriores a la evaluación, se analizaron utilizando modelos de regresión de Poisson robustos. Encontramos que 23.8% de los participantes informaron haberse realizado la prueba del VIH después de la inmigración y 56.7% informaron haberse realizado la prueba del VIH antes de la inmigración. El índice de prevalencia para las pruebas del VIH después de la inmigración fue mayor para los participantes que tenían seguro médico [índice de prevalencia ajustado (IPa): 1.70, intervalo de confianza (IC) del 95%: 1.21-2.38] y un médico o proveedor regular de atención médica después de la inmigración [IPa: 1.43, IC del 95%: 1.03-2.00], y para los participantes que se habían hecho la prueba del VIH antes de la inmigración [IPa: 2.41, IC de 95%: 1.68-3.45]. Además, el índice de prevalencia fue menor para aquellos participantes que tuvieron relaciones sexuales sin condón en los tres meses previos a la inmigración [IPa: 0.65, IC del 95%: 0.47-0.90]. Estos resultados sugieren que es necesario abordar las barreras a los servicios médicos y de prevención en los inmigrantes Latinos jóvenes adultos recién llegados a los Estados Unidos para ampliar las pruebas del VIH en esta población al inicio del proceso de inmigración.

Introduction

The National HIV/AIDS Strategy has prioritized efforts to address HIV-related disparities among Latinos in the United States (U.S.) [1]. However, two persistent public health issues—undiagnosed HIV and late diagnosis—have hindered efforts to reduce HIV-related disparities in this population [2, 3]. These challenges result in delayed linkage to HIV treatment and contribute to the ongoing transmission of HIV [4, 5]. Latinos have the highest percentage of undiagnosed HIV cases (16.7%) compared to Black/African American (14.8%) and White (11.5%) populations [3]. In addition, Latinos have a higher risk for late HIV diagnosis compared to other racial/ethnic groups, with 58.0% of cases diagnosed with AIDS within one year of HIV diagnosis [6, 7]. A particularly vulnerable Latino subgroup is the Latino immigrant population, which has a higher risk for late HIV diagnosis compared to Latinos born in the U.S. [2].

Limited access to HIV testing after immigration may partly explain the high risk for late HIV diagnosis among Latino immigrants [2, 8]. In fact, many Latino immigrants in the U.S. have not undergone HIV testing, predisposing them to late diagnosis [8]. HIV testing is a critical first step toward early diagnosis and accessing HIV prevention and treatment services [9]. Inadequate access to healthcare, such as lack of health insurance coverage or a primary source of care, may lead to underutilization of HIV testing among Latino immigrants [8, 10]. Limited access to HIV testing may be exacerbated for recent immigrants because they may face greater barriers to testing (e.g., limited access to healthcare services, low perception of risk, anticipated stigma) compared to established immigrants [11, 12]. Also, immigrants may be unaware of their HIV status upon arrival to the U.S. because they are no longer required to be tested (mandatory HIV testing was removed in January 2010 [13]) and may need additional outreach to be linked to community testing services.

Latino immigrants comprise nearly half of the new HIV cases among Latinos in the U.S.. [14]. Previous research has suggested that, while many Latino immigrants acquired HIV in their country of origin, most HIV transmissions in this population occur after immigration to the U.S. [15]. Also, recent Latino immigrants may be at greater risk for HIV after immigration due to increased number of sexual partners and engagement in condomless sex after immigration, which may be the result of migration-related factors and limited HIV prevention resources [16]. Thus, increasing HIV testing among Latino immigrants is critical, particularly in areas with high rates of HIV among Latinos.

Miami-Dade County in Florida, where 69.1% of the population are Latinos and 53.3% are immigrants, leads the nation with the highest annual rate of new HIV diagnoses [17, 18]. Latinos in Miami-Dade County represented the highest proportion (59%) of persons newly diagnosed with HIV in the county in 2018, while the non-Latino Black population and White population represented 29% and 11%, respectively [19]. Young adults aged 20–29 and 30–39 had the highest proportion of new HIV diagnoses among Latinos in Miami-Dade County in 2018 [20]. In addition, Latino immigrants in Florida are at higher risk for late HIV diagnosis compared to U.S.-born Latinos [21].

Access to HIV testing early in the immigration process can facilitate timely linkage to HIV prevention and treatment services among Latino immigrants. Few studies have examined HIV testing patterns among Latinos who recently immigrated to the U.S., particularly within the first year of immigration [8, 12, 22, 23]. As such, the present study aims to determine the prevalence of self-report HIV testing pre- and post-immigration and the associations between pre-immigration HIV sexual risk behaviors, access to healthcare post-immigration, and HIV testing post-immigration among Latino immigrants aged 18 to 34 years who recently immigrated to Miami-Dade County, Florida (≤ 12 months in the U.S.). This information is vital to understand access to HIV

testing among young adult recent Latino immigrants and inform HIV testing efforts for this population.

Methods

Participants and Procedures

The present study used baseline data collected between 2018 and 2020 from an ongoing longitudinal study examining pre- to post-immigration transportation and drinking and driving trajectories among young adult recent Latino immigrants. Retrospective pre-immigration and current post-immigration data were obtained from 540 young adult recent Latino immigrants who immigrated to Miami-Dade County, Florida. Inclusion criteria were being a Latino immigrant, 18–34 years old, who recently immigrated (within the 12 months prior to baseline assessment) to the U.S. from a Latin American country with the intention of staying at least three years after baseline.

Participants were recruited using respondent-driven sampling—an effective recruitment strategy used to recruit hard-to-reach populations [24]. Seeds were recruited via flyers and in-person throughout neighborhoods and businesses with substantial recent Latino immigrant populations, community-based agencies serving recent Latino immigrants, and during Latino health fairs in Miami-Dade County. Each seed (recruiter) was asked to refer three individuals from their social network who met eligibility criteria. This procedure was followed for a maximum of three legs per seed.

Surveys were conducted in Spanish by trained bilingual research staff at a confidential, safe location agreed upon by both the interviewer and participant. Informed consent was collected prior to completing the survey. Duration of each survey was approximately 1.5 h, and participants received \$50 for completing the survey. The study was approved by the Institutional Review Board of a large public university in South Florida.

Measures

Outcome

HIV testing post-immigration was measured with the question “since coming to the U.S. have you ever been tested for HIV?” Response categories were “yes” and “no”.

Predictors

Healthcare access variables included having health insurance and a regular doctor or healthcare provider post-immigration. To measure these variables, participants were asked “do you have health insurance” and “since coming to the

U.S. do you have a regular doctor or healthcare provider?” Response categories were “yes” and “no”.

HIV sexual risk behaviors included having more than one sexual partner, engaging in condomless sex, and sex under the influence of drugs or alcohol in the three months prior to immigration. To assess if participants had more than one sexual partner, they were asked to report number of sexual partners in the three months prior to immigration. This variable was then dichotomously recoded as “yes” and “no.” To determine engagement in condomless sex, we assessed frequency of sexual intercourse (“in the last three months before coming to the U.S., how many times did you have sexual intercourse?”) and frequency of condom use (“from the times you had sexual intercourse, how many times did you or your partner use a condom?”). Ratios between sexual intercourse frequency and condom use frequency were calculated and participants that did not always use a condom were classified as engaging in condomless sex (“yes”). Those who always used condoms or did not report any sexual intercourse in the three months prior to immigration were classified as not engaging in condomless sex (“no”). To assess engagement in sex under the influence of drugs or alcohol, two questions asked participants if they ever consumed alcohol or drugs before sexual intercourse in the three months prior to immigration. Those that responded “yes” to any of these questions were classified as engaging in sex under the influence of drugs or alcohol.

Covariates

HIV testing pre-immigration was measured using the question “before coming to the U.S. were you ever tested for HIV?” with response categories “yes” and “no”.

Sociodemographic variables included age (“18 to 24 years” and “25 to 34 years”), gender (“male” and “female”), sexual orientation (“heterosexual” and “gay, lesbian or bisexual”), marital status (“single”, “in a relationship, not legally married”, “married”, “other [separated, divorced, or widowed]”), country/region of birth (“Venezuela”, “Colombia”, “other South America”, “Central America and Mexico” and “Caribbean”), documentation status (“undocumented = without papers, expired visa” and “documented = permanent resident, student visa, dependent on someone else’s visa, asylum, temporary resident, temporary work visa, tourist visa, temporary protected immigrant”), time living in the U.S. (“0–4 months”, “5–8 months” and “9–12 months”), education level (“less than high school or high school diploma” and “some college, bachelor’s degree or graduate/professional studies”), past month total income (“<\$1,000”, “\$1,000 to \$2,999”, and “≥\$3,000”), fluency with spoken English (“poor”, “fair”, “good”, and “excellent”).

Reasons for Not Testing for HIV Post-immigration

When applicable, we assessed why participants did not get tested for HIV after immigration; participants were asked to select the most important reason. Responses were: (a) because you weren't offered an HIV test, (b) because you haven't done anything to get HIV, (c) because you don't know where to go to get tested, (d) because you couldn't get transportation to a testing place, (e) because you didn't have time, (f) because you didn't have the money or the insurance to pay for the test, (g) because you were afraid of finding out that you had HIV, (h) because you were worried your name would be reported to the government if you tested positive, (i) because you were worried someone would find out about your test results, (j) because you were afraid of losing your job, insurance, housing, family, or friends if people found out you tested positive, (k) because you don't like needles, and (l) other reason.

Statistical Analysis

Frequencies and proportions were reported for all categorical variables by country/region of birth. Poisson regression models with robust estimates of variance were used to estimate unadjusted and adjusted prevalence ratios (aPRs) and 95% confidence intervals (CIs) for associations with HIV testing post-immigration. Prevalence ratios were used instead of odds ratios because the prevalence of HIV testing post-immigration was higher than 10% and odds ratios tend to overestimate the strength of association when the outcome is common [25]. Respondent-driven sampling adjusted estimates were not reported as no consensus exists on a standard approach for obtaining these estimates and unweighted Poisson regression has been found to be a reliable method to model respondent-driven sampling data [26]. Bivariate analyses were first conducted and sociodemographic and behavioral covariates with a significance level of <0.10 were included in the final robust Poisson regression model. All data analyses were performed using SPSS V.25 and a statistical significance of <0.05 was used. Thirty-six participants who had not initiated sexual debut were excluded from analyses. The final sample was 504 participants.

Results

Descriptive Characteristics

Sociodemographic and Healthcare Access

Nearly three-quarters of the sample were participants between the ages of 25 and 34 (72.6%, $n = 366$) and about half were males (51.8%, $n = 261$) (Table 1). Most

participants identified as heterosexual (95.8%, $n = 483$), and nearly half were single (49.2%, $n = 248$). Participants were born in Venezuela (29.2%, $n = 147$), Colombia (16.3%, $n = 82$), other South American countries (17.5%, $n = 88$), Central America and Mexico (26.2%, $n = 132$), and the Caribbean (10.7%, $n = 54$). Most participants were documented (80.8%, $n = 407$) and had been living in the U.S. for 5 to 12 months (64.1%, $n = 323$).

Only 29.8% ($n = 150$) of participants had health insurance post-immigration, with similar proportions by country/region of birth (Venezuela: 32.0%, Colombia: 35.4%, other South American countries: 28.4%, Central America and Mexico: 21.2%, and Caribbean: 38.9%). Also, only 18.8% ($n = 95$) of participants had a regular doctor or healthcare provider post-immigration, but proportions varied by country/region of birth. While 35.2% of those born in the Caribbean had a regular doctor or healthcare provider, only 14.3% of Venezuelans did.

HIV Testing and HIV Sexual Risk Behaviors

Only 23.8% ($n = 120$) reported testing for HIV post-immigration and 56.7% ($n = 286$) reported testing for HIV pre-immigration, although these proportions varied by country/region of birth (Table 1). Nearly half of those born in the Caribbean (48.1%) reported testing for HIV post-immigration but only 17.0% of those born in other South American countries and 13.6% of those born in Venezuela reported testing for HIV post-immigration. Also, 65.9% of those born in other South American countries and 61.2% of those born in Venezuela reported testing for HIV pre-immigration but only 48.1% of those born in the Caribbean reported testing for HIV pre-immigration. Among participants who did not get tested for HIV post-immigration (76.2%, $n = 384$), the main reasons were low perception of HIV risk (44.3%) and not having been offered an HIV test (30.5%) (Table 2).

In terms of HIV sexual risk behaviors in the three months prior to immigration, 27.8% ($n = 140$) of participants had more than one sexual partner, 49.4% ($n = 249$) had condomless sex, 50.8% ($n = 256$) had sex under the influence of drugs or alcohol (Table 1).

Bivariate Analyses

Our bivariate analyses revealed that the following factors were associated with HIV testing post-immigration (p -value <0.10 ; Table 3): age, sexual orientation, country/region of birth, time living in the U.S., health insurance post-immigration, regular doctor or healthcare provider post-immigration, more than one sexual partner, condomless sex and sex under the influence of drugs or alcohol in the three months prior to immigration, and HIV testing pre-immigration. Documentation status was not significantly associated

Table 1 Sociodemographic Characteristics, Access to Healthcare, HIV Sexual Risk Behaviors and HIV Testing Behaviors by Country/Region of Birth (n = 504)

	All	Venezuela	Colombia	Other South America	Central America and Mexico	Caribbean
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%) ^a
Total	504	147 (29.2)	82 (16.3)	88 (17.5)	132 (26.2)	54 (10.7) ^a
Sociodemographic						
Age (years)						
18 to 24	138 (27.4)	55 (37.4)	24 (29.3)	18 (20.5)	25 (18.9)	16 (29.6)
25 to 34	366 (72.6)	92 (62.6)	58 (70.7)	70 (79.5)	107 (81.1)	38 (70.4)
Gender						
Male	261 (51.8)	66 (44.9)	35 (42.7)	49 (55.7)	84 (63.6)	26 (48.1)
Female	243 (48.2)	81 (55.1)	47 (57.3)	39 (44.3)	48 (36.4)	28 (51.9)
Sexual orientation						
Heterosexual	483 (95.8)	144 (98.0)	74 (90.2)	83 (94.3)	127 (96.2)	54 (100)
Gay, Lesbian, or Bisexual	21 (4.2)	3 (2.0)	8 (9.8)	5 (5.7)	5 (3.8)	0 (0)
Marital status ^a						
Single	248 (49.2)	76 (52.1)	43 (52.4)	34 (39.1)	57 (43.2)	38 (70.4)
In a relationship, not legally married	98 (19.4)	22 (15.1)	11 (13.4)	24 (27.6)	34 (25.8)	7 (13.0)
Married	149 (29.6)	48 (32.9)	26 (31.7)	28 (32.2)	37 (28.0)	9 (16.7)
Other (separated, divorced, or widowed)	7 (1.4)	0 (0)	2 (2.4)	1 (1.1)	4 (3.0)	0 (0)
Documentation status ^a						
Undocumented	92 (18.3)	17 (11.9)	15 (18.3)	15 (17.0)	34 (26.0)	11 (20.4)
Documented	407 (80.8)	126 (88.1)	67 (81.7)	73 (83.0)	97 (74.0)	43 (79.6)
Time living in the U.S. (months) ^a						
0–4	181 (35.9)	55 (37.4)	31 (37.8)	34 (38.6)	46 (34.8)	14 (25.9)
5–8	185 (36.7)	55 (37.4)	22 (26.8)	35 (39.8)	51 (38.6)	22 (40.7)
9–12	138 (27.4)	37 (25.2)	29 (35.4)	19 (21.6)	35 (26.5)	18 (33.3)
Education level ^a						
Less than high school or high school diploma	191 (37.9)	43 (29.3)	21 (25.6)	32 (36.4)	64 (48.5)	31 (58.5)
Some college, bachelor's degree or graduate/professional studies	312 (61.9)	104 (70.7)	61 (74.4)	56 (63.6)	68 (51.5)	22 (41.5)
Past month total income ^a						
< \$1000	124 (24.6)	24 (16.6)	23 (28.4)	27 (30.7)	38 (29.0)	12 (22.2)
\$1000 to \$2999	306 (60.7)	97 (66.9)	45 (55.6)	52 (59.1)	76 (58.0)	35 (64.8)
≥ \$3000	70 (13.9)	24 (16.6)	13 (16.0)	9 (10.2)	17 (13.0)	7 (13.0)
Fluency with spoken English						
Poor	94 (18.7)	24 (16.3)	12 (14.6)	15 (17.0)	28 (21.2)	15 (27.8)
Fair	242 (48.0)	72 (49.0)	40 (48.8)	41 (46.6)	63 (47.7)	25 (46.3)
Good	119 (23.6)	34 (23.1)	23 (28.0)	23 (26.1)	28 (21.2)	11 (20.4)
Excellent	49 (9.7)	17 (11.6)	7 (8.5)	9 (10.2)	13 (9.8)	3 (5.6)
Healthcare access						
Health insurance post-immigration						
Yes	150 (29.8)	47 (32.0)	29 (35.4)	25 (28.4)	28 (21.2)	21 (38.9)
No	354 (70.2)	100 (68.0)	53 (64.6)	63 (71.6)	104 (78.8)	33 (61.1)
Regular doctor or healthcare provider post-immigration						
Yes	95 (18.8)	21 (14.3)	20 (24.4)	14 (15.9)	21 (15.9)	19 (35.2)
No	409 (81.2)	126 (85.7)	62 (75.6)	74 (84.1)	111 (84.1)	35 (64.8)
HIV sexual risk behaviors						
More than one sexual partner in the last 3 months pre-immigration ^a						
Yes	140 (27.8)	29 (20.0)	21 (25.6)	27 (30.7)	46 (34.8)	17 (31.5)

Table 1 (continued)

	All	Venezuela	Colombia	Other South America	Central America and Mexico	Caribbean
Condomless sex in the last 3 months pre-immigration ^a						
No	362 (71.8)	116 (80.0)	61 (74.4)	61 (69.3)	86 (65.2)	37 (68.5)
Yes	249 (49.4)	70 (47.9)	51 (62.2)	53 (60.2)	59 (44.7)	16 (29.6)
Sex under the influence of drugs or alcohol in the last 3 months pre-immigration ^a						
No	254 (50.4)	76 (52.1)	31 (37.8)	35 (39.8)	73 (55.3)	38 (70.4)
Yes	256 (50.8)	64 (44.1)	46 (57.5)	49 (55.7)	68 (52.3)	29 (54.7)
No	241 (47.8)	81 (55.9)	34 (42.5)	39 (44.3)	62 (47.7)	24 (45.3)
HIV testing						
HIV testing pre-immigration						
Yes	286 (56.7)	90 (61.2)	47 (57.3)	58 (65.9)	65 (49.2)	26 (48.1)
No	218 (43.3)	57 (38.8)	35 (42.7)	30 (34.1)	67 (50.8)	28 (51.9)
HIV testing post-immigration						
Yes	120 (23.8)	20 (13.6)	22 (26.8)	15 (17.0)	37 (28.0)	26 (48.1)
No	384 (76.2)	127 (86.4)	60 (73.2)	73 (83.0)	95 (72.0)	28 (51.9)

^aMay not sum up to n = 504 due to missing data

^b“Central America” includes Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, Panama; “Other South America” includes Argentina, Bolivia, Chile, Ecuador, Paraguay, Peru, Uruguay; “Caribbean” includes Dominican Republic and Cuba

Table 2 Main Reasons for Not Testing for HIV Post-immigration

Reason	N (%) ^a
Low perception of HIV risk	170 (44.3)
Not offered an HIV test	117 (30.5)
No time to get tested	30 (7.8)
Don't know where to get tested	30 (7.8)
No money or insurance to pay for the test	11 (2.9)
Fear of testing positive	1 (0.3)
Don't like needles	3 (0.8)
Other reason	19 (4.9)

^aMay not sum up to n = 384 due to missing data

with HIV testing post-immigration; however, this variable was included in the final model because it has been linked to HIV testing among Latino immigrants [23].

Robust Poisson Regression

A robust Poisson regression revealed that the following factors were associated with HIV testing post-immigration (p -value < 0.05; Table 3): sexual orientation, country/region of birth, time living in the U.S., health insurance post-immigration, regular doctor or healthcare provider post-immigration, condomless sex in the three months prior to immigration, and HIV testing pre-immigration. The prevalence ratio for HIV testing post-immigration was higher for participants who identified as gay, lesbian, or bisexual

compared to heterosexuals (aPR: 1.93, 95% CI 1.22–3.03). Also, the prevalence ratio was higher for participants born in Central America and Mexico (aPR: 2.04, 95% CI 1.28–3.27) or the Caribbean (aPR: 3.03, 95% CI 1.81–5.06) compared to those born in Venezuela, and those living in the U.S. for 5–8 (aPR: 2.27, 95% CI 1.44–3.59) and 9–12 months (aPR: 2.64, 95% CI 1.67–4.16) compared to those living in the U.S. for 0–4 months. Participants with health insurance (aPR: 1.70, 95% CI 1.21–2.38) and a regular doctor or healthcare provider post-immigration (aPR: 1.43, 95% CI 1.03–2.00), along with those that reported HIV testing pre-immigration (aPR: 2.41, 95% CI 1.68–3.45), had a higher prevalence ratio for HIV testing post-immigration. Lastly, the prevalence ratio for HIV testing post-immigration was lower for those who engaged in condomless sex in the three months prior to immigration (aPR: 0.65, 95% CI 0.47–0.90).

Discussion

To our knowledge, this is the first study to examine patterns of HIV testing post-immigration among a sample of young adult recent Latino immigrants living in the U.S. for ≤ 12 months—one of the most vulnerable and hard-to-reach Latino subgroup. This study found that the prevalence of HIV testing was suboptimal, with only 23.8% of participants having undergone testing for HIV post-immigration and 56.7% pre-immigration. The prevalence of post-immigration HIV testing in this sample is similar to the

Table 3 Robust Poisson regression model predicting HIV testing post-immigration among recent latino immigrants

Variable	Unadjusted Prevalence Ratio (95% CI)	Adjusted Prevalence Ratio (95% CI)
Age (Ref: 18 to 24 years)		
25 to 34 years	1.78 (1.16–2.73)**	1.45 (0.99–2.13)
Gender (Ref: Male)		
Female	1.23 (0.90–1.68)	-
Sexual Orientation (Ref: Heterosexual)		
Gay, Lesbian, or Bisexual	2.09 (1.30–3.37)**	1.93 (1.22–3.03)*
Marital Status (Ref: Single)		
In a relationship, not legally married	0.90 (0.57–1.42)	-
Married	1.25 (0.88–1.76)	
Other (Separated, Divorced, Widowed)	1.27 (0.38–4.18)	
Country/Region of Birth (Ref: Venezuela)		
Colombia	1.97 (1.15–3.39)**	1.56 (0.91–2.66)
Other South America	1.25 (0.68–2.32)	1.23 (0.69–2.21)
Central America and Mexico	2.06 (1.26–3.37)**	2.04 (1.28–3.27)*
Caribbean	3.54 (2.16–5.79)**	3.03 (1.81–5.06)*
Documentation Status (Ref: Undocumented) ^a		
Documented	0.80 (0.55–1.16)	0.90 (0.62–1.32)
Time Living in the U.S. (Ref: 0–4 months)		
5–8 months	2.99 (1.83–4.89)**	2.27 (1.44–3.59)*
9–12 months	3.43 (2.09–5.62)**	2.64 (1.67–4.16)*
Education Level (Ref: Less than high school or high school diploma)		
Some college, bachelor's degree or graduate/professional studies	1.02 (0.74–1.41)	-
Past Month Total Income (Ref: < \$1,000)		
\$1,000 to \$2,999	1.13 (0.76–1.66)	-
≥ \$3,000	1.12 (0.66–1.90)	-
Fluency with Spoken English (Ref: Excellent)		
Poor	0.73 (0.42–1.29)	-
Fair	0.80 (0.50–1.28)	-
Good	0.69 (0.40–1.19)	-
Health Insurance Post-immigration (Ref: No)		
Yes	2.00 (1.47–2.71)**	1.70 (1.21–2.38)*
Regular Doctor or Healthcare Provider Post-immigration (Ref: No)		
Yes	2.49 (1.85–3.35)**	1.43 (1.03–2.00)*
More Than One Sexual Partner in the Last 3 Months Pre-immigration (Ref: No)		
Yes	1.50 (1.09–2.05)**	1.10 (0.80–1.50)
Condomless Sex in the Last 3 Months Pre-immigration (Ref: No)		
Yes	0.66 (0.48–0.91)**	0.65 (0.47–0.90)*
Sex Under the Influence of Drugs or Alcohol in the Last 3 Months Pre-immigration (Ref: No)		
Yes	1.32 (0.96–1.81)**	1.37 (1.00–1.88)
HIV Testing Pre-immigration (Ref: No)		
Yes	2.63 (1.78–3.88)**	2.41 (1.68–3.45)*

Deviance = .52; Omnibus test: likelihood ratio χ^2 (df) = 91.26 (15), $p < .0005$

Ref reference group

– Dashes mean the variable was not significant in the bivariate analysis

* $p < .05$

** $p < .10$

^aAlthough not significant in the bivariate analysis, this variable was included in the final model because it is linked with HIV testing among Latino immigrants

prevalence observed among recent Latino immigrants living in the U.S. for 5 years or less (26.0–26.9%) [12, 22], but lower than samples of established immigrants (≥ 5 years in the U.S.) and national samples of Latino immigrants (43.3%–77.1%) [8, 22, 23]. The low prevalence of post-immigration HIV testing in this group is alarming because this population is within an age group at high risk for HIV acquisition and undiagnosed HIV in the U.S. [27, 28]. Young people under the age of 34 years account for 56% of all new HIV diagnoses and are the group with the largest percentage of undiagnosed HIV infections (13–24 years: 44.9%, 25–34 years: 29.3%) in the U.S. [27, 28]. Thus, providing HIV testing early in the immigration process to young Latino immigrants, particularly those arriving in areas with a high HIV prevalence among young Latinos (e.g., Miami-Dade County, Florida) [20], is critical to link them to HIV prevention tools [e.g., condoms, pre-exposure prophylaxis (PrEP)] and antiretroviral treatment. However, strategies to increase access to and acceptance of HIV prevention services need to be culturally tailored and include effective outreach approaches to reach this population (e.g., use of *navegantes* to provide referrals to HIV prevention services to Latino men’s soccer teams, door-to-door HIV prevention outreach by *promotores* [29–32]).

This study also found that those participants who engaged in condomless sex in the three months prior to immigration were less likely to test for HIV post-immigration compared to those who did not engage in condomless sex. This finding is consistent with previous studies showing that engaging in condomless sex does not necessarily lead to HIV testing [22, 33]. Nearly all participants in our sample identified as heterosexual and reported having only one sexual partner in the three months prior to immigration, and over one-third reported low perceived risk as a reason for not getting tested for HIV post-immigration. Thus, this finding could be a reflection of participants not perceiving themselves at risk for HIV and not recognizing the need for testing. This is concerning, as Latino immigrants report a significant increase in the number of sexual partners post-immigration [16], and a high proportion of immigrants with HIV in the U.S. acquire HIV through heterosexual contact (39.4–74.7%) [15, 34, 35]. Some alternative explanations for this finding could be that participants may have changed their patterns of engagement in condomless sex after arrival to the U.S., or they may have withheld disclosure of engagement in high-risk sexual behaviors (which may be common among Latinos [36, 37]; e.g., male-to-male sexual contact) to their healthcare providers—who may have refrained from recommending an HIV test based on incomplete information about the patients’ HIV risk factors. Additionally, this study found that participants who identified as gay, lesbian, and bisexual were more likely to test for HIV post-immigration compared to those who identified as heterosexual. This could be the

result of sexual minorities being more aware of their potential HIV risk and prevention services available as a result of targeted HIV prevention efforts [38, 39]. This is promising as it shows awareness of the importance of testing among young Latino immigrant sexual minorities.

History of an HIV test pre-immigration was found to be positively associated with HIV testing post-immigration, which echoes similar findings in previous studies on Latinos [40]. This finding suggests that prior HIV testing experiences may facilitate future testing, which could occur through increased awareness of HIV risk, need for testing, and understanding of the testing process. Furthermore, having access to healthcare post-immigration, including health insurance or a regular doctor or healthcare provider, was found to be positively associated with HIV testing post-immigration, which is consistent with findings from previous studies [8, 22, 40]. It is likely that having access to healthcare may have facilitated HIV testing through the recommendation of a healthcare provider. In fact, many participants in our study who had not been tested for HIV post-immigration reported lack of HIV testing offers as a reason for not getting tested. Thus, addressing barriers to accessing healthcare services in this population is vital to promote HIV testing. This is even more critical now, as the expansion of the “public charge” rule (which refers to the inadmissibility of an individual to the U.S. based on their likelihood of becoming dependent on the government for subsistence) will likely have an impact on access to healthcare and insurance coverage among immigrants [41]. Latino immigrants may fear that receiving public benefits may risk their future lawful permanent resident status. Innovative strategies could help mitigate the effect that limited access to healthcare has on HIV testing uptake, including: mobile apps that promote free healthcare and HIV testing services in Latino communities (e.g., SALVA [Substance Abuse, Legal Aid, Violence, and HIV/AIDS] mobile app [42]), promoting home-based testing, and partnering with immigrant-serving community-based organizations [30].

This study also found that participants born in Venezuela were less likely to test for HIV post-immigration compared to those born in Central America and Mexico and the Caribbean. This could be because most Venezuelans (61%) in our sample reported getting an HIV test pre-immigration, and they may have felt that a test after immigration was unnecessary. Also, a lower percentage of Venezuelans reported having a regular doctor or healthcare provider post-immigration (14.3%) compared to other country/region of birth groups and, thus, they may not have received a provider’s recommendation to test for HIV. Further, because more Venezuelan immigrants come to the U.S. seeking asylum compared to immigrants from other Latin American countries (e.g., El Salvador, Guatemala and Honduras) [43], many may fear that a positive HIV result may impact their petition for

asylum. In fact, misconceptions about immigration-related consequences of a positive HIV result have been found to deter HIV testing among U.S. Latino immigrants [44]. Moreover, participants who have been living in the U.S. for a longer time (5 to 12 months) were more likely to test for HIV post-immigration compared to those who have been living in the U.S. for a shorter time (0–4 months). This finding was expected as longer time in the U.S. may lead to increased access to healthcare services and the ability to navigate the healthcare system and, thus, fewer barriers to HIV testing [11, 12]. Unexpectedly, documentation status was not associated with HIV testing post-immigration. We hypothesize that this null association may be attributable to the context of HIV testing in Miami-Dade County, where free testing is widely available and U.S. citizenship is not required to access this service.

Limitations

Several limitations of this study should be noted. First, this study used retrospective self-reported measures and, thus, participants may have inaccurately reported their individual data. Second, the respondent-driven sampling methodology may have introduced sampling bias. Third, the generalizability of these findings to the larger population of recent Latino immigrants may be limited because this study was conducted in an established Latino community that may differ, in terms of health and social contexts, from other Latino communities in the U.S. Fourth, information was not collected that could have provided more context on HIV testing post-immigration, including: reasons for HIV testing (e.g., healthcare provider recommendation), testing location (e.g., community-based organization or clinic), and high-risk behaviors post-immigration (e.g., condomless sex, transactional sex, sex work). Fifth, due to the small number of observations in some country groups, we compared immigrants from individual countries to regions of birth. However, future studies should compare individual Latin American countries because Latinos from different countries of origin may have different healthcare needs and behaviors [45].

Conclusion

In conclusion, our findings show that many young adult recent Latino immigrants have not been tested for HIV post-immigration. Continued efforts are needed to make healthcare and HIV prevention services more accessible to Latino immigrants shortly after arrival to the U.S. Providing HIV testing early in the immigration process is critical to link recent immigrants to HIV prevention services and reduce

future HIV transmissions. However, effective strategies that may address the challenges of reaching recent Latino immigrants are needed to improve access to HIV testing for this population.

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Authors' Contributions MS and ER designed and implemented the research project. DR-O and DJF analyzed the data and produced the first draft of the manuscript. MS, ER, DMS and MÁC were involved in the conceptualization of the study and critically revised the manuscript for important intellectual content. All authors reviewed the study design and methods and edited the manuscript.

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Data Availability The data from this study are available upon request.

Declarations

Conflict of interest None of the authors have any conflicts of interest to declare that are relevant to the content of this article.

Informed Consent Informed consent was obtained from all individual participants included in the study.

Ethical Approval Ethical approval was obtained from the Institutional Review Board of Florida International University. The procedures used in this study adhere to the tenets of the Declaration of Helsinki.

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