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The Relative Influence of Perceived Immigration Laws and Consequences on HIV Testing Among US Latino Immigrants

Carol L. Galletly[1] · Timothy L. McAuliffe[1] · Julia B. Dickson-Gomez[1,2] · Laura R. Glasman[1] · Dulce M. Ruelas[3]

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Abstract

The CDC recommends that persons aged 13–64 receive an HIV test at least once in their lifetime and that some groups test annually or more frequently. Nearly one-half of US Latino immigrants have never been tested for HIV. To the extent that immigration-related laws deter documented and undocumented immigrants from engaging in communicable disease control measures, these laws undermine public health efforts. 1750 noncitizen adult, sexually active, Spanish-speaking Latino immigrants across four cities in the US completed a cross-sectional survey assessing perceptions of immigration-related laws and immigration consequences related to HIV testing and diagnosis. Participants were recruited in-person by staff in community settings, through flyers posted in places frequented by Latino immigrants, and by word-of-mouth through snowball sampling. Outcomes were whether participants had ever received an HIV test and whether they tested in the previous 12 months. Multivariable analyses examined the relative contribution of perceived immigration laws and consequences on HIV testing behaviors when considering established predictors of HIV testing. Perceptions of HIV-related immigration laws and immigration consequences was a significant predictor of never having had an HIV test even when considered relative to common predictors of HIV testing. The influence of perceived immigration laws and consequences on testing in the previous 12 months was not significant in multivariable analysis. Perceived HIV-related immigration laws and consequences appear to be a substantial contributor to reluctance to be tested for HIV among Latino immigrants who have never been tested. Effective interventions should be developed to address these.

Keywords HIV testing · Latino immigrants · Immigration policy · Healthcare

Resumen

El CDC recomienda que las personas de 13 a 64 años se hagan una prueba del VIH al menos una vez en la vida y que algunos grupos se hagan la prueba anualmente o con mayor frecuencia. Casi la mitad de los inmigrantes latinos de los Estados Unidos nunca se han hecho la prueba del VIH. En la medida en que las leyes relacionadas con la inmigración disuadan a los inmigrantes documentados e indocumentados de participar en medidas de control de enfermedades transmisibles, estas leyes socavan los esfuerzos de salud pública. 1750 inmigrantes latinos adultos no ciudadanos, sexualmente activos y de habla hispana en cuatro ciudades de EE. UU. completaron una encuesta transversal que evaluó las percepciones de las leyes relacionadas con la inmigración y de las consecuencias de la inmigración relacionadas con las pruebas y el diagnóstico del VIH. Los participantes fueron reclutados en persona en contextos comunitarios, a través de volantes publicados en lugares

✉ Carol L. Galletly
cgalletl@mcw.edu

[1] Department of Psychiatry and Behavioral Medicine, Center for AIDS Intervention Research, Medical College of Wisconsin, 1710 East Lafayette Place, Milwaukee, WI 53202, USA

[2] Institute for Health Equity, Medical College of Wisconsin, Milwaukee, USA

[3] College of Nursing & Healthcare Professions, Grand Canyon University, Phoenix, USA

frecuentados por inmigrantes latinos y de boca en boca a través de muestras de bola de nieve. Las variables dependientes fueron si los participantes se habían hecho una prueba del VIH alguna vez y si se habían hecho la prueba en los últimos 12 meses. Los análisis multivariados examinaron la contribución relativa de la percepción de las leyes de inmigración y de las consecuencias de inmigración sobre los comportamientos relativo a las pruebas del VIH, controlando por predictores conocidos de las pruebas del VIH. Las percepciones de las leyes de inmigración relacionadas con el VIH y las consecuencias de la inmigración fueron un predictor significativo de nunca haberse realizado una prueba del VIH, aun considerando los predictores comunes de la prueba del VIH. La influencia de la percepción de las leyes de inmigración y de las consecuencias de la inmigración sobre la prueba en los últimos 12 meses no fue significativa en el análisis multivariado. Las leyes de inmigración y las consecuencias percibidas relacionadas con el VIH parecen contribuir sustancialmente a la renuencia a hacerse la prueba del VIH entre los inmigrantes latinos que nunca se han hecho la prueba. Deben desarrollarse intervenciones efectivas para abordar esta renuencia.

Introduction

In a tumultuous United States (US) political landscape, immigration laws have emerged as a focal point, with immigrants themselves as targets. To the extent that immigration-related laws deter immigrants, both those who are documented and those who are undocumented, from engaging in communicable disease control measures, these laws undermine public health efforts. Empiric evidence can assist in navigating these highly charged issues and inform sound law.

HIV Infection Among Latino Persons in the US

Over 44 million immigrants live in the US today, nearly half of whom (44.6%) are Latino [1]. Latino persons in the US are disproportionately affected by HIV [2]. While making up 19% of the US population [3], 24% of new HIV diagnoses in the US are among Latinos [2]. US immigrants are also disproportionately infected with HIV, and among these individuals, the majority of those infected are from Latin American countries [4].

HIV Testing Among Latino Immigrants in the US

In 2021, estimates were that over one-half (54.7%) of Latino adults living in the US had never been tested for HIV [5]. HIV testing rates among Latino immigrant groups in discrete geographic areas vary widely. A study in two US emergency departments (N = 1075) found that 72% of immigrants had been tested [6], while among a nationwide sample of over 9000 US Latino white and Latino nonwhite immigrants, 46.7% of Latino white and 65.8% of Latino black immigrants reported ever being tested [7]. Large data sets indicating testing rates in the previous year among diverse samples of Latino immigrants are scarce, although in a study of 1383 southbound immigrant and migrant men surveyed in Tijuana Mexico, 23.9% had been tested in the previous year [8].

HIV testing rates among Latino immigrants likely overestimate testing among some groups. For example, pregnant women who receive prenatal care in the US are routinely tested for HIV and thus HIV testing rates among those who have never received prenatal care in the US are likely overestimated [7]. Further, average HIV testing rates within the immigrant population as a whole may overestimate testing among those who arrived after the 2010 elimination of required HIV testing during immigration medical exams [9].

Given that the Centers for Disease Control and Prevention (CDC) recommends that every person aged 13–64 receives an HIV test at least once in their lifetime and that some groups test more frequently [10], the relatively low rates of HIV testing among US Latino immigrants is concerning. Reaching the goal of the National Ending the HIV Epidemic Plan, to reduce HIV infections by 75% by 2025 [11], is unlikely if this substantial though marginalized US population is overlooked [4].

Factors Influencing HIV Testing

General Factors

General sociodemographic factors strongly correlated with HIV testing include being female [12], having completed more years of education [12], being younger [13, 14], and having health insurance [15, 16]. Additional predisposing factors include knowledge of HIV transmission behaviors and testing recommendations [17, 18] and having received healthcare [19]. Perceived HIV-related stigma is also a strong predictor of testing, with those who perceive less HIV stigma being more likely to have been tested [20, 21]. Those with greater perceived risk for HIV infection are also more likely to be tested [22, 23].

Several of these factors influencing HIV testing are especially relevant to immigrants. In the US, a disproportionate number of immigrants lack health insurance relative to those who are native born [24]. Latino immigrants are also less likely to have received healthcare in the previous 12 months than nonimmigrants [25]. US Latino immigrant adults also have less formal education on average compared

to all persons living in the US [26] and to other US immigrant groups [27].

Immigration-Specific Factors

Immigration-specific factors are also associated with HIV testing rates. With notable exceptions, studies have found that documented immigrants are more likely to have ever been tested compared to those who are undocumented [28, 29]. Recency of immigration and limited English proficiency are also negatively associated with HIV testing [6]. This may be influenced both by a lack providers who speak Spanish and a lack of access to information on health and HIV. Deportation concerns or deportation experiences are also associated with reduced testing [8, 30, 31].

Immigration-Related Laws as an Influence on HIV Testing

Researchers have considered the role of immigration laws and policies on immigrants' HIV testing behaviors [7, 32–34]. One of the most frequently cited laws restricts access to some health insurance sources [35, 36]. Undocumented immigrants and some recent immigrants are not eligible for the Affordable Care Act's medical insurance premium assistance, and undocumented immigrants cannot purchase insurance on the US insurance exchange [24]. Regulations limiting immigrants' use of public services are also commonly cited [37–39]. In most areas, undocumented immigrants and some subsets of recent immigrants are ineligible for all but emergency Medicaid [24].More proximal factors include ineligibility for driver's licenses in some jurisdictions [40], which makes it difficult to access medical care without assuming legal risk. At the more distal level are prohibitions against undocumented persons participating in the formal economy through employment. This results in immigrants taking underpaid jobs that lack workplace protections and health benefits [41].

Immigration-related laws are complex, multi-jurisdictional, and dynamic. Individuals navigate this complexity by forming impressions about legal provisions and what is or is not associated with legal risk. Many of these impressions are overbroad or patently incorrect [42, 43]. Studies on the willingness of immigrants to use healthcare services after proposed restrictions on immigrants' use of public services in 2020 demonstrated a chilling effect on immigrants' use of healthcare *even among those eligible for services* [44, 45]. Specific to HIV testing, our research demonstrated that immigrants who were not aware that the 1993 bar on immigration among those who have HIV had been lifted, as well as those who endorsed misconceptions about the immigration ramifications of using healthcare, were much more likely to report that they had never been tested for HIV [42].

Under-Explored Questions About Immigration-Related Concerns and HIV Testing Among Latino Immigrants

We lack information on the influence of perceptions of immigration-related laws and anticipated legal consequences on HIV testing, *especially given established correlates of testing including immigrant-specific factors*. We report here on a large study that examined Latino immigrants' individual experiences, beliefs, and perceptions of immigration-related structural factors and their associations with HIV testing relative to established general and immigration-specific predictors of testing.

Methods

Data were derived from a multistate study (N = 1750) on the influence of perceived immigration laws and consequences on Latino immigrants' willingness to use, and actual use of, services for HIV testing and for two additional drivers of HIV infection—substance use disorders and intimate partner violence. The IRB of the first author's institution approved all research procedures.

Study Locations

The study was conducted in Chicago, Illinois (IL), Los Angeles, California (CA), Phoenix, Arizona (AZ), and Raleigh, North Carolina (NC). These cities were selected based on their diverse state immigration environments, with Chicago, IL and Los Angeles, CA being within states self-designated as immigration sanctuaries and thus more inclusive of immigrants and Phoenix, AZ and Raleigh, NC being within states that were not [46].

Sample

Participants were adult, Spanish-speaking, non-citizen Latino immigrants (documented and undocumented) who had been living in the US for at least 6 months. The latter requirement was instituted to ensure that participants had spent sufficient time in the US to become familiar with the US and local immigration law and policy environment. Because HIV testing history and current HIV testing habits were central outcomes for the study, participation criteria included reporting HIV-negative or unknown status and having had unprotected anal or vaginal sex in the previous 12 months.

Procedures

Cross-sectional data were collected between September 29, 2019 and January19, 2021. Participants were recruited in person by staff in community settings, through flyers posted in places frequented by Latino immigrants, and by word-of-mouth through snowball sampling. Outreach was conducted in neighborhoods where Latino immigrants worked and spent leisure time (e.g., recreation centers, places where day laborers congregate, consulates, local fast-food restaurants in areas with substantial Latino immigrant residents). To recruit a sample of Latino immigrants that resembled the respective city's Latino immigrant population in terms of age, immigration status, self-identified gender, and country of birth, staff visited and distributed flyers in neighborhoods where diverse subgroups of Latino immigrants lived and worked and among community-based organizations that served diverse Latino immigrant subpopulations.

Promotional flyers encouraged Latino immigrants to call or text a number indicated on the flyer to be screened for eligibility. In the case of in-person recruitment, participants were screened for eligibility on site and if eligible, completed the survey at that time.

From September 29, 2019 to March 15, 2020, prior to the COVID-19 pandemic, the survey was administered in-person on computer tablets via QDS audio computer-administered self-interview (n = 1039). From July16, 2020 to January19, 2021, the survey was self-administered on-line using the Qualtrics survey platform (n = 711). In cases where on-line self-administration was a barrier to participation, interviewers administered the survey via telephone.

The survey took 60–90 min to complete. After completing the survey, participants watched a debriefing video and were given information on relevant local resources serving Spanish speakers. Participants then received $50 in cash or gift card. All materials were in Spanish.

Measures

HIV Testing

Participants indicated whether they had ever been tested for HIV and whether they had been tested in the past year. Responses were dichotomous ('Yes'; 'No'). For analyses on HIV testing in the previous year, we excluded 20 participants who had not lived in the US for 1 year and thus had not had a full year to seek testing.

Sociodemographic Variables

We assessed the following sociodemographic variables: participants' age, self-identified gender, education, the metropolitan area where they lived, and whether they had health insurance. [For analysis, metropolitan area was dichotomized into more and less welcoming immigration environments (Chicago, IL and Los Angeles, CA vs Phoenix, AZ and Raleigh, NC)] [46].

Healthcare Use

Participants' healthcare use was assessed by a single item: 'Have you received any medical care in the US in the previous 12 months?' ('Yes'; 'No').

Perceived HIV Risk, Stigma, and Information Access

Perceived risk for HIV infection was assessed with three items: 'Do you ever wonder if you might have HIV?'; 'Do you ever wonder if someone you have had sex with might have HIV?'; 'Do you ever wonder if someone you have had sex with in the past 12 months might have HIV?' Perceived access to information on HIV and on health were assessed with two items: 'I know where to get my questions about HIV answered' and 'I know where to get my questions about health answered'. Response options for each were dichotomous. ('Yes'; 'No'). To assess HIV-related stigma, a 13-item scale was adapted from Westbrook and Bauman's HIV stigma scale. Item examples are 'Some people are afraid to be around a person who has HIV' and 'Some people will not date someone who has HIV' [47]. Participants responded to both measures using a 4-point scale: 'Disagree', 'Somewhat disagree', 'Somewhat agree', and 'Agree' (range 13–52; Cronbach's *alpha* (α) = 0.78).

Immigration-Specific Sociodemographic Variables

These variables included country of origin, (dichotomized for analysis as born in Mexico; not born in Mexico) and language preference (i.e., speaks Spanish or another language most or half the time and speaks English always or most of the time.). Immigration documentation status was assessed with a single item: 'My immigration status is:'. Response options ranged from permanent resident to visa holder to undocumented immigrant. (For analysis, responses were dichotomized as 'documented' or 'undocumented'.) Participants also indicated the number of years they had resided in the US (dichotomized for analysis as 1–5 years; > 5 years). Four items adapted from the Hispanic Stress Inventory [48] were used to assess deportation experience. The items

asked whether participants had been questioned by immigration authorities, detained by immigration authorities, been deported, or had a family member or close friend be deported. Having deportation experience was defined as responding 'Yes' to any of the four items.

Perceived Local Immigrant Climate and Access to Immigration-Related Information

Perceived local immigration climate was assessed with seven items. These ranged from 'Immigration policies in my city make immigrants feel unwelcome' to 'Immigration authorities in my city are trying to make all immigrants leave the state'. Participants responded to both measures using a 4-point scale: 'Disagree', 'Somewhat disagree', 'Somewhat agree', and 'Agree' (range 7–28; Cronbach's $\alpha = 0.78$). Two questions assessed participants' access to immigrant-specific information. One item assessed participants' access to information on immigration law, 'I know where to get information about immigration law,' and one assessed access to information on public services available to immigrants, 'I know where to get information about services available to immigrants'. Response options were dichotomous ('Yes'; 'No').

Perceptions of Immigration Laws and Policies and Immigration Concerns

Two de novo scales examined participants' understandings of relevant immigration laws and anticipated negative ramifications of using healthcare and of being tested for, or diagnosed with, HIV infection. Sixteen items elicited participants' agreement or disagreement with statements about immigration laws, policies, and immigration concerns related to general healthcare use (range 16–64; Cronbach's $\alpha = 0.88$) and eleven items related to HIV testing (range 11–44; Cronbach's $\alpha = 0.89$). Items for general healthcare utilization ranged from 'If an immigrant uses services at a community health center, they can seem as if they cannot support themselves and hurt their immigration status' to 'Most community health clinics require that patients provide a social security number, valid state ID, or tax record to provide them with services'. Items within the HIV-specific legal perceptions and concerns scale ranged from 'Immigrants can be deported from the US solely because they have HIV' to 'Immigrants must prove they are legal residents to receive an HV test'. Participants responded to both measures using a 4-point scale: 'Disagree', 'Somewhat disagree', 'Somewhat agree', and 'Agree'.

Analysis

Descriptive statistics (frequency and percent or mean and standard deviation) were calculated to characterize the sample sociodemographics, HIV testing history, perceived risk of HIV infection, perceived access to information on HIV and on health, perceived local immigrant climate, general healthcare utilization and HIV-related immigration laws and concerns. Logistic regression analyses were conducted to examine factors associated with having been and having never been tested for HIV and not having been tested for HIV in the past 12 months. Factors in univariate regression with a Wald χ^2 p-value of < 0.20 were included in multivariable regression. In multivariable regression, factors with the largest Wald p-value ≥ 0.05 were removed one-by-one until each remaining factor had a p-value < 0.05 to determine independent factors associated with HIV testing. Odds ratios (OR) and 95% confidence intervals (CI) in univariate logistic regression and adjusted ORs (aOR) in multivariable logistic regression were calculated. To analyze the classification accuracy of the models, the AUC was used together with the values of sensitivity, specificity, and positive predictive value. Analyses were conducted using IBM SPSS Statistics, Version 26 [49].

When a participant's response was missing for a scale item, the sample median of the non-missing responses for each item was imputed. If more than 15% of items within a scale were missing, the scale score was assigned as missing. Cronbach's alpha coefficients (α) were calculated using the current study data.

Results

A total of 1750 eligible individuals completed the survey. Table 1 shows the sample characteristics. The mean age of participants was 38 years (SD 10.6, range 18–77). Most participants (64.1%; 1122) identified as female. Half (47.7%; 836) reported that they had not graduated from high school. Half (47.2%; 826) reported receiving medical care in the US in the previous 12 months.

Three-quarters of participants were born in Mexico (74.1%; 1297) and three-quarters (74.6%; 1305) spoke Spanish half or most of the time. Over a half (58.2%; 1019) were undocumented. 12.9% (225) had immigrated to the US in the previous 5 or fewer years. Participants were evenly sampled from among the four metropolitan areas.

Well over half of the participants (61.3%; 1073) had ever received an HIV test and nearly a third (32%; 560) had an HIV test in the past 12 months. A total of 573 participants (32.7%) reported that they have wondered whether someone that they had sex with might have had HIV.

Table 1 Sociodemographic characteristics, and HIV testing behaviors of participants

Variable	Labels	N (%)
Age, years	Mean (SD)	37.9 (10.6)
Self-identified gender	Male	597 (34.1)
	Female	1122 (64.1)
	Transgender	10 (0.6)
	Other	2 (0.1)
	Missing	19 (1.1)
Education completed	Less than 6th grade	270 (15.4)
	6th grade but not completed high school	566 (32.3)
	Graduated high school/received GED	462 (26.4)
	Graduated technical degree	128 (7.3)
	Attended some college	143 (8.2)
	College graduate	137 (7.8)
	Missing	44 (2.5)
Currently have health insurance	Yes	299 (17.1)
	No	1393 (79.6)
	Missing	58 (3.3)
Ever had an HIV test	Yes	1073 (61.3)
	No	629 (35.9)
	Missing	48 (2.7)
Had an HIV test in the past 12 months	Yes	560 (32.0)
	No	1138 (65.0)
	Missing	52 (3.0)
Ever wonder if you might have HIV	Yes	559 (34.2)
	No	1102 (63.0)
	Missing	49 (2.8)
Ever wonder if someone that you had sex with might have HIV	Yes	573 (32.7)
	No	1124 (64.2)
	Missing	53 (3.0)
Ever wonder if someone that you had sex with in the previous 12 months might have HIV	Yes	403 (23.0)
	No	1294 (73.9)
	Missing	53 (3.0)
HIV-related stigma, range 13–52	Mean (SD)	29.9 (7.8)
	Missing	126 (7.2)
Received any medical care in the US in the previous 12 months	Yes	826 (47.2)
	No	873 (49.9)
	Missing	51 (3.0)
I know where to get my questions about health answered	Yes	1263 (72.2)
	No	425 (24.3)
	Missing	62 (3.5)
I know where to get my questions about HIV answered	Yes	1063 (60.7)
	No	615 (35.1)
	Missing	72 (4.1)
Preferred language	English always or most of the time	65 (3.7)
	English and Spanish about the same	344 (19.7)
	Spanish always or most of the time	1305 (74.6)
	Some other language always or most of the time	8 (0.4)
	Missing	28 (1.6)
Country of origin	México	1297 (74.1)
	Guatemala	101 (5.8)

Table 1 (continued)

Variable	Labels	N (%)
	El Salvador	98 (5.6)
	Honduras	87 (5.0)
	Dominican Republic	34 (1.9)
	Cuba	32 (1.8)
	Ecuador	23 (1.3)
	Nicaragua	6 (0.3)
	Another country	46 (2.6)
	Missing	26 (1.5)
Immigration recency	Over 5 years	1517 (86.7)
	5 years or fewer	225 (12.9)
	Missing	8 (0.4)
Immigration documentation status	Documented	526 (30.1)
	Undocumented	1019 (58.2)
	Missing	205 (11.7)
Perceived local immigration climate, range 7–28	Mean (SD)	16.5 (5.7)
	Missing	122 (7.0)
Any deportation experience	Yes	824 (47.1)
	No	825 (47.1)
	Missing	101 (5.8)
I know where to get information about immigration law	Yes	963 (55.0)
	No	716 (40.9)
	Missing	71 (4.1)
I know where to get information about public services available to immigrants	Yes	915 (52.3)
	No	776 (44.3)
	Missing	59 (3.4)
Perceived immigration laws and consequences—general healthcare utilization scale, range 16–64	Mean (SD)	38.2 (11.2)
	Missing	141 (8.1)
Perceived immigration laws and consequences—HIV scale, range 11–44	Mean (SD)	21.9 (8.6)
	Missing	186 (10.6)

1263 (72.2%) participants reported that they knew where to get questions about health answered, 1063 (60.7%) reported that they knew where to have questions about HIV answered, and 55.0% (963) and 52.3% (915) reported (respectively) knowing where to get information about immigration law and about services available to immigrants.

About 80% of the participants (77.5%; 1357) agreed or somewhat agreed with one or more erroneous statements about legal consequences arising from being tested or diagnosed with HIV. Responses to the scale as a whole tended toward somewhat disagree (M = 21.9; coefficient of variation 39%; scale range 11–44 with greater scores reflecting greater agreement with statements about the immigration consequences). Still, 14.4% of participants (225) indicated that they somewhat agreed or agreed with seven or more statements, suggesting that their immigration concerns were substantial.

Factors associated with never having had an HIV test in univariate analysis are presented in Table 2. Men, those with less than high school education, and those who were younger were less likely to be tested. Those who had no health insurance and those not considering that they may have been exposed to HIV were also less likely to be tested. Of immigration-related factors, individuals who immigrated within the past 5 years were also more likely to have never been tested. Lacking access to information was significantly associated with never having had an HIV test whether the information was on general health, HIV, immigration laws, or services available to immigrants. Those who lived in the cities characterized as having more restrictive immigration policies were also less likely to be tested. Importantly, those with high HIV-specific immigration-related concerns [scale score 33 or above (range 11–44)] had threefold greater odds of never having had an HIV test compared with those who

Table 2 Univariate and multivariable associations with *never having* had an HIV test

	Univariate		Multivariable[b]	
	OR (95% CI)	*P*	aOR* (95% CI)	P_{adj}
General factors				
Study location		< 0.001		0.029
Phoenix/Raleigh-Durham	1.64 (1.35–2.0)		1.32 (1.03–1.70)	
Los Angeles/Chicago	1.0		1.0	
Age, years	0.98 (0.97–0.99)	< 0.001	–	
Self-identified gender[a]		< 0.001		0.001
Male	2.08 (1.72–2.63)		1.56 (1.21–2.01)	
Female	1.0		1.0	
Education		< 0.001		0.019
Less than HS education	1.58 (1.30–1.93)		1.34 (1.05–1.71)	
Graduated from high school/received a GED or beyond	1.0		1.0	
Health insurance		0.007	–	
Currently has health insurance	0.69 (0.53–0.91)		–	
No health insurance	1.0		–	
Ever wonder if you might have HIV		< 0.001		< 0.001
Yes	0.25 (0.19–0.31)		0.41 (0.29–0.58)	
No	1.0		1.0	
Ever wonder if someone you had sex with might have HIV		< 0.001		< 0.001
Yes	0.25 (0.20–0.32)		0.44 (0.31–0.62)	
No	1.0		1.0	
HIV-related stigma scale, range 13–52	1.01 (0.99–1.02)	0.08	–	
Received any medical care in the US in the previous 12 months		< 0.001		< 0.001
Yes	0.35 (0.28–0.43)		0.56 (0.44–0.72)	
No	1.0		1.0	
I know where to get my questions about health answered		< 0.001	–	
Yes	0.29 (0.23–0.36)		–	
No	1.0		–	
I know where to get my questions about HIV answered		< 0.001		< 0.001
Yes	0.26 (0.21–0.33)		0.38 (0.29–0.49)	
No	1.0		1.0	
Immigration-related factors				
Preferred language		0.03	–	
Speaks Spanish or another language most or half of the time	1.91 (1.06–3.44)		–	
Speaks English always or most of the time	1.0		–	
Undocumented immigrant		0.01	–	
Yes	1.34 (1.07–1.68)		–	
No	1.0		–	
Country of origin		0.07		
Born in Mexico	0.81 (0.65–1.01)		–	
Born outside the US, other than in Mexico	1.0		–	
Immigrated to the US within the previous 5 years		< 0.001		0.002
Yes	2.54 (1.90–3.39)		1.79 (1.24–2.58)	
No	1.0		1.0	
Perceived local immigration climate scale, range 7–28	1.04 (1.02–1.06)	< 0.001	–	
Deportation experience		< 0.001	–	
Yes	0.70 (0.57–0.85)		–	
No	1.0		–	
I know where to get information about immigration law		< 0.001	–	

Table 2 (continued)

	Univariate		Multivariable[b]	
	OR (95% CI)	*P*	aOR* (95% CI)	P_{adj}
Yes	0.50 (0.41–0.62)		–	
No	1.0		–	
I know where to get information about public services available to immigrants		< 0.001	–	
Yes	0.54 (0.44–0.67)		–	
No	1.0		–	
Perceived immigration laws and consequences—HIV scale, range 11–44	1.05 (1.03–1.06)	< 0.001	1.03 (1.01–1.05)	< 0.001
Perceived immigration laws and consequences—general healthcare utilization scale, range 16–64	1.02 (1.01–1.03)	< 0.001	–	

*Adjusted odds ratios (aOR) are adjusted for other variables in the multivariable regression model

[a]Excludes 10 transgender and 2 other gender identity

[b]Multi-variable regression Model Chi-square 391.02, DF 9, p < 0.001; Nagelkerke R square 0.312; percentage correct 73.1; with AUC optimal cut point 0.3579, overall percentage correct 71.2, sensitivity 71.2% and specificity 71.2%; positive predictive value 58.7%

had fewer immigration-related concerns (scale score less than 33) (aOR 3.15, 95% CI 2.36–4.22).

In multivariable analysis for having never had an HIV test (Table 2), individuals who immigrated to the US within the previous 5 years were more likely to have never had an HIV test compared with individuals who immigrated to the US over 5 years ago (aOR 1.79, 95% CI 1.24–2.58). Individuals residing in more restrictive immigration environments were more likely to have never had an HIV test (aOR 1.32, 95% CI 1.03–1.70) compared to individuals who resided in more welcoming cities. Individuals who had greater agreement with statements about legal immigration consequences arising from being tested or diagnosed with HIV, compared to those with fewer HIV-specific immigration law related concerns, were more likely to have never had an HIV test (aOR 1.03, 95% CI 1.01–1.05). Perceived immigration laws and consequences related to general healthcare use, however, were not significantly associated with never having had an HIV test.

Factors associated with not having had an HIV test in the previous 12 months in univariate analysis are presented in Table 3. Findings for not having had a test in the last 12 months are similar to findings for never having been tested; however, undocumented status and HIV-related stigma were significantly associated with not testing in the last year but not with never testing.

In multivariable analysis of associations with not having had an HIV test in the past 12 months (Table 3), older individuals (aOR for each year increase 1.04, 95% CI 1.03–1.05), and those who perceived greater HIV stigma (aOR for each unit increase, 1.03, 95% CI 1.01–1.05, $p = 0.001$) had greater odds of not having had an HIV test in the past 12 months. Undocumented immigrants (aOR 1.44, 95% CI 1.11–1.88, $p = 0.007$) and those who had lived in the US for 5 years or less (aOR 1.68, 95% CI 1.09–2.57, $p = 0.018$) also had greater odds of not having had an HIV test in the past 12 months. On the other hand, immigrants who lived in Chicago or Los Angeles, compared to those who lived in the Phoenix and Raleigh (aOR 0.50, 95% CI 0.39–0.66, $p < 0.001$), those who had received any medical care in the US in the past 12 months (aOR 0.53, 95% CI 0.41–0.69, $p < 0.001$), and those who knew of where to access information on HIV (aOR 0.44, 95% CI 0.33–0.58, $p < 0.001$) had lower odds of not having been tested in the previous year.

For the model examining *never having had an HIV test*, the results using the AUC-derived optimal cut point 0.3579 are: overall percentage correct 71.2; sensitivity 71.2%; and specificity of 71.2%. The positive predictive value was 58.7%. For the model examining those who *did not have an HIV test in the past 12 months*, the results using the AUC-derived optimal cut point 0.61643 are: overall percentage correct 69.4; sensitivity 69.4%; and specificity 69.4%. The positive predictive value was 82.0%.

Discussion

Previous research, including our own, has established that heightened immigration concerns are associated with reduced HIV testing. Still, the relative role of these concerns given the many other variables contributing to testing decisions has been underexamined. Understanding the relative importance of concerns is critical in designing the most efficacious interventions. Our study revealed that perceptions of HIV-related immigration laws and the perceived ramifications of being tested or diagnosed with HIV was a significant predictor of having never had an HIV test *even given other common predictors of never testing*. This finding underscores the important role that immigration concerns

Table 3 Univariate and multi-variable associations with *not having had an HIV test in the past 12 months* (N = 1730)

	Univariate[b]		Multivariable[b,c]	
	OR (95% CI)	*P*	aOR* (95% CI)	P_{adj}
General factors				
Study location		< 0.001		< 0.001
Phoenix/Raleigh-Durham	1.77 (1.44–2.17)		1.98 (1.52–2.59)	
Los Angeles/Chicago	1.0		1.0	
Phoenix/Raleigh-Durham	1.77 (1.44–2.17)		1.98 (1.52–2.59)	
Age, years	1.02 (1.01–1.03)	0.001	1.04 (1.02–1.05)	< 0.001
Self-identified gender[a]		0.007	–	
Male	1.35 (1.09–1.67)		–	
Female	1.0		–	
Education		0.008	–	
Less than HS education	1.32 (1.07–1.62)		–	
Graduated from high school/received a GED or beyond	1.0		–	
Health insurance		< 0.001	–	
Currently has health insurance	0.57 (0.44–0.73)		–	
No health insurance	1.0		–	
Ever wonder if you might have HIV		< 0.001		0.007
Yes	0.36 (0.29–0.45)		0.63 (0.45–0.88)	
No	1.0		1.0	
Ever wonder if someone you had sex with might have HIV		< 0.001		< 0.001
Yes	0.31 (0.25–0.38)		0.51 (0.35–0.73)	
No	1.0		1.0	
Ever wonder if someone you had sex with in the previous 12 months might have HIV		< 0.001		0.001
Yes	0.30 (0.24–0.38)		0.55 (0.38–0.78)	
No	1.0		1.0	
HIV-related stigma scale, range 13–52	1.02 (1.01–1.03)	0.007	1.03 (1.01–1.05)	< 0.001
Received any medical care in the US in past 12 months		< 0.001		< 0.001
Yes	0.41 (0.33–0.51)		0.53 (0.41–0.69)	
No	1.0		1.0	
I know where to get my questions about health answered		< 0.001	–	
Yes	0.40 (0.30–0.52)		–	
No	1.0		–	
I know where to get my questions about HIV answered		< 0.001		< 0.001
Yes	0.34 (0.26–0.42)		0.44 (0.33–0.58)	
No	1.0		1.0	
Immigration-related factors				
Preferred language		< 0.001	–	
Speaks Spanish or another language most or half of the time	2.61 (1.57–4.34)		–	
Speaks English always or most of the time	1.0		–	
Undocumented immigrant		0.001		0.007
Yes	1.48 (1.18–1.85)		1.44 (1.11–1.88)	
No	1.0		1.0	
Country of origin		0.53		
Born in Mexico	1.08 (0.85–1.36)		–	
Born outside the US, other than in Mexico	1.0		–	
Immigrated to the US within the previous 5 years		0.004		0.018
Yes	1.64 (1.17–2.29)		1.68 (1.09–2.57)	
No	1.0		1.0	
Perceived local immigration climate scale, range 7–28	1.03 (1.01–1.05)	0.002	–	

Table 3 (continued)

	Univariate[b]		Multivariable[b,c]	
	OR (95% CI)	*P*	aOR* (95% CI)	P_{adj}
Deportation experience		0.13	–	
Yes	0.85 (0.69–1.05)		–	
No	1.0		–	
I know where to get information about immigration law		< 0.001	–	
Yes	0.61 (0.49–0.75)		–	
No	1.0		–	
I know where to get information about public services available to immigrants		< 0.001	–	
Yes	0.63 (0.51–0.78)		–	
No	1.0		–	
Perceived immigration laws and consequences—HIV scale, range 11–44	1.03 (1.01–1.04)	< 0.001	–	
Perceived immigration laws and consequences—general healthcare utilization scale, range 16–64	1.01 (1.00–1.02)	0.006	–	

*Adjusted odds ratios (aOR) are adjusted for other variables in the multivariable regression model

[a]Excludes 10 transgender and 2 other gender identity

[b]Excludes 20 individuals who had only lived in the US for less than a year

[c]Regression Model Chi-square 315.84, DF 10, $p < 0.001$; Nagelkerke R square 0.273; percentage correct 73.3; with AUC optimal cut point 0.61643, overall percentage correct 69.4, sensitivity 69.4% and specificity 69.4%; positive predictive value 82.0%

feature in the decision to accept an HIV test. In our multiple variable analysis, immigration concerns did not emerge as a significant predictor of having had an HIV test in the previous year.

Factors notably absent from our multivariable model for never having an HIV test emerged when testing in the previous year was considered. These included undocumented status and HIV-related stigma. Additional research on unique factors associated with annual testing among Latino immigrants is needed.

In our multivariable analysis, not knowing where to access information about HIV emerged as a significant predictor of both never having an HIV test and not testing in the previous 12 months. It appears that there is a need to expand access to HIV-related information. As an intervention target, expanding access to information may also be more amenable to change than some of the more enduring predictors emerging from our analyses. Still, although immigration law and policy change are critical if we are to increase HIV testing rates and reduce health disparities among Latino immigrants, additional, more proximal factors, should also be considered as intervention targets. These include ensuring that testing sites are accessible and include Spanish-speaking staff and materials and that people working within the healthcare services are also properly educated about immigrant concerns and policies related to access to healthcare.

Limitations

Our study data were based on self-report. Although the low levels of missing data and the willingness of over half of the participants to identify as undocumented suggest that participants were forthright, our results may be influenced by the nature of self-report data. Further, although our choice of variables was comprehensive and consistent with previous research, there is the possibility that we did not consider other significant factors. Further research on the influence of perceived immigration laws and consequences relative to other variables is needed. Our sample was also one of convenience, although every effort was made to reflect in our sample the demographic profile of Latino immigrants in each city and to include the most vulnerable immigrant groups such as those who were recent immigrants and those who were undocumented. Still, this sampling approach may introduce bias.

Conclusions

Perceived immigration laws and concerns appear to play an important role in deterring those who have never been tested for HIV from being tested. Many of these concerns are based on misconceptions of law and legal consequences. Multidisciplinary collaborations among attorneys, community organizations serving immigrants, HIV health navigators and researchers are needed to develop and to evaluate

educational HIV testing interventions for Latino immigrants. Further, larger scale advocacy efforts are needed, including efforts targeting law and policy makers and the media sharing information related to law and policy, to align laws and to provide information that encourage rather than discourage immigrants from following public health recommendations.

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Declarations

Competing Interests No potential competing interest was reported by the author.

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