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ORIGINAL PAPER

HIV Testing, Risk Behaviors, and Fear: A Comparison of Documented and Undocumented Latino Immigrants

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Abstract

Latino immigrants in the United States are at elevated risk for HIV infection and delayed HIV diagnosis. Immigration documentation status and its contribution to fears are important barriers to accessing health services including HIV testing. A currently changing political climate within the United States may have increased the complexity of the intersection of documentation status and health care access. This study used an anonymous survey conducted in March and April 2017 in New York City to compare: sociodemographic characteristics, HIV testing behaviors, HIV risk behaviors, and perceptions of fear around HIV testing among documented and undocumented Latino immigrants (N = 301). We found that undocumented immigrants reported lower levels of education, income, and health insurance than did documented immigrants. However, groups did not differ in having tested for HIV in the last 12 months, in future intentions to test for HIV, or in emotional/cognitive perceptions of fear around HIV testing. Undocumented immigrants reported lower rates of having ever tested for HIV in their lifetime (68.6%) than documented immigrants (80.5%) (p = 0.027). In conclusion, we found that despite sociodemographic challenges, undocumented immigrants had similar HIV testing behaviors as their documented counterparts in our study community. Further understanding of the mitigating factors that resulted in seemingly equal access to HIV testing in this community for undocumented immigrants is warranted.

Keywords HIV testing · HIV risk behaviors · Fear · Latino · Immigrants

Resumen

Los inmigrantes Latinos tienen un mayor riesgo de contraer el VIH y de tener retraso con el diagnóstico en los Estados Unidos. El estatus de documentación de inmigración y su contribución al miedo son obstáculos importantes al acceso a los servicios de salud como la prueba de VIH. El clima político está cambiando actualmente in los estados unidos, lo cual se haya aumentado la complejidad de la intersección del estatus de documentación y el acceso a la asistencia sanitaria. Este estudio utilizó una encuesta anónima realizado en marzo y abril de 2017 en la Ciudad de Nueva York para comparar las características sociodemográficas, los comportamientos de pruebas del VIH, los comportamientos de riesgo, y el miedo de la prueba de VIH entre los inmigrantes Latinos documentados y los indocumentados (N = 301). Encontramos que los inmigrantes indocumentados reportaron niveles más bajos de educación, ingresos, y seguro médico que los inmigrantes documentados. Sin embargo, no hubo diferencias significativas entre los grupos en haberse hecho la prueba del VIH en los últimos 12 meses, en intenciones futuras de hacerse la prueba de VIH, o en la evaluación del miedo cognitivo/emocional acerca de la prueba de VIH. Los inmigrantes indocumentados reportaron tasas más bajas de alguna vez haberse hecho la prueba del VIH (68.6%) que los inmigrantes documentados (80.5%) (p = 0.027). En conclusión, encontramos que, a pesar de las dificultades sociodemográficas, los inmigrantes indocumentados tenían comportamientos similares de hacerse la prueba de VIH que sus contrapartes documentadas en nuestra comunidad en estudio. Es, por tanto, necesario que tengamos una mejor comprensión de los factores atenuantes que contribuyen al acceso a la prueba de VIH que parece igual para inmigrantes indocumentados en esta comunidad.

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Introduction

Latinos are disproportionately affected by HIV, accounting for more than one out of every five people in the nation living with the virus [1]. The HIV diagnosis rate among Latinos is more than three times that of their white counterparts [1], and an estimated 15% of Latinos with HIV remain undiagnosed [2]. HIV testing is the first step to obtaining treatment and is critical for reducing new HIV infections—a primary goal of the National HIV/AIDS Strategy [3]. Late HIV testing is linked to mortality and disparities in HIV-related health outcomes [4]. As Latinos are more likely to get tested later in their disease progression than any other racial/ethnic group in the United States [5], enhancing HIV testing among this population is an urgent priority [3].

The Latino population, however, is widely heterogeneous, and extant research has documented subgroup differences in HIV testing [6, 7]. Yet, the research has largely tended to treat the Latino population as a singular group, often ignoring differences in nationality or migrant versus non-migrant status [8]. The latter is particularly salient for understanding HIV testing as Latino immigrants are at high risk of late HIV diagnosis [8].

Theories on health behavior specific to immigrant populations demonstrate the importance of structural, social, and psychosocial factors in shaping immigrants' vulnerability to poor health outcomes [9–11]. While overarching determinants of health for immigrants often overlap with that of the general population, immigrants encounter unique barriers to health access [10]. Hence, immigration status emerges as a predictor of health behavior given the healthcare access restrictions placed upon some immigrant populations [9]. Moreover, immigration status intersects with structural, social, and psychosocial predictors of health behavior, warranting greater examination of immigration status in relation to HIV testing.

Latino immigrants are less likely to report having access to healthcare and social services than non-immigrant Latinos [12] and face HIV testing barriers attributable to their immigrant status [13]. Given the estimated 11.2 million unauthorized immigrants in the United States [14], many of whom are likely hidden from surveillance systems and excluded from census statistics [15, 16], greater understanding of HIV testing among the Latino immigrant population is needed. However, National HIV surveillance systems, including the National HIV Surveillance System (NHSS), the Medical Monitoring Project (MMP), and the National HIV Behavioral Surveillance System (NHBS), collect little information on migration history and none ask specifically about immigrants' documentation status [15]. While the National Health Interview Survey asks about citizenship status, it does not collect data on whether the participant is authorized to be in the United States [17].

The documentation status of Latino immigrants is an important factor that can determine eligibility for and access to certain benefits and services, including healthcare and federal programs. Prior research highlights that undocumented immigrants are less likely to use healthcare services than documented immigrants [18–21]. For example, undocumented immigrants are less likely to have visited a doctor in the previous year or have a usual source of care. Fear of deportation or discrimination from authorities is commonly linked to these disparities in access to health services among undocumented immigrants [22].

While barriers to healthcare services for undocumented immigrants is widely acknowledged [23], less is known about how HIV risk behaviors and HIV testing behaviors vary between documented and undocumented Latino immigrants in the United States. Extant research demonstrates differences in HIV treatment outcomes between documented and undocumented immigrants [13, 24], finding that undocumented Latino immigrants enter care with more advanced disease than do documented Latino immigrants. There is a dearth of research that examines HIV testing behaviors and intentions among these groups. One study of Hispanic farmworkers in South Florida found that being undocumented was negatively associated with having been tested for HIV [25]. Another study found that documented immigrants were significantly more likely to have tested for HIV than undocumented immigrants; however, participants were recruited from STD clinics, community-based organizations providing HIV-related prevention services, and needle exchange programs, suggesting prior involvement in and access to health and social services [26]. Notably, immigrants with lower levels of access to care are at increased risk for delayed treatment entry [4, 27], implicating the need for greater attention to immigrants that face obstacles to accessing health-related services.

Knowledge about how immigrant status impacts important health behaviors, such as HIV testing, can influence strategies to reach our country's HIV/AIDS goal to increase access to care for people living with HIV [3]. Early and routine HIV testing is critical for prevention and treatment among high-risk groups [3], and Latino immigrants represent a particularly vulnerable group during the nation's immigration debate. The current political climate for immigrants have contributed to an overarching sentiment of fear among Latino immigrants with implications for health related outcomes [9].

Fear is a complex, yet important factor that can shape decision-making and behavior among Latino immigrants [28] and has also been identified as a barrier to HIV testing among at-risk groups [29]. The decision-making literature demonstrates the importance of both cognitive and

emotional appraisals of events or situations in determining behavior [30, 31]. Hence, fear in relation to HIV testing, can present as both [1] an emotional state where individuals experience feelings of fear, and as [2] a cognitive belief or expectancy where individuals fear particular consequences or outcomes from HIV testing. The research on fear in relation to HIV testing among Latino immigrants, however, have tended to focus on the fear of specific expectancies related to learning of a positive result [32–34]. Despite the unique qualities of emotions as psychological experiences [35], there has been less attention on affective states or feelings about HIV testing in predicting testing behavior among Latino immigrants. As fear has been commonly cited as a source of vulnerability to negative health outcomes particularly among undocumented immigrant populations [9, 23, 28, 36–39], greater understanding of how cognitive and affective conditions of fear of HIV testing differs between documented and undocumented groups may elucidate opportunities for targeted prevention interventions.

The present study examined differences in HIV risk behaviors and HIV testing behaviors between undocumented and documented Latino immigrants in New York City. The study also explored differences in important barriers to HIV testing, such as socioeconomic factors, healthcare access, and fear of HIV testing, between these groups.

Methods

Participants and Procedures

The study was conducted in the West Queens neighborhood of New York City (NYC) from March 2017–April 2017. West Queens encompasses the zip codes in NYC that has among the highest HIV prevalence [40]. Specifically, of the 181 NYC zip codes, West Queens is ranked in the top quintile for multiple diseases: HIV/AIDS, viral hepatitis, sexually transmitted diseases and tuberculosis [41]. Within West Queens, the Corona neighborhood is more heavily Latin American than any other Queens' neighborhood [42]. Specifically, Corona has the greatest number of Mexican (15,300) and Ecuadorian (14,000) immigrant residents than any other New York City neighborhood and more Dominican immigrant residents (11,200) than any other Queens' neighborhood [42]. Additionally, more than half (64.2%) of the residents in Corona are immigrants [42]. The high percentage of immigrants in conjunction with high HIV rates provided the rationale for making Corona the target site of the study.

The target Corona neighborhood was divided into eight zones, and each zone was mapped with corresponding streets and avenues that were included in each zone. To reduce selection bias, recruitment efforts occurred on both weekdays and weekends from 8 a.m. to 8 p.m. A target zone was randomly selected for each day of recruitment, and trained bilingual research staff recruited participants in the target zone via a door-to-door approach [43]. Specifically, trained staff knocked on doors of residences in the target zone and solicited participants using a detailed recruitment script to provide details describing the study and screen interested individuals for eligibility. Eligible participants were at least 18 years of age, immigrants (not born in the United States), and of Latino ethnicity. Surveys were administered in the language (Spanish or English) of the participant's preference and in the participant's desired location where privacy could be ensured (i.e. inside participants' homes, on a stoop nearby).

The study was reviewed and approved by the Institutional Review Board (IRB) at New York University. All surveys were anonymous, and no identifying information was collected from participants. Staff obtained informed verbal consent prior to conducting the survey with participants. The requirement of a signed consent form was waived by the IRB given that breach of confidentiality could potentially result in harm. Specifically, project staff (1) read the consent form to participants in either Spanish or English, (2) assessed for participants' understanding of participation in the study, (3) provided participants with the opportunity to ask questions, (4) obtained verbal agreement from subjects to participate in the research, and (5) provided participants with a copy of the consent form to keep.

Survey Measures

Sociodemographic Information

Participants were asked to report their documentation status via the following categories: (1) naturalized citizen, (2) legal permanent resident, (3) legal temporary immigrant; (4) eligible immigrant; (5) unauthorized immigrants. Naturalized citizens, legal permanent residents, legal temporary immigrants, and eligible immigrants were categorized as "documented" immigrants and unauthorized immigrants were categorized as "undocumented" immigrants. We asked participants about their sex, age, country of origin, highest level of education, annual household income, religion, marital status, sexual orientation (heterosexual/straight, gay/lesbian, bisexual, other), and length of time in the United States (since first arrival).

Healthcare Access

Given the importance of healthcare access in predicting HIV, the survey asked whether participants had health insurance (yes/no). Participants who reported having health insurance

were asked about the type of plan (private plan/employment based; private plan/direct purchase; Medicare; Medicaid; other). Participants were also asked about healthcare access using the Immigrant Barriers to Health Care Scale- Hispanic Version [44]. The 11-item measure asked participants how much they agreed with statements that described healthcare barriers on a 1–5 agree-disagree scale (i.e. "I have a doctor who speaks my language"; "I have a way to pay for health services"). The mean scores were calculated, and scores above 2.99 characterized high levels of healthcare access. The internal consistency of the scale was $\alpha = 0.71$, and the mean healthcare access score across the sample was 3.53.

HIV Testing

We asked participants if they had ever tested for HIV (yes/no). We also asked the amount of time since the participant's last HIV test to determine current testing (tested in the last 12 months). Of specific interest to this study is routine HIV testing given the importance of regular testing among high-risk populations. Given the cross-sectional nature of the study, we asked about future intentions to get tested for HIV. Intention to perform a behavior is the single best and most immediate predictor of behavior [45–48]. We measured intentions to get an HIV test in the next 12 months ("I plan to get an HIV test in the next 12 months") and intentions to get a test every 12 months ("I plan to get an HIV test every 12 months [annually]") on a five-point Likert-type scale (1 = strongly disagree, 2 = moderately disagree, 3 = neither agree nor disagree, 4 = moderately agree, 5 = strongly agree).

HIV Risk Behaviors

HIV risk behaviors included whether participants had sex during the past 12 months (yes/no), had more than one sex partner in the last 12 months (yes/no), used a condom during last sex (yes/no) [49], and injected drugs in the last 12 months (yes/no). We also asked participants about engagement in transactional sex in the previous 12 months (given drugs in exchange for sex; received drugs or money in exchange for sex) [50].

Fear of HIV Testing

Participants were asked about both emotional and cognitive appraisals of fear of HIV testing. The content of the measures regarding emotional and cognitive appraisals of fear of HIV testing included in the survey were based on separate in-depth interviews with Latino immigrants that asked about barriers and facilitators to HIV testing. Informed by the Unified Theory of Behavior [51] and guided by the process of using qualitative methods to inform measure development [52], in-depth interviews were conducted with 34 Latino immigrants to assess immigrants' affect and expectancies regarding HIV testing. Among the frequently mentioned affectual responses to HIV testing were feeling nervous and feeling scared about getting tested for HIV. Among the frequently mentioned cognitive appraisals or beliefs about HIV testing was the expectancy that one would get into trouble. While in-depth interviews emphasized the legal ramifications of HIV testing in the in-depth interviews, interview participants broadly conceptualized the experience as "getting into trouble." The qualitative work instantiated the construct of fear and shaped the language used in the questionnaire. Specifically, the emotional appraisal of fear of HIV testing was measured by the following two items on a five-point Likert-type scale (1 = strongly disagree, 2 = moderately disagree, 3 = neither agree nor disagree, 4 = moderately agree, 5 = strongly agree): (1) "If I got an HIV test at this time in my life, I would feel scared"; (2) "If I got an HIV test at this time in my life, I would feel nervous." The two items were correlated ($r = 0.791$, $p = 0.000$), and hence, were averaged to serve as the emotional appraisal of fear of HIV testing. The cognitive appraisal of fear of HIV testing was measured on the same five-point Likert-type scale to the following question: "If I got an HIV test at this time in my life, I would get into trouble." Taken together, the measures captured both emotional and cognitive appraisals of fear regarding HIV testing.

Statistical Analysis

We calculated descriptive statistics to characterize the demographics, HIV risk behaviors and HIV testing behaviors of the sample. Bivariate analyses including t-tests and Chi square tests were conducted to compare documented and undocumented Latino immigrants on sociodemographic characteristics, healthcare access, HIV testing, HIV risk behaviors, and fear of HIV testing. Correlation coefficients were used to examine associations between HIV testing and fear of HIV testing. We completed all analyses using SPSS v.19 at a two-tailed level of significance of $p < 0.05$.

Results

Characteristics of the Sample

There were 306 Latino immigrants who participated in the study. Five participants did not provide data on immigration status, and were excluded from analyses. Non-contact with potential subjects and refusal to participate were important considerations with regard to recruitment bias. Approximately one out of every five persons approached via the recruitment strategy described above refused to participate. The vast majority of refusers declined to provide project

staff with any demographic data and cited lack of interest or time as the reason for refusal. To assess potential bias of non-contact and refusal, study participants were compared to existing archival data on the population of Corona, Queens. Demographically, the three largest foreign-born groups in Corona are from Ecuador, the Dominican Republic, and Mexico (Lobo & Salvo), which was reflected among study participants (31.2, 27.6, and 20.6%, respectively).

Reports of HIV testing among study participants were also compared to data from the New York City Department of Health's 2015 Community Health Survey and HIV/AIDS Surveillance Data (2006–2013). In West Queens, the number of Latinos living with HIV/AIDS is 1223.9 per 100,000 population. There were two subjects who reported living with HIV/AIDS in the study, which was slightly lower than the archived data on HIV prevalence in the community. According to New York City data, 71% of Latinos in Queens have ever tested for HIV and 41% tested in the past 12 months. Approximately 77% of participants in this study reported ever testing for HIV and 41% of study participants reported testing in the past year. The higher reports of ever testing in the present study may reflect neighborhood level differences and differences in testing between foreign-born versus non-foreign-born Latinos. Additionally, our data may suggest that we may have been less likely to reach Latinos who had not tested for HIV. Hence, these biases are noted for interpreting the results of the study.

Documentation Status and Sociodemographic Characteristics

Among the 301 participants, 71.4% (n = 215) were documented and 28.6% (n = 86) were undocumented Latino immigrants. The population was not statistically significantly different by documentation status in sex, marital status, or sexual orientation but differed across all other sociodemographic characteristics (Table 1). Documented Latino immigrants tended to be older than undocumented Latino immigrants with mean ages of 39 years and 36 years, respectively. Undocumented participants were more likely to be from Mexico (51.2%) compared to documented participants (8.4%), and reported shorter lengths of time in the mainland U.S. than their documented counterparts. Undocumented immigrants also had lower education levels and annual household incomes than documented immigrants. The majority of undocumented immigrants reported being Catholic (80.7%) while 65.5% of documented immigrants reported being Catholic. While more than three quarters (75.3%) of documented immigrants reported having health insurance, only 10.5% of undocumented immigrants indicated having health insurance (Table 1). Among those who indicated having health insurance, the majority of both documented (54.6%) and undocumented immigrants (66.7%) reported Medicaid as the type of health plan (Not included in Table). Additionally, documented immigrants reported higher mean levels of healthcare access (3.63) than did undocumented immigrants (3.28).

Risk Behaviors, HIV Testing Behaviors, and Fear of HIV Testing

Documented and undocumented immigrants did not statistically significantly differ across risk behaviors (Table 2). The vast majority of both groups reported having sex in the past 12 months, and over 65% of all participants reported not using a condom during last sex. There were few reports of injection drug use and engagement in transactional sex among participants, both documented and undocumented, precluding inclusion of this information in the table. Specifically, three documented immigrants (1.4%) and no undocumented immigrants reported injection drug use in the last 12 months. Four documented immigrants (1.8%) and no undocumented immigrants reported engaging in transactional sex in the last 12 months (Not included in table). While documented immigrants indicated slightly lower mean levels of emotional and cognitive appraisals of fear of HIV testing than undocumented immigrants, the differences were not statistically significant ($p < 0.05$). Across HIV testing behaviors, groups did not statistically differ apart from having ever tested for HIV. Among documented immigrants, 80.5% reported ever testing for HIV while 68.6% of undocumented immigrants reported ever testing.

Correlations between HIV testing behaviors (ever tested, tested for HIV in past 12 months, intention to test in next 12 months, and intention to test every 12 months) and fear of HIV testing (emotional appraisal and cognitive appraisal) are presented for documented and undocumented immigrants separately (Table 3). Among documented immigrants, the cognitive appraisal of fear of getting into trouble from getting an HIV test was negatively correlated with having ever tested for HIV and the plan to get an HIV test every 12 months ($r = -0.367$, $p = 0.000$; $r = -0.138$, $p = 0.049$, respectively).

Among undocumented immigrants, the emotional appraisal of fear of HIV testing was negatively correlated with having ever tested for HIV and having tested for HIV in the past 12 months ($r = -0.214$, $p = 0.049$; $r = -0.274$, $p = 0.035$, respectively). Additionally, among the undocumented group, the cognitive appraisal that one would get into trouble from HIV testing was negatively correlated with the intention to get an HIV test in the next 12 months and the intention to get an HIV test every 12 months ($r = -0.265$, $p < 0.005$; $r = -0.272$, $p < 0.005$, respectively).

Table 1 Sociodemographic characteristics by documentation status

Characteristic	Documented N (%)	Undocumented (N = 86) N (%)	Test statistic	p value
Sex			1.12 (χ^2)	0.290
Female	108 (50.2)	49 (57.0)		
Male	107 (49.8)	37 (43.0)		
Age (years)			14.33 (χ^2)	0.006*
18–24	29 (13.7)	6 (7.0)		
25–34	61 (28.8)	34 (39.5)		
35–44	51 (24.1)	30 (34.9)		
45–54	40 (18.9)	13 (15.1)		
55+	31 (10.4)	3 (3.5)		
Country of origin			57.34 (χ^2)	0.000*
Mexico	18 (8.4)	44 (51.2)		
Ecuador	65 (30.2)	29 (33.7)		
Dominican Republic	81 (37.7)	2 (2.3)		
Peru	12 (4.0)	4 (1.3)		
Other[a]	39 (18.1)	7 (8.1)		
Education			17.47 (χ^2)	0.002*
8th grade or less	27 (12.7)	24 (27.9)		
Some high school	41 (19.2)	17 (19.8)		
Completed high school	68 (31.9)	31 (36.0)		
Some college	48 (22.5)	11 (12.8)		
Completed college	29 (13.6)	3 (3.5)		
Annual household income			18.82 (χ^2)	0.001*
$0–$9,999	52 (24.6)	35 (42.7)		
$10,000–19,999	55 (26.1)	25 (30.5)		
$20,000–$29,999	39 (18.5)	15 (18.3)		
$30,000–$39,999	35 (16.6)	4 (4.9)		
$40,000+	30 (14.2)	3 (3.7)		
Religion			6.51 (χ^2)	0.038*
Catholic	135 (65.5)	67 (80.7)		
Christian	38 (18.4)	9 (10.8)		
None or other	33 (16.0)	7 (8.4)		
Marital status			6.32 (χ^2)	0.286
Single/not living with a partner	65 (30.2)	24 (27.9)		
Not married but living with a partner	32 (14.9)	22 (25.6)		
Married and living with a partner	67 (31.2)	27 (31.4)		
Married but not living with a partner	27 (12.6)	6 (7.0)		
Other	24 (11.2)	7 (8.1)		
Sexual orientation			0.56 (χ^2)	0.454
Heterosexual or straight	200 (93.0)	82 (95.3)		
Gay, lesbian, bisexual or other	15 (7.0)	4 (4.7)		
Length of time in U.S. (years)			28.43(χ^2)	0.000*
< 5	45 (15.1)	13 (15.1)		
5–< 10	22 (10.3)	11 (12.8)		
10–< 15	31 (14.6)	29 (33.7)		
15–< 20	40 (18.8)	24 (27.9)		
20+	75 (35.2)	9 (10.5)		
Health insurance			105.40 (χ^2)	0.000*
Yes	162 (75.3)	9 (10.5)		
No	53 (24.7)	77 (89.5)		
Healthcare access	3.63 (M)	3.28 (M)	3.46 (*t* test)	0.001*

*$p < 0.05$

[a]Included: Cuba, Colombia, El Salvador, Guatemala, Nicaragua, Venezuela, Paraguay, and Puerto Rico

Table 2 HIV testing, risk behaviors, and fear of HIV testing by documentation status

Characteristic	Documented (N = 215) N (%)	Undocumented (N = 86) N (%)	Test statistic	p value
HIV testing				
Ever tested for HIV	173 (80.5)	59 (68.6)	4.89 (χ^2)	0.027*
Tested for HIV in past 12 months	94 (53.1)	30 (50.0)	0.17 (χ^2)	0.677
Intention to get an HIV test in next 12 months	3.57 (M)	3.21 (M)	1.76 (*t* test)	0.079
Intention to get an HIV test every 12 months	3.64 (M)	3.29 (M)	1.73 (*t* test)	0.085
HIV risk behaviors				
Had sex during the past 12 months	185 (87.3)	75 (87.2)	0.00 (χ^2)	0.990
Had more than one sex partner in the last 12 months	41 (19.6)	15 (17.6)	0.15 (χ^2)	0.697
Did not use a condom during last sex	124 (68.1)	49 (65.3)	0.19 (χ^2)	0.664
Fear of HIV testing				
If I got an HIV test at this time in my life, I would feel nervous/scared (emotional appraisal)	1.80 (M)	2.08 (M)	− 1.62 (*t* test)	0.106
If I got an HIV test at this time in my life, I would get into trouble (cognitive appraisal)	1.48 (M)	1.62 (M)	− 1.06 (*t* test)	0.290

*p < 0.05

Table 3 Correlations between fear of HIV testing and HIV testing behaviors for documented and undocumented immigrants

	Ever tested for HIV		Tested for HIV in past 12 months		Plan to get HIV test in next 12 months		Plan to get HIV test every 12 months	
	r	p value	r	p value	r	p value	r	p value
Documented Immigrants								
I would feel nervous/scared (emotional appraisal)	− 0.132	0.056	0.044	0.568	0.070	0.311	0.070	0.314
I would get into trouble (cognitive appraisal)	− 0.367	0.000*	− 0.131	0.089	− 0.115	0.101	− 0.138	0.049*
Undocumented Immigrants								
I would feel nervous/scared (emotional appraisal)	− 0.214	0.049*	− 0.274	0.035*	− 0.062	0.573	− 0.117	0.285
I would get into trouble (cognitive appraisal)	− 0.206	0.059	− 0.089	0.503	− 0.265	0.014*	− 0.272	0.012*

*p < 0.05

Discussion

This study is among the first to compare HIV testing behaviors and fear of HIV testing in documented and undocumented Latino immigrants in the United States. Unsurprisingly, documented and undocumented Latino immigrants differed on important sociodemographic characteristics, such as education, annual income, health insurance status, and healthcare access. These differences reiterate the additional barriers that undocumented Latino immigrants face in accessing healthcare and preventative services, and suggest the need to place even greater attention on identifying strategies to meet the healthcare needs of undocumented groups [53].

In accordance with national trends, more than half (51.2%) of the undocumented population were from Mexico compared to 8.4% of the documented population [54]. In addition, more than a third of documented Latino immigrants were from the Dominican Republic, highlighting important social networks within documented and undocumented groups. While prior research has examined differences in HIV testing and HIV-related health outcomes by country of origin [8, 55], these differences may be, in part, attributable to the legal ramifications of documentation status conferred to individuals from specific countries. While particular subgroups have unique cultural values and traditions, their intersection with the historical factor of migration trends and policies cannot be overlooked.

The lack of differences in HIV risk behaviors between documented and undocumented immigrants provide opportunity to highlight that individual behavior is not the sole determinant of HIV risk. Both groups reported high rates of having sex in the past 12 months and the majority did not use a condom during last sex. Individual level factors are insufficient in understanding risk, and multilevel frameworks

that integrate the structural and social factors that influence HIV risk and behavior are particularly necessary in developing interventions for Latino immigrant populations [56]. As undocumented immigrants may face greater structural barriers due to previously mentioned factors such as healthcare access, education, and income, their HIV risk behaviors must be examined within this context.

Despite notable differences in sociodemographic characteristics and healthcare access between documented and undocumented immigrants, documented and undocumented immigrants performed somewhat similarly in current and future HIV testing behaviors. While undocumented immigrants reported lower levels of having ever tested for HIV than documented immigrants (68.6% vs. 80.5%, respectively), they did not significantly differ in having tested for HIV in the past 12 months, intention to test in the next 12 months, and intention to test every 12 months. Complex factors may be at play to shape these outcomes. The lack of differences in intentions despite the difference in ever testing may be explained by abilities to enact the behavior. Specifically, while intentions are strongly linked to actual behavior, the *ability* to get tested for HIV may affect this relationship [57]. Undocumented immigrants may intend to get tested for HIV but lack the ability to do so due to financial and knowledge barriers. This suggests that undocumented immigrants need not be convinced of the importance of HIV testing or the need to do so; rather, that they need concrete skills and opportunities to get tested for HIV. However, the lack of differences between documented and undocumented immigrants in current testing (tested for HIV in past 12 months) may be attributable to greater efforts to reduce testing barriers through expanded HIV testing initiatives—routine and free HIV testing has become increasingly available and frequently offered, even in disadvantaged communities. Hence, the traditional structural barriers to HIV testing may be less pertinent for immigrants in the current U.S. context where HIV testing has become more acceptable and accessible.

Individual level factors may provide additional explanations for study results, particularly in the current unfavorable political climate for immigrants in the United States. While differences in attitudinal influences on intentions may have elucidated opportunities for targeted intervention [57], undocumented and documented immigrants did not statistically significantly differ in their fears of HIV testing. However, when examining correlates between indicators of fear of HIV testing and HIV testing behaviors among documented and undocumented immigrants, notable linkages emerged. Specifically, the emotional appraisal of feeling nervous/scared about testing for HIV was negatively correlated with ever testing for HIV among undocumented immigrants, suggesting the importance of addressing the emotional fears about testing among undocumented groups. Moreover, the cognitive appraisal of fear of getting into trouble from HIV testing was negatively correlated with intentions to get an HIV test in the next 12 months and every 12 months for undocumented immigrants. While there is a time measurement discrepancy between the measured intention and the cognitive appraisal that warrants noting, this finding suggests that the fear of getting into trouble may be particularly salient for undocumented immigrants in weighing the advantages and disadvantages of future testing behavior.

For documented immigrants, the cognitive appraisal that "I would get into trouble" from getting an HIV test was negatively correlated with having ever tested for HIV and the intention to test for HIV every 12 months. As documented immigrants encompassed not only legal permanent residents and naturalized citizens, but also temporary and eligible immigrants, this finding may point to fears that were linked to specific categories within documentation status. Despite having "documentation," its seemingly provisional or tenuous nature may contribute to barriers to accessing health services, even among documented immigrants.

There are several limitations to this study. The cross-sectional nature of the study limits our understanding of the temporality of the relationships studied, and causality cannot be determined. Additionally, the study focused solely on residents of the Corona community in Queens, New York. While aspects of Corona, Queens parallel those of other metropolitan areas, the density and demographics of Corona and its proximity to the Manhattan borough are unique. Hence, caution should be exercised before generalizing the study results to other geographic regions and Latino immigrant communities.

Also important to note is that the results did not take into account potential confounders due to issues of multicollinearity. Specifically, we conducted sensitivity analyses to further assess the difference between documented and undocumented immigrants in having ever tested for HIV, controlling for sociodemographic variables. After adjusting for age, country of origin, education, income, length of time in U.S., and health insurance, documented immigrants were no longer statistically significantly more likely to have ever tested for HIV than undocumented immigrants (AOR 2.0, 95% CI 0.83–4.8, $p = 0.17$). However, these analyses are confounded by issues of multicollinearity between documentation status and the sociodemographic variables as demonstrated in Table 1. Still, future studies should acknowledge the influential role of sociodemographic factors in shaping HIV related behaviors and outcomes.

As previously noted, the study measured fear of HIV testing "at this time in one's life." These fear measures were examined in relationship to four different HIV testing behaviors with distinct time implications: past, current, future, and far future. The principle of correspondence emphasizes specificity in which "specific health behaviors are likely to

correlate only with equally specific attitudes" [58]; hence, the lack of attitude-behavior correspondence is an important limitation when interpreting the study's findings. In addition, the study relied on self-report measures, which are subject to recall bias and socially desirable responding. Given the sensitive nature of the data collection and the potential for socially desirable responding, we measured social desirability response tendency. Two adapted items from the Balanced Inventory of Desirable Responding (BIDR) Impression Management subscale were included in the survey [59, 60] (Tendency to underreport undesirable behaviors) ($\alpha = 0.77–0.85$) [60]. There were negligible correlations ($p < 0.2$) between this measure and reports of HIV risk behaviors, HIV testing, and documentation status, suggesting social desirability was not a significant factor in participants' reports. Notwithstanding this effort to account for social desirability bias, estimates of risk behaviors may be underestimates and estimates of HIV testing behaviors may be overestimates. Finally, little consideration of drug and alcohol use among participants limited our understanding of HIV risk behaviors among this population. While injection drug use was assessed among participants, a minuscule number of participants reported ever injecting drugs.

Conclusions

Findings of this study have important implications for improving HIV testing behaviors among documented and undocumented Latino immigrants. First, the study highlights the important sociodemographic differences among documented and undocumented Latino immigrants. Undocumented Latino immigrants have often been considered a "hidden" population [56], and attention to their socioeconomic and educational challenges may facilitate efforts to better reach this group.

Second, the role of fear of HIV testing is important to understanding HIV testing behaviors, particularly in the current political climate. Fear can manifest in emotional and cognitive ways to contribute to barriers in accessing health services among undocumented Latino immigrants [28]. Yet, this study indicates that fear of HIV testing did not differ by documentation status. Notably, both documented and undocumented persons can be linked to the same family and social networks, suggesting that fear pervades the immigrant population, regardless of documentation status. Hence, attention to social networks and relationships may be important for understanding similarities in fear and HIV testing behaviors among this population. However, the mechanisms through which the feelings and cognitions of fear of HIV testing translate into actual behavior may differ between documented and undocumented groups due to differences in ability. Further research that examines how fear is directly implicated in HIV testing behavior is warranted. Specifically, identifying factors that can shape the relationship between fear and actual testing behavior may elucidate strategies to quell fears among this population. Given the recent salience of immigration and documentation status in the political discourse, increased efforts among immigrants to "hide" may present challenges to HIV testing interventions. Hence, greater attention to the differences between undocumented and documented immigrants with regard to HIV testing can support efforts to overcome the obstacles to reaching this hidden population.

Results highlighted comparable intentions to test for HIV and reports of current HIV testing between documented and undocumented immigrants. These findings suggest that HIV testing has become increasingly accessible for immigrants regardless of documentation status. Undocumented immigrants, however, reported lower rates of ever testing for HIV than documented immigrants. Further research that identifies strategies to increase opportunities for testing for undocumented immigrants without further ostracizing this population is urgently needed. Additionally, improved surveillance efforts that document and track this sizeable and at-risk population in the United States is warranted.

It is also important to note that there are several categories of immigrants within documented and undocumented groups. For example, there are several categories of "authorized" immigrants in the United States. While this study dichotomized documentation status, future research that examines differences among more specific documentation statuses may explicate particular risk and protective factors related to the different rights, protections, and responsibilities that a specific documentation status confers.

In sum, this study is among the first to compare HIV testing behaviors, HIV risk behaviors, and fear of HIV testing among documented and undocumented Latino immigrants. By explicitly acknowledging the challenges to HIV testing for undocumented groups, we can develop targeted and specific efforts to improve HIV surveillance and testing for both documented and undocumented immigrants. To reach the National HIV/AIDS Strategy goals to reduce new HIV infections, we must focus prevention efforts on key populations, which include those who are often missed in surveillance. Fear is a nuanced and complex emotion that may differentially shape behaviors among Latino immigrants, and is particularly relevant given the current political climate. While our study suggests that documentation status is not a significant predictor of cognitive/emotional fear, attention to how fear manifests within the immigrant population to shape behavior warrants greater understanding. Attention to nuanced feelings and beliefs of fear and improvements in immigrants' ability to carry out intentions to test and access health services may provide opportunities for increasing HIV testing among Latino immigrants in the United States.

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Compliance with Ethical Standards

Conflict of interest The authors declare that they have no conflict of interest.

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the Institutional Review Board at New York University and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. This article does not contain any studies with animals performed by any of the authors.

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

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