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# HIV Testing Among Immigrant Sexual and Gender Minority Latinos in a US Region with Little Historical Latino Presence

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## Abstract

Immigrant sexual and gender minority Latinos constitute a vulnerable subgroup about which little is known. We examined HIV testing among 190 such Latinos recruited via respondent-driven sampling in North Carolina, a state with little historical Latino presence but recent, rapid growth of this population. Sixty-eight percent reported an HIV test in the past year, and nearly half reported multiple HIV tests. Concern for their health was the most frequent reason for seeking an HIV test. Reasons not to get tested included fear of a positive test, previous HIV tests, worry that test results might be reported to the government, and concerns that others might treat the person differently if found to be HIV positive. In a multiple variable model, correlates of HIV testing included age, educational attainment, HIV stigma, comfort with sexual orientation, and previous STD diagnoses. Among participants reporting anal sex, consistent condom use was associated with HIV testing, suggesting that protective behaviors may co-occur. These findings may inform the development of more efficacious interventions to increase HIV testing among this subgroup.

## Introduction

SINCE 1990, THE UNITED STATES (US) has witnessed exponential growth of its Latino population.<sup>1</sup> While the largest numbers of Latinos continue to be found in states with long-established communities, such as California, Texas, Florida, and New York, recent demographic changes have been most pronounced in states with little or no historical Latino presence, including North Carolina.<sup>2-4</sup> Many Latinos in the Southeast US reside in communities that lack experience with immigrants and infrastructures to meet their needs.<sup>5,6</sup> Immigrant sexual and gender minority Latinos—a subgroup that includes gay-identified men, non-gay-identified men who have sex with men (MSM), and transgender or gender variant persons—constitute a particularly vulnerable subgroup which may be marginalized along multiple dimensions, including immigration status, language use, ethnic minority status, gender identity, or sexual orientation.

Concurrent with shifting demographics, the Southeast US has faced ongoing epidemics of HIV and sexually transmitted diseases (STDs), with disproportionately higher levels among people of color, rural residents, and the poor.<sup>7,8</sup> Recent North Carolina surveillance data have documented a number of sexual health disparities. Compared to non-Latino white men, in 2010, Latino men had three-fold higher incidence of HIV

(35.5 vs. 11.6 per 100,000), four-times higher incidence of chlamydia (118.1 vs. 30.6 per 100,000), and three-times higher incidence of gonorrhea (36.9 vs. 12.8 per 100,000).<sup>9</sup> Furthermore, the rate of HIV infection among Latino MSM in North Carolina has been estimated at 1.5 times greater than that among white MSM and second only to the rate among African-American MSM.<sup>10</sup>

Increasing HIV testing has been a recommended strategy to address the disproportionate burden of HIV among racial/ethnic minorities.<sup>11,12</sup> Testing provides people with further information about HIV risk and its prevention. For immigrant Latinos who may have little understanding of the US health care system, HIV testing has the added benefit of serving as point of entry into health care and may also help them obtain other services for different needs. Increasing research has examined HIV testing among Latinos.<sup>13-18</sup> Two novel intervention strategies (door-to-door outreach and trained peer educators) have demonstrated efficacy to increase HIV testing among heterosexual Latinos in North Carolina.<sup>19,20</sup> To date, however, few interventions have been developed to increase HIV testing among sexual and gender minority Latinos,<sup>21,22</sup> despite their recognition as a priority population for HIV prevention efforts.<sup>23,24</sup> Compounding the challenge, little is known about HIV testing among Latino immigrants in areas where there has been little historical Latino presence.

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Therefore, we sought to describe the HIV testing behavior of immigrant sexual and gender minority Latinos in North Carolina. To deepen our understanding, we identified correlates of HIV testing among demographic, psychosocial, and behavioral data. As an exploratory study, there were no *a priori* hypotheses.

## Methods

### Sample

The study was guided by an ongoing community-based participatory research (CBPR) partnership that includes representatives from public health departments, AIDS service organizations, universities, the local Latino community (including immigrant sexual and gender minority Latinos), and community-based organizations serving the Latino community. Because sexual and gender minority Latinos are often considered a hard-to-reach population, the parent study used respondent-driven sampling (RDS) to recruit participants. RDS is an extension of chain-referral methods that enables researchers to sample "hidden" populations when no sampling frame can be established.<sup>25-27</sup> Initially, the CBPR partnership identified eight seeds, initial participants chosen to represent the diversity of the local Latino community (e.g., by level of "outness" about their sexual orientation, country of origin, gender identity, and HIV status). During data collection, nine additional seeds were enrolled to expedite recruitment in accordance with standard RDS procedures, for a total of 17 seeds. All participants self-identified as Latino, were ages 18 or older, and reported having had sex with a man since age 18. Each seed provided informed consent, completed an in-depth psychosocial and behavioral assessment, received instruction on the study's recruitment protocol and eligibility criteria, and recruited up to three additional participants from their social networks. Each subsequent participant completed an assessment, received instruction on the study's recruitment protocol and eligibility criteria, and recruited up to three new participants from their social network. Recruitment waves continued until the target sample size ( $n=190$ ) was met. All participants were compensated for completing their own assessment (\$50) and for each referral who also completed an assessment (\$20). This dual incentive structure is a hallmark of RDS methods. The Institutional Review Board at Wake Forest University Health Sciences approved the study.

### Measures

The CBPR partnership developed a comprehensive psychosocial and behavioral assessment, using Spanish-language measures whenever possible and adapting English-language measures or developing new measures when necessary. Following a committee approach, an increasingly preferred method,<sup>28,29</sup> we convened a group of individuals with complementary skills to translate the English-language items into Spanish. The group included professional translators (including native Spanish speakers from Mexico and Central America), a translation reviewer, content specialists, and a questionnaire design expert. Multiple group members made independent translations of the assessment, and the full committee met to discuss and reconcile the various versions. The CBPR partnership, which included native Spanish speakers, reviewed and approved the final Spanish translation.

The assessment asked participants if they had obtained an HIV test in the past year (coded 0=no; 1=yes). Participants who reported having had an HIV test were then asked about the location of their most recent HIV test (open-ended response) and asked to choose from among six possible reasons for obtaining the test (e.g., "I thought I was at risk from sex"). Participants who reported not having had an HIV test in the past year were asked to select all relevant reasons not to take an HIV test from a list of 15 non-mutually exclusive statements (e.g., "I don't have the time").

We investigated the following demographic, psychosocial, and behavioral variables as potential correlates of HIV testing. Demographic variables included age at time of interview (years), educational attainment (coded 1=less than high school; 2=high school diploma or GED; 3=some college; 4=four-year college degree or higher), employment status (coded 0=not employed; 1=employed year-round; 2=employed seasonally), length of time in US (years), self-identifying as gay (coded 0=no; 1=yes), self-identifying as transgender (coded 0=no; 1=yes), and relationship status (coded 1=single; 2=dating; 3=partnered or married).

Among psychosocial variables, we measured HIV knowledge using 11 true/false items (e.g., "A person will not get HIV if she or he is taking antibiotics") that have been used successfully among immigrant Latinos.<sup>30</sup> We summed the number of correct answers to create an HIV knowledge score (range=0-11). Seeking a parsimonious measure of HIV-related stigma, we adapted eight items from an established instrument.<sup>31</sup> Participants indicated the degree to which they agreed or disagreed with statements about people with HIV/AIDS (e.g., "Most people are uncomfortable around someone with AIDS"; coded 1=strongly disagree to 4=strongly agree;  $\alpha=0.89$ ). A single item inquired whether participants worried about contracting HIV (coded 0=no; 1=yes). We measured condom use efficacy, or belief in one's ability to successfully use condoms, with a revised version of an established scale.<sup>32</sup> Participants indicated the degree to which they believed they could perform 19 condom-related behaviors (e.g., "Could you stop and look for condoms when you are sexually aroused?"; coded 1=definitely no to 5=definitely yes;  $\alpha=0.95$ ). We assessed sexual compulsivity using a 10-item scale,<sup>33</sup> in which participants reported the frequency of sexual situations (e.g., "I sometimes get so horny I could lose control"; coded 1=never to 4=very frequently;  $\alpha=0.95$ ). Using an eight-item scale,<sup>34</sup> we assessed endorsement of traditional male role attitudes. Participants reported the extent to which they agreed or disagreed with a series of statements (e.g., "A man will lose respect if he talks about his problems"; coded 1=strongly disagree to 4=strongly agree;  $\alpha=0.94$ ). We measured social support using an adaptation of the Index of Sojourner Social Support.<sup>35</sup> Originally an 18-item scale, we used 11 items based on our own confirmatory factor analysis of the instrument. The adapted scale assessed the availability of other people for specific supportive functions (e.g., "Share your good and bad times"; coded 0=no one would do this to 4=many would do this;  $\alpha=0.96$ ). Using six items from the widely used Rosenberg Self-Esteem scale,<sup>36</sup> we assessed self-esteem (e.g., "I feel that I have a number of good qualities"; coded 1=strongly disagree to 4=strongly agree;  $\alpha=0.81$ ). We measured trust in doctors using a six-item scale (e.g., "Doctors are extremely thorough and careful"; coded 1=strongly disagree to 4=strongly agree;  $\alpha=0.99$ ).<sup>37</sup> We measured English use, a proxy for assimilation

into US society, using the five-item subscale from the Short Acculturation Scale for Hispanics (e.g., "What language(s) do you usually speak with your friends"; coded 1 = only Spanish to 5 = only English;  $\alpha = 0.92$ ).<sup>38</sup> In addition, we assessed internalized negative attitudes about gay men and MSM using the Reactions to Homosexuality Scale.<sup>39</sup> Although the items performed well ( $\lambda = 0.76\text{--}0.86$ ), preliminary analysis found a different factor structure in our sample. Thus, we used a subset of items to assess: (1) social comfort about gay men and MSM (6-items; e.g., "Social situations with gay men make me feel uncomfortable";  $\alpha = 0.86$ ); (2) internalized negative stereotypes about gay men (4 items; e.g., "It would be harder in life to be a homosexual man";  $\alpha = 0.82$ ); and (3) personal comfort and acceptance of sexual orientation (five items; e.g., "I am comfortable about people finding out I am gay";  $\alpha = 0.74$ ). All items were coded 1 = strongly disagree to 7 = strongly agree.

Among behavioral variables, we measured the total number of male and female sex partners in the past 3 months, any bisexual behavior, defined as sex with at least one man and one woman in the past year (coded 0 = no; 1 = yes), and current monogamous relationship status (coded 0 = no; 1 = yes). We assessed any previous diagnosis of gonorrhea, chlamydia, syphilis, herpes, hepatitis, or genital warts (six items; coded 0 = no; 1 = yes). We summed responses to arrive at a count of previous bacterial or viral STD diagnoses (range 0–6).

#### Data collection

Data were collected by three native Spanish-speaking male interviewers from March to December 2008. Interviews took 45–90 min to complete. We used face-to-face interviews rather than other methods, such as audio computer-assisted self-interview (ACASI), based on formative data and feedback from CBPR partnership members that suggested that participants were more likely to engage with a well-trained interviewer who could establish rapport and trust. We believed this approach was more culturally congruent, given that some Latinos value *personalismo*, a cultural feature that stresses the importance of warm and friendly interactions and interpersonal engagement.<sup>40</sup> Furthermore, utilizing an interviewer-administered assessment overcame both poor literacy and reduced visual acuity (resulting from lack of access to optical services).

#### Analysis

First, we computed means, proportions, and frequencies to describe the sample and the prevalence of HIV testing. Next, we performed bivariate tests of association using logistic regression with each demographic, psychosocial, and behavioral variable to identify a set of potential correlates of HIV testing. We followed model building procedures suggested by Hosmer and Lemeshow, retaining all variables that had bivariate associations at  $p < 0.25$  for construction of a multiple variable logistic regression model.<sup>41</sup> Because the data were obtained via RDS methods—violating the assumption of independent observations—we accounted for the sampling strategy by computing post-hoc sampling weights for the dependent variable using the RDS Analysis Tool v5.6 (RDS Incorporated, Ithaca NY). These sampling weights allowed us to adjust for participants' different social network sizes (i.e., different numbers of potential recruits) and homophily within recruitment dyads (i.e., the tendency of recruiters to recruit

others similar to themselves), thereby minimizing the bias introduced by the sampling method. Although there is currently no consensus on appropriate regression modeling of RDS data,<sup>42</sup> sampling weights are an increasingly accepted approach.<sup>43–49</sup>

To maximize statistical power, we imputed missing data for potential correlates of HIV testing. Because Classical Test Theory holds that individual scale items measure a common latent variable, we substituted the mean of all non-missing items for missing values. For all other variables, we used SAS PROC MI to generate missing values using Markov Chain Monte Carlo methods, beginning with 500 iterations to establish stable estimates, then taking every 100th estimated data set for a total of ten imputed data sets. To enable multiple imputation of categorical variables, we created indicators for each response level except the referent group. We performed independent analyses for each imputed data set and combined results using SAS PROC MIANALYZE. Because traditional goodness-of-fit statistics are not available in multiple imputation, we used the COMBCHI macro (available at <http://www.ssc.upenn.edu/~allison/#macros>) to combine likelihood ratio chi-square statistics from each imputed data set, allowing us to test the overall null hypothesis that all coefficients equal zero.

Not all participants reported engaging in anal sex. Therefore, we repeated the analyses for the subset of participants who reported any insertive anal intercourse in the past 3 months ( $n = 140$ ), adding an indicator for condom use for insertive anal sex (coded 0 = less than consistent; 1 = consistent). Similarly, for those who reported any receptive anal intercourse in the past 3 months ( $n = 160$ ), we added an indicator for condom use for receptive anal sex (coded 0 = less than consistent; 1 = consistent). We report adjusted odds ratios (aOR) and 95% confidence intervals (95% CI) for final models. All analyses were completed using SAS v9.3 (SAS Institute, Cary NC).

#### Results

One hundred ninety immigrant sexual and gender minority Latinos completed a comprehensive psychosocial and behavioral assessment. Participants' average age was 26 years, and average length of residence in the United States was 10 years. Most participants self-identified as gay (79%), were originally from Mexico (81%), and were currently employed year-round (91%). The majority (69%) had obtained a high school diploma or GED; 13% had less than a high school diploma or GED. A minority of participants (17%) self-identified as transgender. The sample included approximately equivalent proportions that were single (48%) and in a dating relationship (46%). Among dating or partnered/married participants, 38% reported being in monogamous relationships.

#### HIV testing behavior

One hundred thirty participants (68%) had obtained an HIV test in the past year. Among 82 participants who reported a lifetime history of multiple HIV tests, approximately equivalent proportions had one previous HIV test (33%), two previous HIV tests (30%), and three or more previous HIV tests (37%). When asked to select the reason for their most recent HIV test from a closed list of five options, 60% cited "other." Because interviewers followed-up and asked

participants to elaborate, we were able to code the verbatim answers and created three additional categories (out of concern for health; habit of regular tests; persuaded by a friend). As shown on Table 1, half of participants cited concern for their health as the reason they sought their most recent HIV test; 28% said it was at a partner’s request, and 9% said they thought they were at risk from sex. Few participants sought testing in response to partner notification (2%), out of a habit of regular testing (2%), from perceived risk of HIV from needle use (1%), or were persuaded by a friend (1%). Ten participants’ reasons (8%) remained unknown.

We asked participants who had obtained an HIV test the location of their most recent HIV test. Forty-one (31%) failed to provide the information. Among participants with complete data, however, most reported going to a public health department clinic (66%), and few (17%) reported going to a private health care provider (Table 2). Less than 10% reported getting their most recent test at an AIDS service organization (7%), community-based organization (4%), or private hospital (1%).

Among participants who did not receive an HIV test in the past year, the most frequently endorsed reason not to seek an HIV test was fear of a positive test (46%), followed by having had a previous HIV test (36%), concerns that test results might be reported to the government (34%), and concerns that other people might treat the person differently if found to be HIV positive (32%) (Table 3). Few participants endorsed items related to access, such as “I can’t get to the test site” (7%), “I can’t afford it” (5%), or “I don’t know where to get tested” (5%).

*Correlates of HIV testing*

Thirteen demographic, psychosocial, and behavioral variables met our inclusion criterion ( $p < 0.25$ ) in bivariate tests of association and formed the pool of potential correlates of HIV testing. In the multiple variable model, four variables had significant associations with HIV testing (Table 4). Each additional year of age increased odds of HIV testing by 12% (aOR 1.12; 95% CI 1.01, 1.24). Educational attainment was positively associated with HIV testing. Compared to no high school diploma or general equivalency diploma (GED), earning a high school diploma or GED increased odds of HIV testing over seven-fold (aOR 7.78; 95% CI 1.86, 32.51), and some college increased odds of HIV testing 14-fold (aOR 14.31; 95% CI 2.26, 90.65); however, obtaining a four-year college degree had no effect. Each additional previous STD

TABLE 1. REASONS FOR MOST RECENT HIV TEST AMONG PARTICIPANTS WHO OBTAINED AN HIV TEST IN THE PAST YEAR (N= 129)

Reason	n	(%)
Out of concern for health	65	(50)
At partner’s request	36	(28)
I thought I was at risk from sex	11	(9)
Other/reason not specified	10	(8)
In response to partner notification	3	(2)
Habit of regular tests	2	(2)
I thought I was at risk from using needles	1	(1)
Persuaded by a friend	1	(1)
Never got results from last test	0	–

TABLE 2. LOCATION OF MOST RECENT HIV TEST AMONG PARTICIPANTS WHO OBTAINED AN HIV TEST IN THE PAST YEAR (N= 89)

Reason	n	(%)
Public health department	59	(66)
Private healthcare provider	15	(17)
AIDS service organization (ASO)	6	(7)
Community based organization (CBO)	4	(4)
Private hospital	1	(1)
Don’t know /don’t remember	4	(4)

diagnosis increased the odds of HIV testing by 81% (aOR 1.81; 95% CI 1.30, 2.52). Counterintuitively, each incremental increase in HIV stigma increased odds of HIV testing over three fold (aOR 3.51; 95% CI 1.01, 12.21), while each incremental increase in personal comfort with sexual orientation decreased odds of HIV testing by nearly half (aOR 0.54; 95% CI 0.35, 0.84).

*Subgroup analyses*

One hundred forty participants (74% of total sample) reported engaging in insertive anal sex in the past 3 months, of whom 64% reported consistent condom use. Examining the subgroup that reported any insertive anal sex in the past 3 months, four variables were significantly associated with HIV testing in the past year. Similar to the full sample, obtaining a high school diploma or GED increased odds of HIV testing seven-fold (aOR 7.01; 95% CI 1.25, 39.14); however, neither some college nor a four-year college degree had any effect. Each additional previous STD diagnosis doubled the odds of HIV testing (aOR 2.01; 95% CI 1.29, 3.13), and consistent condom use for insertive anal sex increased the odds of HIV testing over six-fold (aOR 6.67; 95% CI 1.65, 29.96). Each one-unit increase in English use score increased the odds of HIV testing three-fold (aOR 3.18; 95% CI 1.08, 10.29).

TABLE 3. REASONS NOT TO TAKE AN HIV TEST AMONG PARTICIPANTS WHO DID NOT OBTAINED AN HIV TEST IN THE PAST YEAR (N= 60)<sup>a</sup>

Reason	n	(%)
I’m afraid I might be HIV positive	27	(46)
I have been tested for HIV	21	(36)
I’m afraid my results might be reported to the government	20	(34)
I’m afraid people might treat me differently	19	(32)
I have been practicing safe sex	16	(27)
I don’t have the time	10	(17)
I know my partners don’t have HIV	7	(12)
I’m afraid people will think I’m gay	6	(10)
I can’t get to test site	4	(7)
I can’t afford it	3	(5)
I don’t know where to get tested	3	(5)
I am not at risk for HIV	2	(3)
It is not important	0	–
My doctor never recommended I get an HIV test	0	–
Other reason	5	(8)

<sup>a</sup>Reasons are not mutually-exclusive (i.e., participants chose all that applied).

TABLE 4. CORRELATES OF HIV TESTING IN THE PAST YEAR

Variable	Full sample (n=190)			IAI subset (n=140)			RAI subset (n=160)		
	aOR	(95% CI)	p	aOR	(95% CI)	p	aOR	(95% CI)	p
Age	1.12	(1.01, 1.24)	0.04	1.07	(0.92, 1.23)	0.38	1.09	(0.96, 1.24)	0.17
Educational attainment									
Less than HS or GED	ref.	–	–	ref.	–	–	ref.	–	–
HS or GED	7.78	(1.86, 32.51)	0.01	7.01	(1.25, 39.14)	0.03	1.04	(0.17, 6.32)	0.97
Some college	14.31	(2.26, 90.65)	<0.01	2.60	(0.31, 21.84)	0.38	1.10	(0.11, 11.48)	0.94
Four year college degree	0.16	(0.01, 4.27)	0.28	>99.99	(<.01, >99.99)	0.56	1.98	(0.00, 1325.56)	0.84
Years in US	1.06	(0.95, 1.19)	0.31	1.07	(0.89, 1.30)	0.47	1.11	(0.98, 1.27)	0.11
Relationship status									
Single	ref.	–	–	ref.	–	–	ref.	–	–
Dating	1.10	(0.46, 2.64)	0.83	1.29	(0.36, 4.62)	0.69	0.80	(0.28, 2.33)	0.69
Partnered/married	1.54	(0.19, 12.59)	0.68	4.58	(0.21, 102.37)	0.34	8.29	(0.38, 183.48)	0.18
HIV stigma	3.51	(1.01, 12.21)	0.05	3.67	(0.64, 21.03)	0.14	5.61	(1.03, 30.75)	0.05
Condom efficacy	1.42	(0.93, 2.16)	0.11	0.18	(0.67, 2.15)	0.55	1.29	(0.71, 2.36)	0.41
Sexual compulsivity	1.06	(0.45, 2.53)	0.89	1.09	(0.28, 4.23)	0.91	0.97	(0.34, 2.79)	0.96
Traditional male role attitudes	1.72	(0.81, 3.64)	0.16	1.28	(0.44, 3.73)	0.65	1.54	(0.58, 4.09)	0.39
English language use	1.37	(0.67, 2.80)	0.38	3.18	(1.08, 10.29)	0.04	1.68	(0.73, 3.90)	0.23
Social comfort with gay men	1.04	(0.69, 1.56)	0.85	0.82	(0.47, 1.45)	0.49	0.91	(0.53, 1.55)	0.72
Internalized negative stereotypes	1.22	(0.89, 1.66)	0.21	1.19	(0.76, 1.88)	0.44	1.56	(0.89, 2.75)	0.12
Personal comfort with sexual orientation	0.54	(.35, .84)	0.01	0.90	(0.49, 1.66)	0.73	0.62	(0.35, 1.08)	0.09
Number of previous STDs	1.81	(1.30, 2.52)	<0.01	2.01	(1.29, 3.13)	<0.01	2.58	(1.51, 4.40)	<0.01
Consistent condom use	–	–	–	6.67	(1.65, 26.96)	<0.01	6.13	(1.96, 19.20)	<0.01

aOR, adjusted odds ratio using post-hoc sampling weights; 95% CI, 95% confidence interval; IAI subset, participants reporting insertive anal intercourse in past 3 months; RAI subset, participants reporting receptive anal intercourse in past 3 months.

One hundred sixty participants (84% of total sample) reported engaging in receptive anal sex in the past 3 months, of whom 63% reported consistent condom use. Examining the subgroup that reported any receptive anal sex, three variables were significantly associated with HIV testing in the past year. Unlike the two previously reported models, educational attainment had no effect on the outcome. Like the full sample, HIV stigma increased the odds of HIV testing (aOR 5.61; 95% CI 1.03, 30.75). Each additional previous STD diagnosis more than doubled the odds of HIV testing (aOR 2.58; 95% CI 1.51, 4.40), and consistent condom use for receptive anal sex increased the odds of HIV testing six-fold (aOR 6.13; 95% CI 1.96, 19.20).

## Discussion

In our sample of young, recently arrived, mostly Mexican, and largely gay-identified Latinos, we found that a majority had received an HIV test in the past year and that nearly half reported multiple HIV tests in their lifetime, indicating that HIV testing is not uncommon. The proportion of participants reporting an HIV test in the past year (68%) appears high but is similar to results reported by other studies of recent HIV testing among Latino men and other minority MSM, which ranged from 19% to 76%.<sup>14,15,21,50–52</sup> Most other studies, however, failed to disaggregate Latino samples by sexual orientation and gender identity or to disaggregate sexual minority samples by race/ethnicity, limiting their relevance to our study population. None of the other studies examined HIV testing among Latinos in nontraditional migration destinations. Thus, our findings augment the available literature by describing HIV testing among a particularly vulnerable subgroup in a setting experiencing concurrent epidemics of

HIV and STDs, where there is little history of Latino immigration, where a bilingual/bicultural infrastructure has yet to be developed, and where culturally and linguistically appropriate services may not be available.

In our sample, 66% of participants who had been tested in the past year reported going to a public health department clinic for their HIV test, suggesting that it is an acceptable venue. There are a number of plausible explanations for this finding. The low utilization of alternative testing sites, such as AIDS service organizations (ASOs) or community-based organizations (CBOs), may reflect the relative scarcity of those organizations in North Carolina compared to other states with long-established ethnic and sexual minority communities (i.e., traditional Latino migration destinations such as California, Florida, or New York where there are also gay Latino enclaves). In addition, North Carolina's ASOs and CBOs may have less capacity to offer bilingual and bicultural services than public health departments, which are required to offer interpretation services by Title VI of the Civil Rights Act of 1964. Alternately, public health departments may resemble the health service organizations that provided care, including HIV testing, in participants' countries of origin. Public health departments may also capitalize on a Latino value of deference to medical authorities, such that peers or other nonmedical staff may not be perceived as qualified to provide HIV testing. Thus, public health departments may be seen as familiar and preferable venues. Finally, the high level of recent HIV testing and use of public health department clinics may reflect efforts during the data collection period to expand testing among Latinos through targeted outreach (e.g., in apartment complexes and trailer home communities with high proportions of Latino residents and through Spanish language media).<sup>53</sup> Of note,

North Carolina's "Get Real, Get Tested" campaign included a Spanish language component and the state promoted HIV testing in conjunction with an annual Latino AIDS awareness day.<sup>54</sup> Unfortunately, it is not possible to determine why the majority of HIV tests took place in public health departments given the data available. Future research is necessary to better understand how immigrant sexual and gender minority Latinos select HIV testing sites.

These findings extend our understanding of the reasons immigrant sexual and gender minority Latinos seek HIV tests. Half of all participants who had obtained a test in the last year cited a concern for their own health. Given that less than 10% cited a perceived risk from sex or needle use, this suggests either a more generalized perception of risk (i.e., gay men are at higher risk for HIV) or the importance of safeguarding one's health. Alternately, the low perceived risk of HIV may reflect a misunderstanding among sexual and gender minority Latinos about the purpose and value of HIV testing. This may be a function of health literacy levels, as low health literacy has been found to contribute to HIV risk, while high health literacy may enable protective behaviors.<sup>55-57</sup> Further research, particularly using qualitative methods, may better elaborate perceptions of risk and motivations to seek an HIV test. Among potential barriers, approximately one-third of those who had not received an HIV test in the past year cited concerns about test results, particularly how information might be disclosed and repercussions of a positive test. To expand HIV testing, these concerns must be addressed.

While these findings are encouraging, the ongoing high incidence of HIV in the Southeast US and threat of undiagnosed HIV infection remain public health concerns. In other words, if HIV testing is a key prevention strategy, there is room for improvement among this particularly vulnerable population. Strategies that may be leveraged to increase HIV testing include ensuring adequate safeguards for undocumented Latinos, providing culturally and linguistically congruent services, and further refining targeted outreach for sexual and gender minority Latinos.

To our knowledge, our multiple variable model constitutes the first attempt to quantify correlates of HIV testing among immigrant sexual and gender minority Latinos in a nontraditional settlement state. Consistent with the literature, we found in the full sample that age and educational attainment were positively associated with HIV testing. We also found that previous STD diagnoses increased odds of HIV testing; however, this finding may reflect routine screening for HIV whenever an STD is diagnosed and treated, a recommended clinical practice.<sup>58</sup> In subgroup analyses, we found that consistent condom use for anal sex was strongly associated with HIV testing, suggesting that protective behaviors may co-occur.

Counterintuitively, we found that greater HIV stigma sometimes increased odds of recent HIV testing and that greater personal acceptance of sexual orientation may be negatively associated with HIV testing. Among possible explanations, we believe that the measure of HIV stigma may have been partially driven by the perceived severity of HIV, which may in turn increase the perceived threat of HIV and motivate testing. As perceived severity and threat were not measured, we are not able to evaluate these constructs. We encourage future research to explore the validity of and relationships among HIV stigma, perceived severity, and per-

ceived threat in this population, as well as formative research to establish the construct validity of measures.

The decreased likelihood of testing associated with greater personal acceptance of sexual orientation is unexpected and counter to other empirical findings for Latinos.<sup>59</sup> We suspect it may reflect an adverse effect of participation in gay male communities. With greater acceptance and support found in such communities, and greater emphasis on the positive aspects of being gay, negatively framed issues such as HIV may not be prioritized. If so, this indicates an important disconnect between documented HIV disparities among racial/ethnic and sexual minorities and the perception of HIV risk among gay Latinos. Alternately, attitudes about HIV may change based on group norms (i.e., that HIV is a manageable chronic disease, or that HIV infection is inevitable). Complacency about HIV and the waning effectiveness of prevention efforts (i.e., prevention fatigue) have been previously identified in gay male enclaves,<sup>60,61</sup> and one study found that beliefs about the efficacy of antiretroviral therapy (ART) treatment were more strongly associated with HIV risk behaviors among racial/ethnic minority MSM.<sup>62</sup> To our knowledge, however, neither misperception of risk nor prevention fatigue has been found in emergent communities such as recently arrived immigrant sexual and gender minority Latinos in the Southeast US. As our interpretation is speculative, additional research is needed to confirm this relationship and contextualize this finding.

Considering our analysis (including the gaps we have identified) and the empirical literature, several research priorities become apparent. First, additional basic research on the determinants of HIV testing among this subgroup of Latinos is needed. In particular, do the correlates of HIV testing identified in other Latino groups, such as sexual behaviors,<sup>21</sup> perceived risk,<sup>63</sup> socioeconomic characteristics,<sup>15</sup> and health care provider recommendation,<sup>51,64</sup> also hold for sexual and gender minority Latinos? Other factors that contribute to Latino HIV disparities, such as the role of health literacy, co-occurring mental health and substance use disorders, and access to healthcare, also warrant investigation.<sup>65</sup> Naturally, such research will depend on development of psychometrically sound, culturally and linguistically congruent measures of key constructs. Second, there is an opportunity for dissemination research and effectiveness trials of existing interventions that may be relevant for our study population. A number of novel interventions to promote HIV testing among heterosexual Latinos have been developed, including ones that target families,<sup>66</sup> take advantage of social marketing techniques,<sup>67</sup> utilize door-to-door outreach,<sup>19</sup> and employ peer educators.<sup>20</sup> Future research may investigate whether these efficacious interventions could be adapted for sexual and gender minority Latinos. In addition, a smaller number of interventions have been developed specifically for this subgroup, employing venue-based outreach and bundling of HIV testing with other medical services.<sup>18,68</sup> As these interventions were tested in traditional settlement states with longstanding Latino communities and more visible gay male communities, it remains unknown if they can be successfully disseminated to states that lack a history of Latino presence. Third, future research on HIV prevention must reflect changing Latino demographics, particularly the growth of Latino populations in nontraditional settlement states. Much of the research on sexual and gender minority Latinos continues to focus on a small number of urban communities in

traditional Latino enclaves (e.g., Los Angeles, Chicago, New York, Miami). Given the vastly different community characteristics and social contexts for Latino immigrants in the Southeast US, the generalizability of previous research findings from established Latino communities to newly emerging communities cannot be assumed.<sup>69</sup>

Several potential limitations must be considered. First, the data were collected in a cross-sectional survey, thereby precluding any causal inferences. Nevertheless, our findings provide valuable information because association is a necessary condition to establish causation. Second, the parent study utilized respondent-driven sampling (RDS), a non-probabilistic sampling method designed to reach otherwise "hidden" populations. RDS methods introduce bias, but by applying post-hoc sampling weights in our regression analyses, we reduced bias associated with the sampling method and arrived at generalizable estimates. Third, the sample size for analysis was modest and may have reduced the statistical power of our regression models. This was particularly apparent in the wide confidence intervals around some point estimates in the subgroup analyses. Recognizing this threat, we imputed all missing data, thus ensuring use all possible information. Larger samples in future research, however, will provide more precise parameter estimates. Fourth, the single item that assessed location of most recent HIV test suffered from 31% non-response. Therefore, our findings should be interpreted cautiously as they might not reflect the true settings of participants' most recent HIV test. In addition, we did not inquire why participants chose one testing site over another. Interventions to promote HIV testing would greatly benefit from such information, which future studies should strive to collect. Finally, our analysis of correlates of HIV testing was atheoretical. Although we followed established quantitative procedures, we recognize that future research that combines behavioral theory with sound analytic methods may produce more informative findings.

In sum, our findings extend the limited literature on HIV testing among immigrant sexual and gender minority Latinos, a vulnerable population at risk for HIV. Identifying a parsimonious set of factors associated with HIV testing may inform the development of more efficacious interventions to increase HIV testing and address the disproportionate burden of HIV among this population, particularly in non-traditional settlement states. This analysis' findings, as well as gaps and limitations, provide an agenda for future research.

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