Published in final edited form as:

AIDS Care. 2016 February ; 28(2): 137–146. doi:10.1080/09540121.2015.1071769.

HIV testing practices among Latina women at risk of getting infected: A five-year follow-up of a community sample in South Florida

Catalina Lopez-Quintero^a, Patria Rojas^b, Frank Dillon^{b,c}, Leah Varga^b, and Mario De La Rosa^{b,+}

Catalina Lopez-Quintero: clopez@msu.edu; Patria Rojas: proja003@fiu.edu; Frank Dillon: fdillon@fiu.edu; Leah Varga: levarga@fiu.edu; Mario De La Rosa: delarosa@fiu.edu

^aDepartment of Epidemiology and Biostatistics, College of Human Medicine, Michigan State University, East Lansing, MI, 49924, USA. Tel +1 517 353 8623X100, Fax +1 517 432 1000

^bCenter for Research on US Latinos HIV/AIDS and Drug Abuse, Florida International University, 11200 SW, 8th Street, Miami, FL 33199, USA. Tel +1 305 348 7352, Fax +1 305 348 7405

^cDepartment of Education and Counseling Psychology, State University of New York at Albany, 1400 Washington Avenue, Albany, NY, 12222, USA. Tel. +1 518 442 5047, Fax +1 518 442 4952

Abstract

Latinos are more likely to delay HIV testing, present to care with an AIDS defining illness, and die within one year of learning their HIV-positive status than non-Latino blacks and whites. For this paper, we explore the role of partner-relationship characteristics and health behaviors, in predicting HIV testing among Latina adult women who engaged in risky sexual behaviors (i.e., unprotected vaginal and/or anal sex). Data from a convenience sample of 168 Latina adult women who engaged in risky sexual behavior in the year prior to assessment were analyzed for this paper. Rates and predictors of HIV testing among this sample were assessed after a five year follow-up. Descriptive and analytical estimates include incidence rates and adjusted odds ratios (AOR) from multilevel models. At five-year follow-up, 63.7% (n=107) women reported having been tested for HIV, of whom 12.2% (n=13) were women who never tested before. Main reasons for not having been tested at follow-up included: low risk perception (62.1%) and trusting their partner(s)/being in a monogamous relationship/knowning their partner's HIV status (17.2%). Predictors of HIV testing included: age (AOR: 0.96; 95% C.I.=0.92–0.99), provider endorsement of HIV testing (AOR: 4.59; 95% C.I.=1.77–11.95), poor quality of their romantic relationships (AOR: 1.12; 95% C.I.=1.03–1.26) and knowing the HIV sero-status of sexual partner (AOR: 4.35; 95% C.I.=1.79–10.54). This study characterizes a group of Latina women at high risk for HIV infection and their HIV testing behaviors. Our findings underscore the need of increasing access to quality health care services and HIV behavioral interventions, and to strengthen the adherence to HIV/STD testing recommendations and guidelines among local health care providers serving the Latino community in South Florida.

⁺Correspondence: Mario De La Rosa, Center for Research on US Latinos HIV/AIDS and Drug Abuse, Florida International University, 11200 SW, 8th Street, Miami, FL 33199, USA, Tel +1 305 348 7352, Fax +1 305 348 7405, delarosa@fiu.edu.

Disclosure of Conflict of Interest

The authors declare that they have no conflicts of interest.

Keywords

Hispanic/Latina women; HIV testing; sexual risk behavior; sexual transmitted infections

INTRODUCTION

Latinos are more likely than non-Latino blacks and whites to delay HIV testing, present to care with an AIDS defining illness, and die within one year of learning their HIV diagnosis (Dennis et al., 2011; Poon et al., 2013; Trepka et al., 2014). Public health strategies promoting HIV testing and early entry into treatment, such as those designed by the CDC and other scientific organizations (Branson et al., 2006; Qaseem et al., 2009; Lubinski et al., 2009; American College of Obstetricians and Gynecologists; 2008; Committee on Pediatric AIDS, 2011; Moyer, 2013) would greatly benefit the Latino population in the US. The benefits derived from early diagnosis would be even more consequential in metropolitan areas, like Miami where HIV prevalence rates among all adults and adolescents males (1,034.0per 100,000) and females (613.0per 100,000) exceed those observed nationally (males: 526per 100,000, and females: 167.5per 100,000), or in any other metropolitan area in the US (CDC, 2013a). In addition, the rate of heterosexual transmission among women living with HIV is higher for Latina women in Florida than women in the U.S. (85% vs. 71%) (Florida Department of Health, 2013a). While the burden of HIV among women in Florida is higher for Black and Latina women than among White women, from 2003 to 2012, the proportion of HIV cases has decreased by 4% among black women and increased by 15% among Latina women (Florida Department of Health, 2013b).

Previous studies on HIV among Latinos have found numerous barriers to HIV testing practices and future testing intentions, including: country of origin, low educational attainment, poor English proficiency, male sex, not knowing someone with HIV, being an MSM uncomfortable with sexual orientation, being uninsured, not having a regular source of care, poor HIV knowledge, low perceived risk and fear of stigma and the social (e.g. victimization) and legal consequences (e.g. deportation) associated with testing and diagnosis (Craig et al., 2012; Fernandez et al., 2003; Fernandez et al., 2005; Gilbert & Rhodes, 2013; Glasman et al., 2010; Jenness et al., 2009; Lopez-Quintero, et al., 2005; Montealegre et al., 2012; Morales-Aleman & Sutton, 2014; Seña et al., 2010; Solorio et al., 2013; Wohl et al., 2009).

Considering existing literature reviewed above and the increasing burden that HIV poses to heterosexual Latina women in Florida, our study of HIV testing among at-risk Latino women seeks to expand the existent knowledge on HIV testing by: 1) studying the role of HIV testing factors previously identified (e.g., age, access to health care) together with other partner-relationship characteristics (e.g. quality of the current romantic relationship) and behavioral and psycho-social factors (e.g., alcohol or drugs intoxication before/during sex) that have not been explored; 2) focusing on a highly vulnerable and understudied population of minority women at risk of getting infected, and 3) using a longitudinal design, as most of the factors associated with HIV testing have been identified in cross-sectional studies.

Methods

Study sample

As part of the “Longitudinal Study of Drug Abuse & HIV Risk Among Latina Mother-daughter Dyads”, a convenience sample (n=320 women) of adult Latina mother and daughter dyads (18+ years old) living in Miami-Dade County, Florida was recruited via the snowball sampling (chain referral) method between 2005 and 2007. The study purposely attempted to recruit substance using and non-using participants to ensure adequate range of variability in alcohol/drug use practices. Five years later, between 2010 and 2011, 299 of the women who participated at baseline were re-interviewed (attrition rate=7%). A detailed description of the study methods, sample selection criteria, and sampling methods is provided elsewhere (De La Rosa et al, 2010; De La Rosa et al, 2014).

For this paper, we analyzed data from a subsample of 168 women who 1) engaged in unsafe sex (anal or vaginal sex without condom at least once in the 12 months prior to baseline assessment), 2) self-reported negative HIV serostatus at baseline, 3) participated in both waves of data collection, and 4) were sexually active over the follow-up period. We tested for patterns of missing data in our sample. From the original sample who met the first two criteria (n=191), 23 women did not participate in the follow-up or did not provide information regarding their HIV testing practices between baseline and follow up. No differences were found between these 191 women the 168 women included in this study ($p = 0.05$). The main causes of attrition included: death, hospitalization, or refusals.

Data collection

Study participants were administered a face-to-face structured standardized questionnaire. At follow-up, data were collected using the Computer Assisted Personal Interview software (CAPI). Consent forms and questionnaires were available in English and Spanish. Interviews lasted approximately 1 to 1.5 hours to complete and participants received a \$40.00 and \$50.00 stipend at each interview, respectively. Interviews took place at locations convenient to participants (e.g. participants' homes or in public places). Trained bilingual female interviewers were hired to complete the interviews, which helped mitigate reading and literacy barriers. The study protocol was approved by, and conducted in compliance with, the institutional review board at a large southeastern university.

Study variables

HIV-testing was assessed by using a binary item indicating whether the participant reported having had an HIV test prior to the interview or since the baseline interview. Reasons for not having been tested for HIV were assessed with an open-ended question and recoded in six categories for analytical purposes. We included in the models covariates previously identified as predictors of HIV testing and covariates of interest that never have been explored. Detailed operational definitions of the covariates are provided in Appendix 1.

Socio-demographic variables included: age (in years), education attained (1=less than high school, 2=high school diploma or equivalent, 3= post high school training, but not a bachelor degree, 4=bachelor degree or more education), and proportion of years living in the

US (1=less of one-third of their lives; 2=more than one-third of their lives, but less than two-thirds, 3= more than two-thirds of their lives, 4=US born).

Health related characteristics and behaviors included: health insurance coverage during baseline and follow-up (1=Yes, 2=No), having a regular source of health care at baseline (1=community health center, 2=emergency room, 3=hospital, 4=private doctor, 5=not a regular source of care), provider endorsement of HIV testing (yes/no), any sexually transmitted disease(STD) diagnosis in the 12 months before baseline or during follow-up (1=Yes, have/had an STD; 2=No, never diagnosed with an STD), and level of alcohol or drugs intoxication before/during sex (1. Strongly/somewhat intoxicated, 2=not at all/never used).

Partner-relationship characteristics included: living with sexual partner (yes/no), quality of current/last romantic relationship (a continuous composite scale of eight items based on one of the five dimensions of the Chronic Stress Scale (Turner, 2011), that reflects stress level and satisfaction in the current or last romantic relationship, Cronbach's alpha=0.91, higher scale scores indicate higher stress and less satisfaction), number of sexual partners over the past 12 months, and known HIV status of partner.

Data analytic plan

Descriptive statistics were used to characterize the sample. Summary statistics were compiled for all variables in terms of proportions for categorical variables and means, medians, standard deviations (SD) and ranges for continuous variables. Statistical differences in the baseline and follow-up characteristics of the study sample were tested using chi-square test or t-test when appropriate. We used a random effects multilevel logistic regression model to account for the clustering effects given the structure of the data and to examine the role of partner-relationship characteristics and health behaviors, in predicting HIV testing among Latina adult women who engaged in risky sexual behaviors over time. Specifically, we used PROC GLIMMIX in SAS 9.3 (SAS Institute Inc., 2011) and ran three models. First, we fit a three-level null model with time point as level 1, individual as level 2 and dyad at level 3 ($-2 \ln - \text{Likelihood}$: 397.68, AIC: 403.68, BIC: 412.07); second, we examined the association between each covariate and HIV testing in three-level bivariate models, and third we ran a three-level multivariable model that included variables with a significance level of 0.2 at the bivariate analyses. Associations are expressed in crude and adjusted Odds Ratios (OR) and their 95% confidence intervals. Variance Inflation Factors (VIF) were estimated to assess for multicollinearity, predictors with a VIF greater than 2.5 were excluded from the models. Analyses were performed using STATA 13.1 software (STATA Institute Inc., 2013) and SAS 9.3. (SAS Institute Inc., 2011).

Results

Characteristics of the sample

At baseline the sample was composed of 141 women who engaged in unprotected vaginal sex, 2 women who engaged in unprotected anal sex, and 25 women who engaged in both unprotected vaginal and anal sex. As shown in Table 1, the mean and median age of the

sample at baseline were 36.1 and 36 years old, respectively, (range 13 to 63 years old). At baseline, less than one third reported having completed less than high school (27.4%). The majority (64.3%) of participants were foreign-born, and among them, half (32.7%) have resided in the US less than one-third of their lives. Approximately half (53.6%) reported having health insurance coverage. More than half (54.2%) of the sample indicated that a doctor had talked with them about HIV prevention and safer sex. About one in ten (9.7%) reported having been told by a doctor or other health care provider that they had an STD 12 months before baseline. Other characteristics at baseline and follow-up are presented in Table 1.

HIV testing

About three-quarters (75.0%) reported ever having been tested for HIV at baseline. At five-year follow-up, 63.7% (n=107) of the women reported being tested for HIV, 12.2% (n=13) were women who never tested before. Reasons for not having been tested at follow-up included: not at risk/not need to be tested (62.1%), trust partner/in a monogamous relationship/partner's status known (17.2%), don't know where to go/issue with health insurance (5.2%), doctor never mention it/test was never offered (3.4%), always use condoms (3.4%) and other reasons, such as don't know if test needed or don't know if tested in blood bank (8.6%) (Figure 1).

Predictors of HIV testing

Results of the three-level logistic regression model indicate that the likelihood of undergoing HIV testing decreased as age increased (AOR: 0.96; 95% C.I.=0.92–0.99) (Table 2). Women who reported that their doctor had talked with them about HIV prevention and safer sex were more likely to having being tested for HIV (AOR: 4.59; 95% C.I.=1.77–11.95). As the quality (stress level and satisfaction) of the current or last romantic relationship decreased the likelihood of getting tested increased (AOR: 1.12; 95% C.I.=1.03–1.26), and knowing the HIV status of the sexual increased the likelihood of getting HIV tested (AOR: 4.35; 95% C.I.=1.79–10.54).

Discussion

This analysis of HIV testing behaviors among Latina women who engaged in unprotected sex indicates that the majority have been tested for HIV. The analyses also identified predictors of HIV testing including: age, provider endorsement of HIV testing, quality of the romantic relationship and known HIV status of partner. Interestingly, having health insurance, access to a regular source of care or a diagnosis of an STD did not increase the likelihood of getting tested.

Age predicted HIV testing, with the likelihood of getting tested for HIV decreasing as age increases. Low rates of testing and barriers to HIV testing in older women were previously documented in the baseline sample (Craig et al, 2012) and in other studies among Latina women in Miami (Cianelli et al, 2013). Specifically in Florida, newly reported HIV cases in adults 50 year old or older increased by 58% between 2003 (18.6% of total) and 2012 (29.7% of total) (Florida Department of Health, 2013c). The importance of HIV testing

among sexually active older women increases due to the interplay of biological, socio-cultural and structural factors that increase their risk for HIV infection and disease progression. Biological factors include age-related vaginal thinning and dryness that cause tears in the vaginal mucosae and immunosenescence (Grabar et al., 2004; Imai et al., 2013; Pratt et al., 2010; Simone & Appelbaum, 2008; Yung & Mo, 2003). In addition, these biological liabilities are potentiated by socio-cultural and structural factors such as: poor risk perception and knowledge of HIV transmission, less condom use, poor assessment of sexual life and risky sexual behaviors among women over 50 years old by health care providers (Lindau et al. 2007), few prevention campaigns for older Latinas, sex tourism, and new medications and devices to extend sexual life. Low HIV testing and poor risk awareness in the population 50 years old and older has resulted in late diagnoses and entry into treatment (Inungu et al., 2001).

In accordance with the results of the baseline data (Craig et al., 2012) and previous studies among Latino (Fernández et al., 2003; Fernández et al., 2005) and other minority groups (Petroll, et al., 2009), Latina women in this sample were found to be more likely to undergo HIV testing if endorsed by a care provider, regardless of their health insurance coverage or access to a regular source of care. General compliance with medical advice in regards to HIV testing has been shown to be common among adults of most races and ethnicities (Takahashi et al., 2005) and at different levels of risk (Hudson et al., 2012). However, despite high rates of compliance with the medical advice, still, a large proportion of health care providers need to improve their adherence to the 2006 CDC guidelines of universal HIV testing, and overcome attitudinal barriers (e.g., perception that the patient would be uncomfortable, offended or refuse HIV testing) or structural barriers (e.g., competing clinical priorities, concerns about reimbursement, or language barriers) (Zheng, et al., 2014; Arya et al., 2014). The increased access to preventive services for women proposed in the Affordable Care Act, and in particular the recommendation of annual counseling and screening for HIV for all sexually active women (Institute of medicine, 2011), would positively affect Latina women, who historically have been less likely than women in other population groups to receive regular care and preventive services (Corbie-Smith et al, 2002; Fiscella et al, 2002).

An STD diagnosis 12 months before assessment or at follow-up period did not predict HIV testing. Specifically, the 2006 Revised recommendations for HIV testing of adults, adolescents, and pregnant women in health-care settings (Branson et al, 2006) and the 2010 Sexually Transmitted Diseases Treatment Guidelines (Workowski et al., 2010) recommend that patients seeking treatment for STDs or with biological specimens and/or clinical evidence of an STD should be screened routinely for HIV regardless of whether the patient is known or suspected of engaging in HIV risky behaviors. Well-established evidence from retrospective studies and clinical trials have proved that a history of an STD increases the risk of subsequent HIV infection by more than three times (Cohen et al., 1997; Kaul et al., 2004; Newbern et al., 2013) and STD/HIV co-infection increases HIV transmissibility and progression to AIDS (Chun et al., 2013). The findings are highly relevant for this population in Florida, where the rates of syphilis in males and females (7.2/100,000 vs. 5.0/100,000) and gonorrhea in men (106.1/100,000 vs. 105.8/100,000) exceed the national estimates (Centers for Disease Control and Prevention, 2013b), and underscore the need of strengthen

the adherence to these recommendation and guidelines among local health care providers serving the Latino community.

Partner-relationship characteristics such as quality of the romantic relationship and awareness of the HIV sero-status of the current or last sexual partner also predicted HIV testing. Specifically, as the quality of the romantic relationship decreased the likelihood of getting tested for HIV increased. Quality of a romantic relationship has been previously linked to condom use, contraceptive use and notification of STD's (Fortenberry et al., 2002; Katz et al., 2000; Manlove et al., 2007), but never before, to our knowledge, to HIV testing. The finding that Latina women who reported being in a stressful and unsatisfying relationship were more likely to get tested for HIV within the next five years is a positive finding, however, a better understanding of the reasons motivating these testing behaviors should be further explored.

Findings from this study should be interpreted in light of several limitations. First, the sample selected purposively included a group of women who engage in high risky behaviors, such as heavy substance use. Given the strong association between substance use and sexual risky behaviors, our results might tend to overestimate the prevalence of sexual transmitted diseases and the proportion of risky sexual behaviors in which Latina women generally engage. A second limitation is the self-report of non-normative behavior such as unprotected vaginal and anal sex, which is commonly prone to social desirability and reporting bias. In this regard, the research staff received training on strategies to gain participants trust and rapport, minimize inconsistencies in participants' responses, and address culturally sensitive issues properly. A third limitation is the lack on data regarding the frequency of testing overtime and data on other time-varying covariates that could have influenced HIV testing in a five year period. Lastly, the selected sample reflects the composition of Latinas in Miami-Dade County; therefore the findings are not generalizable to the entire U.S. Latina population.

The findings of this longitudinal study describes the HIV testing behaviors and its predictors among a group of Latina women at high risk of getting infected for HIV. We analyzed and confirmed the role behavioral, psycho-social and structural factors play in HIV testing while exploring partner-relationship characteristics that had never been examined in this population. HIV testing services might be more cost-effective if focused on older Latina women who have not received advice to get tested form their health care providers, and who ignore the HIV sero-status of their sexual partners; particularly because these women might not perceive themselves to be at risk of acquiring HIV (Lekas et al., 2005). The findings underscore the need of increasing access to quality health care services among Latina women in general, and HIV preventive behavioral interventions in particular. At the same time, the findings indicate that additional efforts are needed to strengthen the adherence to HIV/STD testing recommendations and guidelines among local health care providers serving the Latino population in South Florida.

Acknowledgments

This work was supported by the National Center on Minority Health and Health Disparities under Grant P20MD002288; and National Institute on Drug Abuse under Grant R24DA014260; and by the National Institute of Nursing Research under Grant R01NR012150.

References

- American College of Obstetricians and Gynecologists (ACOG). ACOG committee opinion. Routine human immunodeficiency virus screening. *Obstetrics and Gynecology*. 2008; 112(2 Pt 1):401–403. [PubMed: 18669743]
- Arya M, Patel S, Kumar D, Zheng MY, Amspoker AB, Kallen MA, Street RL Jr, Viswanath K, Giordano TP. Why Physicians Don't Ask Interpersonal and Intrapersonal Barriers to HIV Testing—Making a Case for a Patient-Initiated Campaign. *Journal of the International Association of Providers of AIDS Care (JIAPAC)*. 2014 2325957414557268.
- Branson BM, Handsfield HH, Lampe MA, Janssen RS, Taylor AW, Lyss SB, Clark JE. Centers for Disease Control and Prevention (CDC). Revised recommendations for HIV testing of adults, adolescents, and pregnant women in health-care settings. *MMWR. Recommendations and Reports: Morbidity and Mortality Weekly Report Recommendations and Reports/Centers for Disease Control*. 2006; 55(RR-14):1–17. quiz CE1–4. [PubMed: 16988643]
- Centers for Disease Control and Prevention. HIV surveillance supplemental report No. 18(8). 2013a. Centers for Disease Control and Prevention. Diagnosed HIV infection among adults and adolescents in metropolitan statistical areas—United States and Puerto Rico, 2011.
- Centers for Disease Control and Prevention. Sexually Transmitted Disease Surveillance 2012. Atlanta: U.S. Department of Health and Human Services; 2013b. 2013
- Chun HM, Carpenter RJ, Macalino GE, Crum-Cianflone NF. The role of sexually transmitted infections in HIV-1 progression: A comprehensive review of the literature. *Journal of Sexually Transmitted Diseases*. 2013; 2013
- Cianelli R, Villegas N, Lawson S, Ferrer L, Kaelber L, Peragallo N, Yaya A. Unique factors that place older Hispanic women at risk for HIV: Intimate partner violence, machismo, and marianismo. *Journal of the Association of Nurses in AIDS Care*. 2013; 24(4):341–354. [PubMed: 23790277]
- Cohen MS, Hoffman IF, Royce RA, Kazembe P, Dyer JR, Daly CC, Zimba D, Vernazza PL, Maida M, Fiscus SA, Eron JJ Jr. Reduction of concentration of HIV-1 in semen after treatment of urethritis: Implications for prevention of sexual transmission of HIV-1. *The Lancet*. 1997; 349(9069):1868–1873.
- Emmanuel PJ, Martinez J. Committee on Pediatric AIDS. Adolescents and HIV infection: The pediatrician's role in promoting routine testing. *Pediatrics*. 2011; 128(5):1023–1029. [PubMed: 22042816]
- Corbie-Smith G, Flagg EW, Doyle JP, O'Brien MA. Influence of usual source of care on differences by race/ethnicity in receipt of preventive services. *Journal of General Internal Medicine*. 2002; 17(6):458–464. [PubMed: 12133161]
- Craig SL, Beaulaurier RL, Newman FL, De La Rosa M, Brennan DJ. Health and cultural determinants of voluntary HIV testing and counseling among middle-aged and older Latina women. *Journal of Women & Aging*. 2012; 24(2):97–112. [PubMed: 22486474]
- De La Rosa M, Dillon FR, Ganapati NE, Rojas P, Pinto E, Prado G. Mother-daughter attachment and drug abuse among Latinas in the United States. *Journal of Drug Issues*. 2010; 40(2):379–404.
- De La Rosa M, Huang H, Rojas P, Dillon FR, Lopez-Quintero C, Li T, Ravelo G. Influence of mother-daughter attachment on daily alcohol use: A longitudinal study of a Latina community based sample. *Journal of Studies on Alcohol and Drugs*. 2015; 76(2):307–316. [PubMed: 25785806]
- Dennis AM, Napravnik S, Sena AC, Eron JJ. Late entry to HIV care among Latinos compared with non-Latinos in a Southeastern US cohort. *Clinical Infectious Diseases: An Official Publication of the Infectious Diseases Society of America*. 2011; 53(5):480–487. [PubMed: 21844031]
- Fernández MI, Bowen GS, Perrino T, Royal S, Mattson T, Arheart KL, Cohn S. Promoting HIV testing among never-tested Hispanic men: A doctor's recommendation may suffice. *AIDS and Behavior*. 2003; 7(3):253–262. [PubMed: 14586188]

- Fernández MI, Collazo JB, Bowen GS, Varga LM, Hernandez N, Perrino T. Predictors of HIV testing and intention to test among Hispanic farmworkers in South Florida. *The Journal of Rural Health*. 2005; 21(1):56–64. [PubMed: 15667010]
- Fiscella K, Franks P, Doescher MP, Saver BG. Disparities in health care by race, ethnicity, and language among the insured: Findings from a national sample. *Medical Care*. 2002; 40(1):52–59. [PubMed: 11748426]
- Florida Department of Health. Epidemiology of HIV among Hispanics Reported in Florida, Through 2012. HIV/AIDS and Hepatitis Section Division of Disease Control and Health Protection. 2013a. Retrieved from: http://www.floridahealth.gov/diseases-and-conditions/aids/surveillance/_documents/HIV-AIDS-slide%20sets/Hispanics_2012.pdf
- Florida Department of Health. Epidemiology of HIV among Women in Florida, Reported through 2012. HIV/AIDS and Hepatitis Section Division of Disease Control and Health Protection. 2013b. Retrieved from: http://www.floridahealth.gov/diseases-and-conditions/aids/surveillance/_documents/HIV-AIDS-slide%20sets/Women_2012.pdf
- Florida Department of Health. Epidemiology of HIV among Persons Aged 50 and Older Reported in Florida, Through 2012. HIV/AIDS and Hepatitis Section Division of Disease Control and Health Protection. 2013c. Retrieved from: http://www.floridahealth.gov/diseases-and-conditions/aids/surveillance/_documents/HIV-AIDS-slide%20sets/50plus_20122.pdf
- Fortenberry JD, Brizendine EJ, Katz BP, Orr DP. The role of self-efficacy and relationship quality in partner notification by adolescents with sexually transmitted infections. *Archives of Pediatrics & Adolescent Medicine*. 2002; 156(11):1133–1137. [PubMed: 12413343]
- Gilbert PA, Rhodes SD. HIV testing among immigrant sexual and gender minority Latinos in a US region with little historical Latino presence. *AIDS Patient Care and STDs*. 2013; 27(11):628–636. [PubMed: 24138487]
- Glasman LR, Weinhardt LS, DiFranceisco W, Hackl KL. Intentions to seek and accept an HIV test among men of mexican descent in the midwestern USA. *AIDS Care*. 2010; 22(6):718–728. [PubMed: 20467940]
- Grabar S, Kousignian I, Sobel A, Le Bras P, Gasnault J, Enel P, Jung C, Mahamat A, Lang JM, Costagliola D. Immunologic and clinical responses to highly active antiretroviral therapy over 50 years of age. Results from the French hospital database on HIV. *Aids*. 2004; 18(15):2029–2038. [PubMed: 15577624]
- Hudson AL, Heilemann MV, Rodriguez M. Missed Opportunities for universal HIV screening in primary care clinics. *Journal of clinical medicine research*. 2012; 4(4):242. [PubMed: 22870171]
- Imai K, Sutton MY, Mdodo R, del Rio C. HIV and menopause: A systematic review of the effects of HIV infection on age at menopause and the effects of menopause on response to antiretroviral therapy. *Obstetrics and Gynecology International*. 2013; 2013
- Inungu J, Mokotoff E, Kent J. Characteristics of HIV infection in patients fifty years or older in Michigan. *AIDS Patient Care and STDs*. 2001; 15:567–573. [PubMed: 11788066]
- Institute of Medicine (US). Committee on Preventive Services for Women, & Board on Population Health and Public Health Practice. *Clinical preventive services for women: Closing the gaps*. National Academies Press; 2011.
- Jenness SM, Murrill CS, Liu KL, Wendel T, Begier E, Hagan H. Missed opportunities for HIV testing among high-risk heterosexuals. *Sexually Transmitted Diseases*. 2009; 36(11):704–710. [PubMed: 19652632]
- Katz BP, Fortenberry JD, Zimet GD, Blythe MJ, Orr DP. Partner-specific relationship characteristics and condom use among young people with sexually transmitted diseases. *Journal of Sex Research*. 2000; 37(1):69–75.
- Kaul R, Kimani J, Nagelkerke NJ, Fonck K, Ngugi EN, Keli F, MacDonald KS, Maclean IW, Bwayo JJ, Temmerman M, Ronald AR, Moses S. Kibera HIV Study Group. Monthly antibiotic chemoprophylaxis and incidence of sexually transmitted infections and HIV-1 infection in Kenyan sex workers: A randomized controlled trial. *Jama*. 2004; 291(21):2555–2562. [PubMed: 15173146]
- Lekas HM, Schrimshaw E, Siegel K. Pathways to HIV testing among adults aged fifty and older with HIV/AIDS. *AIDS Care*. 2005; 17(6):674–687. [PubMed: 16036254]

- Lindau ST, Schumm LP, Laumann EO, Levinson W, O'Muircheartaigh CA, Waite LJ. A study of sexuality and health among older adults in the United States. *New England Journal of Medicine*. 2007; 357(8):762–774. [PubMed: 17715410]
- Lopez-Quintero C, Shtarkshall R, Neumark YD. Barriers to HIV-testing among Hispanics in the United States: Analysis of the national health interview survey, 2000. *AIDS Patient Care & STDs*. 2005; 19(10):672–683. [PubMed: 16232051]
- Lubinski C, Aberg J, Bardeguez AD, Elion R, Emmanuel P, Kuritzkes D, Saag M, Squires KE, Weddle A, Rainey J, Zerehi MR, Ralston JF, Fleming DA, Bronson D, Cooke M, Cutler C, Ejnes Y, Gluckman R, Liebow M, Musana K, Mayer ME, Purtle MW, Reynolds PP, Viswanathan L, Weiss KB, Yehia B. HIV policy: The path forward--a joint position paper of the HIV Medicine Association of the Infectious Diseases Society of America and the American College of Physicians. *Clinical Infectious Diseases: An Official Publication of the Infectious Diseases Society of America*. 2009; 48(10):1335–1344. [PubMed: 19385087]
- Manlove J, Ryan S, Franzetta K. Contraceptive use patterns across teens' sexual relationships: The role of relationships, partners, and sexual histories. *Demography*. 2007; 44(3):603–621. [PubMed: 17913013]
- Montealegre JR, Risser JM, Selwyn BJ, Sabin K, McCurdy SA. HIV testing behaviors among undocumented Central American immigrant women in Houston, Texas. *Journal of Immigrant and Minority Health*. 2012; 14(1):116–123. [PubMed: 21964937]
- Morales-Aleman MM, Sutton MY. Hispanics/Latinos and the HIV continuum of care in the Southern USA: a qualitative review of the literature, 2002–2013. *AIDS Care*. 2014; 16:1–13.
- Moyer VA. Screening for HIV: US preventive services task force recommendation statement. *Annals of Internal Medicine*. 2013; 159(1):51–60. [PubMed: 23698354]
- Newbern EC, Anschuetz GL, Eberhart MG, Salmon ME, Brady KA, De Los Reyes A, Baker JM, Asbel LE, Johnson CC, Schwarz DF. Adolescent sexually transmitted infections and risk for subsequent HIV. *American Journal of Public Health*. 2013; 103(10):1874–1881. [PubMed: 23947325]
- Petroll AE, DiFranceisco W, McAuliffe TL, Seal DW, Kelly JA, Pinkerton SD. HIV testing rates, testing locations, and healthcare utilization among urban African-American men. *Journal of Urban health*. 2009; 86(1):119–131. [PubMed: 19067176]
- Poon KK, Dang BN, Davila JA, Hartman C, Giordano TP. Treatment outcomes in undocumented Hispanic immigrants with HIV infection. *PloS One*. 2013; 8(3):e60022. [PubMed: 23555868]
- Pratt G, Gascoyne K, Cunningham K, Tunbridge A. Human immunodeficiency virus (HIV) in older people. *Age and Ageing*. 2010; 39(3):289–294. [PubMed: 20190230]
- Qaseem A, Snow V, Shekelle P, Hopkins R, Owens DK. Clinical Efficacy Assessment Subcommittee of the American College of Physicians. Screening for HIV in health care settings: A guidance statement from the American college of physicians and HIV medicine association. *Annals of Internal Medicine*. 2009; 150(2):125–131. [PubMed: 19047022]
- Seña AC, Hammer JP, Wilson K, Zeveloff A, Gamble J. Feasibility and acceptability of door-to-door rapid HIV testing among Latino immigrants and their HIV risk factors in North Carolina. *AIDS Patient Care and STDs*. 2010; 24(3):165–173. [PubMed: 20214484]
- Simone MJ, Appelbaum J. HIV in older adults. *Geriatrics*. 2008; 63(12):6–12. [PubMed: 19061274]
- Solorio R, Forehand M, Simoni J. Attitudes towards and beliefs about HIV testing among Latino immigrant MSM: A comparison of testers and non-testers. *AIDS Research and Treatment*. 2013; 2013
- Takahashi TA, Johnson KM, Bradley KA. A population-based study of HIV testing practices and perceptions in 4 U.S. States. *Journal of General Internal Medicine*. 2005; 20(7):618–622. [PubMed: 16050856]
- Trepka MJ, Fennie KP, Sheehan DM, Lutfi K, Maddox L, Lieb S. Late HIV diagnosis: Differences by Rural/Urban residence, Florida, 2007–2011. *AIDS Patient Care and STDs*. 2014; 28(4):188–197. [PubMed: 24660767]
- Turner, J. Drug Use Trajectories: Ethnic/Racial Comparisons, 1998–2002, United-States. Ann Arbor, MI: Inter-university Consortium for Political and Social Research; 2011. ICPSR30862-v1 Retrieved from <http://doi.org/10.3886/ICPSR30862.v1>

- Wohl AR, Tejero J, Frye DM. Factors associated with late HIV testing for Latinos diagnosed with AIDS in Los Angeles. *AIDS Care*. 2009; 21(9):1203–1210. [PubMed: 20024781]
- Workowski, KA.; Berman, SM. Centers for Disease Control and Prevention (CDC). Sexually transmitted diseases treatment guidelines, 2010. Department of Health and Human Services, Centers for Disease Control and Prevention; 2010.
- Yung RL, Mo R. Aging is associated with increased human T cell CC chemokine receptor gene expression. *Journal of Interferon & Cytokine Research*. 2003; 23(10):575–582. [PubMed: 14585197]
- Zheng MY, Suneja A, Chou AL, Arya M. Physician barriers to successful implementation of US Preventive Services Task Force routine HIV testing recommendations. *Journal of the International Association of Providers of AIDS Care (JIAPAC)*. 2014; 13(3):200–205. [PubMed: 24442739]

Appendix 1. Description of the covariates

Type of covariate	Item (including number and recoded categories)
Socio-demographic variables	
Age	Date of birth Categories/scale: continuous, age
Education attained	What was the last grade you completed in school? Categories/scale: 1=less than high school, 2=high school diploma or equivalent, 3= post high school training, but not a bachelor degree, 4=bachelor degree or more education
Proportion of years living in the US	Number of months living in the US Categories/scale: a continuous scale further recoded as 1=less of one-third of their lives; 2=more than one-third of their lives, but less than two-thirds, 3= more than two-thirds of their lives, 4=US born
Health related characteristics and behaviors	
Health insurance coverage	“Do you have health insurance right now?” Categories/scale: 1=yes, 2=no
Regular source of health at baseline	“What type of healthcare facility you use as a regular source of healthcare” Categories/scale: 1=community health center, 2=emergency room, 3=hospital, 4=private doctor, 5=does not have a regular doctor
Provider endorsement of HIV testing	“Has your doctor or any health professional spoken to you about HIV prevention or safe sex, in the last 12 months?”, Categories/scale: 1=yes, 2=no
Any sexually transmitted disease – STD in the 12 months before baseline and during follow-up period	Disease specific dichotomous items at baseline and 8 disease specific dichotomous items at follow-up: “Have you been told by a doctor or other health professional that you had (gonorrhea, syphilis, genital herpes, chlamydia, genital warts, hepatitis, vaginitis/thichomoniasis, pelvic inflammatory disease)?”, and at follow-up “As I read each STD in the list, tell me if since the last interview you have been told by a doctor or other health professional that you had (gonorrhea, syphilis, herpes, chlamydia, genital warts, hepatitis, vaginitis/thichomoniasis, pelvic inflammatory disease) ?” Categories/scale: a composite scale recoded as 1=Yes, had an STD; 2=No, never diagnosed with an STD
Level of alcohol or drugs intoxication before/during sex	Four Items: “In the last 12 months, how often did you or your partner drink alcohol before or during sex?; “In the last 12 months, how often did you or your partner use any drugs to get high or intoxicated before or during sex? “; “On average, how strongly were <u>you</u> affected by the alcohol, very strongly, somewhat or not at all”; “On average, how strongly were <u>you</u> affected by the drugs, very strongly, somewhat or not at all” Categories/scale: a composite scale recoded as 1= strongly/somewhat affected, 2=Not at all/never used
Partner-relationship characteristics	

Type of covariate	Item (including number and recoded categories)
Living with sexual partner	<p>"Living arrangements most representative of the past three years"</p> <p>Categories/scale: of the nine responses options, two of them included the options living with sexual partner and living with sexual partner and children. 1=yes, living with sexual partner, 2= No, not living with sexual partner</p>
Quality of current/last romantic relationship	<p>Eight items: 1. "You have a lot of conflict with your partner", 2. "Your partner does not understand you", 3. "Your relationship restricts your freedom", 4. "Your partner expects too much of you", 5. "You don't get what you deserve out of your relationship", 6. "Your partner does not show enough affection", 7. "Your partner is not committed enough to your relationship" and 8. "Your sexual needs are not fulfilled by this relationship"</p> <p>Categories/scale: response option for each item included, 1. "Not true", 2. "Somewhat true" and 3. "Very true". A continuous composite scale of eight items; Cronbach's $\alpha=0.91$; higher scale scores reflect less positive relationship quality)</p>
Number of sexual partners over the past 12 months	<p>Three items: "Thinking back over the past 12 months, with how many different people, including men and women, have you had vaginal sex even if only one time?", "thinking back over the past 12 months, with how many different people, including men and women, have you had anal sex even if only one time?", "thinking back over the past 12 months, with how many different people, including men and women, have you had oral sex even if only one time?)"</p> <p>Categories/scale: continuous, total number of partners</p>
HIV status of partner known	<p>"Do you know the HIV status of your partner"?"</p> <p>Categories/scale: 1=yes, 2=no</p>

Figure 1.

Reasons for not having been tested for HIV at follow-up among Latina women at risk of getting infected in a community sample in South Florida

Table 1

Characteristics of the study sample at baseline (Wave 1) and follow-up (Wave 2)

Characteristics	Study sample (n=168)			
	Wave 1		Wave 2	
	n	%	n	%
Socio-demographic characteristics				
Age (mean, SD)*	168	36.13 (12.5)	168	42.01 (12.49)
Education attained*	46	27.38	36	21.43
	33	19.64	33	19.64
	54	32.14	46	27.38
	35	20.83	53	31.55
Proportion of years living in the US*	55	32.74	43	25.60
	33	19.64	44	26.19
	20	11.9	23	13.69
	60	35.71	58	34.52
Health related characteristics				
Health insurance coverage*	78	46.43	86	51.19
	90	53.57	82	48.81
Regular source of health care at baseline	37	22.16	37	22.16
	9	5.39	9	5.39
	21	12.57	21	12.57
	79	47.31	79	47.31
	21	12.37	21	12.37
Provider endorsement of HIV testing/safer sex*	77	45.83	81	48.21
	91	54.17	87	51.79
	149	90.30	144	85.71
Any STD*	16	9.70	24	14.29
Level of alcohol or drugs intoxication before/during sex*	103	63.19	104	69.80
	60	36.81	45	30.20
Partner-relationship characteristics				
Living with sexual partner*	82	48.81	73	43.45

Characteristics	Study sample (n=168)			
	Wave 1		Wave 2	
	n	%	n	%
	86	51.19	95	56.55
Quality of romantic relationship (mean, SD)*	165	12.58(4.57)	168	11.14 (3.97)
Number of sexual partners (mean, SD)*	168	1.36 (1.19)	168	4.43 (23.1)
HIV status of partner known	70	42.42	61	42.36
	95	57.58	83	57.64
HIV testing*	42	25.00	61	36.31
	126	75.00	107	63.69

Note: Differences in Wave 1 and Wave 2 characteristics were tested using chi-square test or t-test when appropriate (*=p<0.01).

Table 2

Predictors of HIV testing among Latina women at risk of getting infected in a community sample in South Florida. Unadjusted (OR) and adjusted (AOR) estimates from multilevel logistic regression models.

Characteristics	Model 1		Model 2	
	OR	95%CI	AOR	95%CI
Intercept (β , SE)			-0.44	1.13
Socio-demographic characteristics				
Age				
Education attained				
Less than high school	1		1	
High school diploma/equivalent	1.70	0.56–5.13	1.85	0.58–5.91
Post high school training but not a BA	2.42	0.78–7.47	2.55	0.72–9.04
Bachelor degree or more education	2.67	0.98–7.31	2.18	0.73–6.44
Proportion of years living in the US				
Less than one-third of their lives	1		1	
Less than two-thirds, more than one-third	2.23	0.69–7.22	1.63	0.50–5.28
More than two thirds	2.58	0.58–11.52	1.92	0.41–8.93
US-born	3.38	1.05–10.45	2.30	0.73–7.27
Health and behavioral related characteristics				
Health insurance coverage				
No	1			
Yes	1.07	0.49–2.27		
Regular source of health care at baseline				
Community health center	1			
Emergency room	0.88	0.11–7.32		
Hospital	0.95	0.22–4.08		
Private office	0.67	0.22–1.99		
Not a regular source of care	0.49	0.12–1.99		
Provider endorsement of HIV testing/safer sex				
No	1		1	
Yes	7.45	2.98–18.61	4.59	1.77–11.95
Any STD				
No	1			
Yes	1.16	0.35–3.79		
Level of alcohol or drugs intoxication before/during sex				
Strongly/somewhat affected	1			
Not at all/never used	1.37	0.59–3.15		
Partner-relationship characteristics				

Characteristics	Model 1		Model 2	
	OR	95%CI	AOR	95%CI
Living with sexual partner	1			
		No		
		Yes		
Quality of romantic relationship (high to low)	0.31	0.14–0.69		
Number of sexual partners	1.15	1.04–1.28	1.12	1.03–1.26
HIV status of partner known	1.09	0.89–1.34		
	1		1	
	3.50	1.61–7.60	3.61	1.46–8.95
Covariance				
Level 2 (β , SE)				1.706 (0.9427)
Level 3 (β , SE)				0.6404 (1.3153)
Model Fit				
–2ln (Likelihood)				258.31
AIC				286.31
BIC				325.22
Covariance test (Chi-square, p-value)				5.89 (0.0208)

Note: OR = Odds Ratio, AOR= Adjusted Odds Ratio

Model 1: Bivariate Analyses

Model 2: Multivariable Analyses