Published in final edited form as:

AIDS Care. 2020 February ; 32(2): 193–201. doi:10.1080/09540121.2019.1619664.

Individual and Structural Factors Predicting HIV Testing among Latinx MSM: Substance Use as a Moderator

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Abstract

The rate of HIV infection for Latinx men who have sex with men (LMSM) increased 20% from 2008–2014 even as rates stabilized among MSM of other racial and ethnic backgrounds. We hypothesize that this disparity is partially attributable to individual and structural factors associated with HIV testing, including substance use practices, among LMSM. In this retrospective study, we examined data from 502 LMSM to determine whether (a) hypothesized relationships exist between individual factors (perceived HIV susceptibility, experiences with HIV prevention, condom use, sex under the influence, sexual identity development status, heterosexual self-presentation, and traditional Latinx gender norms) and structural factors (access to healthcare resources and social support) and HIV testing for LMSM. We also tested whether (b) substance use practices moderate relations between individual and structural factors and HIV testing. Findings indicate that (a) relationships exist between several individual and structural factors and HIV testing and that (b) substance use moderated these relationships to HIV testing in a number of hypothesized ways. Practice and prevention implications are discussed.

HIV testing is among the most effective means of preventing the spread of the virus (Lechuga, Owczarzak, & Petroll, 2013), but Latinx MSM (LMSM) are less likely than other MSM to test for HIV (CDC, 2018a). Individual and structural factors impact testing among LMSM (Joseph et al., 2014; Oster et al., 2013; Spadafino et al., 2016). Furthermore, consistent with the theory of syndemics, which addresses the impact of intersectional social marginalization on health disparities among minority groups, MSM use alcohol and other substances at disproportionately high rates (Halkitis, Kapadia, Bub, Barton, Moreira, & Stults, 2015). Substance use is a contributing factor to health disparities among MSM (e.g., Eisinger & Fauci, 2018) and high-risk sexual practices among LMSM (Ramirez-Valles, Garcia, Campbell, Diaz, & Heckathorn, 2008). What remains understudied is how substance use may influence the HIV testing patterns of LMSM.

By reviewing established correlates of HIV testing in past studies (e.g., Parent, Torrey, & Michaels, 2012; Joseph et al., 2014; Spadafino et al., 2016; Oster et al., 2013), we identified individual and structural factors potentially linked with HIV testing among LMSM.

Individual Factors Predicting Testing

First, beliefs about HIV (e.g., perceived susceptibility) are robustly linked to testing practices among MSM (Joseph et al., 2014). Second, exposure to HIV prevention programming increases the likelihood that MSM will test (Sumartojo et al., 2008). Third, risky sexual practices are positively linked to testing among MSM (Ramirez-Valles et al., 2008). Fourth, because of the aforementioned syndemic theory-based relationship (Halkitis et al., 2015), we expect LMSM who report more sex under the influence (and more substance use) to test less than peers. Fifth, MSM who label their sexual identity as *gay* are more likely to test (Noble, Jones, Bowles, DiNenno, & Tregear, 2017). However, sexual identity development includes complex individual and social processes by which people define and acknowledge their sexual orientation and expression (Dillon, Worthington, & Moradi, 2011). Thus, LMSM who are more committed to their identities are hypothesized to internalize fewer heterosexist beliefs than those who are uncertain or less committed (Szymanski & Carr, 2008). Hence, we expect men reporting more commitment, and less uncertainty about their sexual identity, to be more likely to have tested than peers. Sixth, heterosexual self-presentation describes the desire to be perceived as heterosexual. Unlike sexual identity commitment, heterosexual self-presentation is a construct that refers exclusively to behaviors that reflect masculine gender role norms, which are negatively linked to HIV testing among MSM (Parent et al., 2012). Because gender norms are culture-bound, two concepts, *machismo* and *caballerismo*, may affect behaviors of LMSM in ways that are disparate from their non-Latinx peers. *Machismo* is characterized in part by tendencies toward aggression, hyper-masculinity, sexualized behavior, substance use, and HIV risk behaviors (Estrada, Rigali-Oiler, Arcienaga, & Tracey, 2011; Sanchez, Blas-Lopez, Martinez-Patino, & Vilain, 2016). *Caballerismo* refers to the positive, protective aspects of masculinity: assertiveness, responsibility, sincerity, and emotional responsiveness (Arciniega, Anderson, Tovar-Blank, & Tracey, 2008; Griffith, Gunter, & Watkins, 2012). Thus, we hypothesize that LMSM who rate lower on *machismo*, but higher on *caballerismo*, will be more likely to have tested.

Structural Factors Predicting Testing

Access to healthcare resources and social support are positively linked to testing (Scott et al., 2014). Social support is conceptualized as the degree of access to interpersonal resources for emotional and tangible support (Cohen, Mermelstein, Kamarck, & Hoberman, 1985) and may be especially important for sexual minority communities, for whom estrangement from loved ones is common (Hatzenbuehler, McLaughlin, & Xuan, 2012).

In sum, we hypothesize that the aforementioned individual and structural factors will influence HIV testing among LMSM. Moreover, substance use practices of LMSM are expected to (a) weaken the direct, positive relationships between individual and structural factors and HIV testing and (b) strengthen direct, negative relationships between these factors and HIV testing.

METHOD

Inclusion criteria were (a) identifying as male, (b) identifying as Latinx, (c) endorsing sex (oral or anal) with at least one male-identified person within the 12 months prior to assessment, (d) being HIV-negative or of unknown HIV status, and (e) being aged 18 or older. Participants were recruited via online social networking sites designed to invite traffic from LMSM and community-based organizations serving LMSM. Men were directed to an informed consent page in both English and Spanish that indicated university IRB approval for the study. Consenting participants were directed to bilingual measures.

Measures

Demographics.—Participants reported age, race, and Latinx nationalities, sexual orientation (using the Kinsey Scale), relationship status (0 = *Unmarried/partnered*, 1 = *Married/partnered*), annual income (1 = *less than \$10,000* to 10 = *\$200,000 or more*), education level (1 = *High School Diploma or GED* to 6 = *Master's, doctorate, or other graduate/professional degree*), and immigration status [1 = *US Citizen (by Birth)*, 2 = *Naturalized US Citizen (became a US citizen)*, 3 = *Documented Immigrant*, 4 = *Undocumented Immigrant*].

Individual factors

Perceived HIV Susceptibility.—An item (“In general, how worried are you about getting HIV?”) assessed susceptibility on a 4-point Likert-style scale (1 = *not at all* to 4 = *a great deal*; Joseph et al., 2014).

Experiences with HIV Prevention.—Items assessed whether respondents had encountered, within the previous 12 months, HIV prevention information on the benefits of condom use, testing for HIV and sexually-transmitted infections, and sexual monogamy (Sumartojo et al., 2008). Each item had a yes/ no response. Affirmative responses were summed to yield a count variable. Potential range was 1 to 8 with lower scores reflecting less experiences.

Condom Use.—The Risk Behavior Survey (National Institute on Drug Abuse, 1993) assessed frequency of condom use (past 12 months) during anal, vaginal, and oral sex on a 5-point Likert-type scale from 1 (*Never*) to 5 (*Always*). An average score was calculated yielding a potential total condom use score range of 1 to 5 with higher scores reflecting more condom use. Cronbach's alpha for the current study was .84.

Sex Under the Influence.—Sex under the influence of alcohol/drugs for the 12 months prior to assessment was measured using a six item index (Life Course and Health Research Center, 1997). Using a 5-point Likert-type scale (1=*Always*, 5=*Never*), two items assessed frequency of alcohol/drug use before or during sex by the participant and his partner(s). Four items assessed how strongly alcohol/drug use affected the participant and his partner(s) before or during sex, scored on a 3-point Likert-type scale (1=*Very strongly*, 3=*Not at all*). Responses were averaged to yield a total score. The potential range of the total score was 1 to 3.7. Lower scores indicated more sex while intoxicated.

Sexual Identity Development Status.—The Commitment and Uncertainty subscales of the Measure of Sexual Identity Exploration and Commitment (Worthington, Navarro, Savoy, & Hampton, 2008) assessed sexual identity development status. The six Likert-style items of the Commitment subscale assessed participants' degree of certainty in their sexual identity (1= *Very uncharacteristic of me* to 6= *Very characteristic of me*), while the three items of the Uncertainty subscale measured participants' lack of commitment to a sexual identity. The potential range of scores from both scales was 1 to 6, with higher scores reflecting higher endorsement. Cronbach's alphas for the Commitment and Uncertainty subscales in the current study were .76 and .63, respectively.

Heterosexual Self-Presentation.—The Heterosexual Self-Presentation subscale of the Conformity to Masculine Norms Inventory-46 (Parent & Moradi, 2009) was used to measure the importance a man places on being perceived by others as heterosexual. This 6-item subscale uses a 4-point Likert-type scale, 0 (*strongly disagree*) to 3 (*strongly agree*). Cronbach's alpha for the current study was .78.

Machismo and Caballerismo.—The Machismo and Caballerismo Scale (Arciniega et al., 2008) measured traditional Latinx masculine gender role beliefs. The Traditional Machismo and Caballerismo subscales are rated on a 7-point Likert-type scale from 1 (*very strongly disagree*) to 7 (*very strongly agree*). Cronbach's alphas for the Traditional Machismo and Caballerismo subscales in the current study were .89 and .88, respectively.

Alcohol and Illicit Drug Use.—The Alcohol Use Disorders Identification Test (Babor, Biddle-Higgins, Saunders, & Monteiro, 2001) assessed alcohol use within the previous 12 months. Scores range from 0 to 40; higher scores indicate a higher risk of problematic alcohol use. Cronbach's alpha for the current study was .92.

The Drug Use Frequency measure (O'Farrell, Fals-Stewart, & Murphy, 2003) measured the frequency of illicit drug use and non-prescribed use of prescription drugs among the participants within the 12 months prior to assessment. The frequency of use of (a) sedatives, hypnotics, or tranquilizers, (b) cannabis, (c) stimulants, (d) heroin, (e) cocaine, (f) phencyclidine, and/or (g) hallucinogens was assessed on a scale from 0 (*"never"*) to 7 (*"everyday"*). An average frequency score across drug classes was calculated, ranging from 0 to 7 (higher scores reflect more frequency).

Structural factors

Access to Healthcare Resources.—Participants rated six items derived from the HIV Cost and Services Utilization Study (Kinsler et al., 2009). Items are on a 5-point Likert-type scale from 1 (*strongly disagree*) to 5 (*strongly agree*), with higher scores indicating more perceived access to medical care. Total score were calculated by averaging responses, ranging from 1 to 5. Cronbach's alpha for the current study was .76.

Social Support.—The Interpersonal Support Evaluation List-12 (Cohen et al., 1985) assessed participants' perceived social support. This 12-item measure asked participants to rate on a 4-point Likert-type scale from 1 (*definitely false*) to 4 (*definitely true*) with higher

scores indicating higher support. Total scores were calculated by averaging items, ranging from 1 to 4. Cronbach's alpha in the current study was .77.

Criterion Variable

HIV testing.—HIV testing was measured using an item asking whether participants had been tested for HIV within the 12 months prior to assessment (not tested = 0, tested = 1), as recommended by the CDC for sexually active MSM (CDC, 2018b).

Analytic Plan

The analytic plan consisted of three steps. First, we accounted for potential multiple intersecting marginalized identities relating with HIV testing (not covered by our major research questions) by exploring relations between HIV testing and (a) race, (b) socioeconomic status (education level, yearly income), (c) self-identified sexual orientation, and (d) country of origin (US or foreign-born) to detect covariates [i.e., variables significantly related with HIV testing ($p < .05$)]. Second, correlation coefficients between all hypothesized predictor variables and HIV testing were calculated to assess bivariate relations, evidence of discriminant validity, and multicollinearity. Third, covariates and predictor variables were entered into two logistic regression analyses. In the first logistic regression, covariates and individual and structural factors hypothesized to associate with HIV testing were examined. Next, to test moderators of any significant associations between hypothesized predictors and HIV testing, we created two-way interaction terms for each proposed moderator and predictors associated with testing in the first logistic regression ($p < .05$). We standardized all predictors and the moderator variables to facilitate interpretation (Lorah & Wong, 2018). In the second logistic regression analysis, predictors and interaction terms were simultaneously entered to test moderation hypotheses.

RESULTS

Participants

The sample included 502 LMSM with a mean age of 30.77 ($SD = 6.26$). The majority of participants ($n = 368$, 73.7%) identified their race as White, while 25.7% ($n = 128$) identified as Black Hispanic/Latinx. Participants identified with the following nationalities: Mexican (50.1.0%), Cuban (17.6%), Puerto Rican (7.8%), and Dominican (3.8%). Self-reported sexual orientations included 21 (4.2%) exclusively heterosexual, 99 (19.8%) mostly heterosexual, 57 (11.4%) bisexual, 120 (24.0%) mostly homosexual, and 197 (39.5%) exclusively homosexual. Current relationship status included 46.7% single/never married, 26.7% married, 21.4% cohabitating with a partner, 3% divorced, 1.2% separated, and 0.8% widower. The median annual income was \$75,000 to \$99,000 and 58.5% had obtained a Bachelor's degree or higher. Approximately 96% were U.S. citizens (by birth [91.0%] or naturalization [5.0%]), while 3.6% were documented immigrants. Approximately 95% ($n = 473$) were recruited from online study announcements, 2.4% ($n = 12$) from announcements posted in agencies, and 2.2% ($n = 11$) from other sources.

Preliminary Analyses

Descriptive statistics and correlations for hypothesized predictors and HIV testing variables are presented in Table 1. Approximately 21% reported HIV testing within the 12 months prior to assessment. Men indicating higher yearly incomes ($r = -.27, p < .001$) reported less testing. Men who endorsed more heterosexual self-labeling versus more homosexual self-labeling also reported less testing ($r = .25, p < .001$). Income, education level, and self-identified sexual orientation were included as covariates in the main analyses.

Multiple Logistic Regression

Results of logistic regression analyses revealed several significant direct, conditional effects as well as moderators (see Table 2). Approximately 85 percent of variability in HIV testing within the 12 months prior to assessment was explained by full model.

Illicit drug use as a moderator of HIV testing—Men reporting more drug use frequency and more exposure to prevention programming had 2.58 times higher odds of testing than men reporting more drug use frequency and less exposure to prevention programming (see Figure 1). Also, men reporting more drug use frequency and more commitment to their sexual identity had 6.45 times higher odds of testing than men reporting more drug use frequency and less commitment to their sexual identity (see Figure 2).

Alcohol as moderator of HIV testing.—Men reporting lower alcohol use and who self-identify as more homosexual on the Kinsey Scale had 0.25 times higher odds of testing than men reporting lower alcohol use and who self-identify as more heterosexual on the Kinsey Scale (see Figure 3). In addition, men reporting higher alcohol use and more access to healthcare had 2.33 times higher odds of testing ($p = .005$) than men reporting higher alcohol and less access to healthcare (see Figure 4).

DISCUSSION

Our hypotheses about the moderating effects of substance use on links between certain factors and HIV testing among LMSM was partially confirmed, with alcohol and illicit drug use moderating conditional links between several factors and testing. It is notable that the frequency of participants' reported HIV testing within the past 12 months (21%) was notably smaller among this sample compared to some previous studies of LMSM (e.g., Oster et al., 2013). One potential explanation for this is the sampling frame, as we recruited participants online and from diverse settings (e.g., bars, clubs) rather than solely from venues where testing is offered (e.g., clinics). We therefore sampled men across identity spectrums, some of whom may be less likely to test for HIV than others. Further, extant research suggests that LMSM test for HIV significantly less often than MSM of other backgrounds (CDC, 2010; 2018a).

LMSM who reported higher drug use frequency along with more exposure to prevention programming were more likely to test than peers who were exposed to less programming. While substance use has been associated with poorer testing rates (e.g., Noble et al., 2017), men who use drugs more frequently may be doing so socially at bars, clubs, and other

venues (e.g., bathhouses) frequented by MSM populations (Carpiano, Kelly, Easterbrook, & Parsons, 2011), which often advertise HIV prevention and testing initiatives (Kalichman, 2010).

Similarly, LMSM were more likely to engage in HIV testing when they reported higher drug use frequency along with more sexual identity commitment than peers who report higher drug use frequency but less sexual identity commitment. Hence, more sexual identity commitment may protect LMSM against HIV testing stigma (Parent et al., 2012), when engaging in relatively higher levels of illicit drug use. This positive link between more advanced sexual identity development and testing was reinforced by the finding that men reporting lower alcohol use who self-identify as more homosexual had slightly higher odds of testing than men reporting lower alcohol use who identify more as more heterosexual.

At present, this is the only study to establish intersecting relationships between drug use, sexual identity commitment, and HIV testing among LMSM. These findings find a frame in Meyer's minority stress model (e.g., 2003), which posits that experiences of discrimination, including on the basis of sexual orientation, can result in substance use-based coping strategies. It is conceivable that LMSM who (a) use drugs and (b) are more committed to their sexual identity may (c) test for HIV to reduce risks associated with their drug use (Ostrow et al., 2009). These links may help inform prevention strategies designed to promote sexual health among LMSM, for whom social, cultural, and psychosexual factors (e.g., sexual identity development) may meaningfully influence health behaviors (e.g., Rhodes et al., 2017). Further, men who use drugs more frequently and who are more exposed to prevention programming are also more likely to test. This suggests that HIV prevention efforts for LMSM may be improved by considering the role of substance use in testing patterns.

Finally, LMSM who reported higher alcohol use and more access to healthcare were twice as likely to have tested for HIV than their high alcohol using peers with low access to healthcare. Access to healthcare has been directly, positively linked to HIV testing in extant research (Lo, Turabelidze, Lin, & Friedberg, 2012), but this is the first known study to examine the moderating influence of alcohol use on this link. The moderating effect found here reflects new knowledge that LMSM who (a) drink relatively more and (b) have more access to healthcare may test more, possibly due to the increased access to healthcare in comparison to their high alcohol using peers.

Limitations

Any interpretation of the results of this study should take into account its limitations. First, the sample of LMSM was relatively high in terms of socioeconomic status and education level. Similarly, most participants were U.S. citizens, and most identified as White Latinx. Hence, findings may not be generalizable to all LMSM. Third, the complex impact of stigma on HIV testing, including the stigma of identifying with intersecting marginalized identity groups should be prioritized in future research (e.g., Kurtz, Buttram, Surratt, & Stall, 2012; Watkins-Hayes, 2014). However, our findings have the potential to inform and improve HIV prevention programming targeting LMSM. HIV testing initiatives should seek to account for

the variety of individual and structural factors, including substance use, associated with HIV testing for MSM.

Acknowledgements

Funding: This study was supported by a grant from the National Institute on Minority Health and Health Disparities, award number R15MD010193. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institute on Minority Health and Health Disparities or the National Institutes of Health.

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Figure 1.
The relation between experience of HIV prevention programming and HIV testing at low and high levels of drug use frequency within past 12 months.

Figure 2.
The relation between sexual identity commitment and HIV testing at low and high levels of drug use within past 12 months.

Figure 3.

The relation between self-identified sexual orientation (Kinsey Scale) and HIV testing at low and high levels of alcohol use within past 12 months.

Figure 4. The relation between access to health care and HIV testing at low and high levels of alcohol use within past 12 months.

Table 1.

Descriptive statistics and bivariate correlations between main study variables.

Variable	Mean, Median, or %	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. HIV test within 12 months prior to assessment	20.9% Yes	-	1.00													
Individual-based predictors																
2. Age	30.76	6.26	.19**	1.00												
3. Perceived HIV Susceptibility	2.71	0.88	-.05	-.03	1.00											
4. Experiences with HIV Prevention	4.9	1.40	.48**	.15**	-.15**	1.00										
5. Condom Use	3.25	1.12	-.15**	.07	.33**	-.09	1.00									
6. Sex Under the Influence	2.48	0.72	.04	-.21**	-.32**	.09	-.34**	1.00								
7. Sexual Identity Commitment	4.12	0.93	.42**	.28**	-.19**	.43**	-.28**	.08	1.00							
8. Sexual Identity Uncertainty	3.16	0.93	-.38**	-.24**	.32**	-.45**	.29**	-.14**	-.77**	1.00						
9. Heterosexual Self-Presentation	2.42	0.62	-.33**	-.13**	.37**	-.25**	.20**	-.23**	-.52**	.61**	1.00					
10. Machismo	4.71	1.23	-.21**	-.02	.20**	-.26**	.24**	-.36**	-.28**	.45**	.40**	1.00				
11. Caballerismo	5.33	0.94	.17**	.10*	.12*	.07	.12**	-.25**	.21**	-.03	.05	.52**	1.00			
12. Alcohol Use	16.32	8.65	-.15**	.06	.30**	-.22**	.50**	-.54**	-.31**	.41**	.36**	.53**	.28**	1.00		
13. Illicit Drug Use Frequency	2.79	2.01	-.21**	-.15*	.24**	-.31**	.38**	-.33**	-.39**	.51**	.39**	.64**	.38**	.61**	1.00	
Structural predictors																
14. Access to Health Care Resources	4.00	0.63	.12**	-.01	.11*	-.05	.10*	-.07	.01	.10*	.07	.41**	.49**	.19**	.36**	1.00
15. Social Support	2.85	0.46	.40**	.23**	-.24**	.44**	-.35**	.22**	.64**	-.60**	-.50**	-.38**	.02	-.40**	-.44**	-.02

Note:

* $p < .05$; $p < .01$

Table 2.

Results of multiple logistic regression: Direct and moderated association between individual and structural factors and HIV testing among Latino MSM.

	Odds Ratio	S.E.	p
Intersectional identity covariates			
Education Level	1.08	0.14	.61
Yearly Income	0.80	0.14	.08
Sexual Orientation (Kinsey Scale)	1.45	0.14	.02
Individual Factors			
Age	1.06	0.02	.02
Relationship Status	0.38	1.07	.13
Perceived HIV Susceptibility	1.55	0.14	.01
Experiences with HIV Prevention	1.72	0.07	<.01
Alcohol Use	1.07	0.03	.01
Heterosexual Self-Presentation	0.66	0.50	.30
Sex Under the Influence	1.25	0.26	.44
Sexual Identity Commitment	1.79	0.17	.01
Sexual Identity Uncertainty	1.52	0.18	.05
Caballerismo	1.80	0.16	.01
Machismo	0.71	0.26	.11
Condom Use	0.81	0.20	.15
Illicit Drug Use Frequency	0.78	0.20	.15
Structural Factors			
Access to Health Care Resources	1.97	0.20	.01
Social Support	1.57	0.33	.27
Interaction Terms			
Illicit Drug Use X Sexual Orientation (Kinsey)	1.72	0.25	.10
Illicit Drug Use X Age	1.40	0.32	.36
Illicit Drug Use X Perceived HIV Susceptibility	0.95	0.28	.85
Illicit Drug Use X Alcohol Use	0.63	0.76	.44
Illicit Drug Use X Access to Health Care	0.08	7.10	.13
Illicit Drug Use X Sexual Identity Commitment	6.45	0.09	<.00
Illicit Drug Use X Caballerismo	0.92	0.54	.87
Illicit Drug Use X HIV Prevention	2.58	0.14	<.00
Alcohol Use X Sexual Orientation (Kinsey)	0.25	1.29	.02
Alcohol Use X Age	1.01	0.22	.96
Alcohol Use X Perceived HIV Susceptibility	1.30	0.18	.19
Alcohol Use X Access to Health Care	2.33	0.16	<.00
Alcohol Use X Sexual Identity Commitment	0.65	0.59	.36
Alcohol Use X Caballerismo	1.65	0.21	.07
Alcohol Use X HIV Prevention	1.18	0.18	.39