Acculturation as a moderator of HIV risk behavior correlates among Latino men who have sex with men.

José E. Diaz, Ph.D.[1,2], **Eric W. Schrimshaw, Ph.D.**[2], **Hong-Van Tieu, M.D.**[3], **Vijay Nandi, M.S.**[4], **Beryl A. Koblin, Ph.D.**[3], **Victoria Frye, DrPH.**[5,6]

[1]Department of Epidemiology, Mailman School of Public Health, Columbia University, New York, USA

[2]Department of Sociomedical Sciences, Mailman School of Public Health, Columbia University, New York, USA

[3]Laboratory of Infectious Disease Prevention, Lindsley F. Kimball Research Institute, New York, USA

[4]Laboratory of Data Analytic Services, Lindsley F. Kimball Research Institute, New York, USA

[5]Department of Community Health and Social Medicine, City University of New York School of Medicine, New York, USA

[6]Laboratory of Social and Behavioral Sciences, Lindsley F. Kimball Research Institute, New York, USA

Abstract

Acculturation is associated with increased sexual risk behaviors among heterosexual Latinos, but its influence among Latino gay, bisexual, and other men who have sex with men (MSM) remains less clear. Elements of acculturation may create distinct lived experiences among sexual minority Latinos, moderating how beneficial and adverse influences contribute to their sexual risk behaviors. Latino MSM living in New York City (n = 412) were recruited using a modified time-space venue- and web-based sampling method. Negative binomial regression models estimated associations between indicators of acculturation (i.e., language use, nativity status, ethnic identification), sexual minority stressors (i.e., internalized homophobia, sexual orientation-based discrimination), peer condom use norms, and the number of serodiscordant condomless anal intercourse (SDCAI) encounters. Acculturation indicators were then tested as simultaneous moderators of the influence of each predictor variable on the outcome. The association between internalized homophobia and SDCAI was significant only among English language speakers

Corresponding Author: José E. Diaz, Mailman School of Public Health, Department of Epidemiology, Columbia University, 722 West 168th Street, New York, NY, 10032, jed2158@cumc.columbia.edu.

(aIRR=3.05 [2.13, 4.37]) and those born outside of the US (foreign-born = 0, aIRR=0.17 [0.08, 0.36]). Sexual orientation-based discrimination and SDCAI were also positively associated among both English-speaking (aIRR=1.82 [1.22, 2.72]) and foreign-born men (aIRR=0.34 [0.14, 0.84]). Stronger ethnic identification also moderated the protective effects of peer condom use norms on SDCAI (aIRR=0.28 [0.15, 0.52]). Results suggest that different dimensions of acculturation help shape how both stressors and protective factors influence HIV risk among Latino MSM. Future research is needed to examine the mechanisms through which these differences in acculturation may act on sexual risk behaviors among Latino MSM.

Keywords

Latino men who have sex with men; acculturation; sexual minority stress; HIV risk behaviors

Introduction

Latino gay, bisexual, and other men who have sex with men (MSM) in the United States are disproportionately burdened by HIV. Latinos accounted 26% of all new HIV diagnoses in 2017, despite comprising only about 17% of the U.S. population (Centers for Disease Control and Prevention [CDC], 2018). Among Latinos, the majority of new diagnoses (86%) were attributed to male same-sex sexual contact (CDC, 2018). Moreover, new HIV diagnoses have risen by roughly 18% among Latino MSM in recent years (CDC, 2019). In spite of the continued and growing disparity of HIV diagnoses among Latino MSM, our understanding of the drivers of HIV-related risk and infection among this population remains limited. It thus becomes vital to further our understanding of the factors that contribute to the heightened HIV burden faced by Latino MSM. We will examine the associations between indicators of acculturation, sexual minority stressors, peer condom use norms, and HIV risk among Latino MSM and examine how elements of acculturation may moderate these relationships.

Acculturation is broadly defined as the process through which individuals balance the adoption of values, norms, attitudes, and behaviors of a non-heritage culture with those from their heritage culture (Abraído-Lanza, Armbrister, Florez, & Aguirre, 2006; Berry, 2005; Schwartz, Unger, Zamboanga, & Szapocznik, 2010). Acculturation influences both immigrants and their non-immigrant descendants differently (Schwartz et al., 2010). For example, migrating to a new country may expose immigrants to a host of unique stressors and traumatic experiences that shape their interaction with their non-native cultures (Martinez-Donate et al., 2018). Still, the study of acculturation is not without its theoretical and methodological critiques (e.g., Lara, Gamboa, Kahramanian, Morales, & Hayes Bautista, 2005). As a result, our understanding of acculturation has grown from conceptualizing it as a simple unidirectional process towards envisioning acculturation as complex, multidimensional, and distinct patterns that may be continuous, dynamic, and broad in nature and influence (Abraído-Lanza, Echeverría, & Flórez, 2016; Schwartz et al., 2010; Schwartz & Zamboanga, 2008; Rudmin, 2003). Contact with both host and native cultures may, for instance, guide the development of, and changes in, the ethnic identity of both foreign- and native-born groups (Phinney, 2003; Schwartz, Montgomery, & Briones,

2006). As a result, acculturation is thought to play a prominent role in our understanding of Latinos, particularly related to their health.

The study of Latino health in the U.S. has long documented seemingly paradoxical epidemiologic findings. In particular, Latinos in the U.S. tend to have lower morbidity and mortality compared to their non-Hispanic White counterparts, in spite of greater disadvantage (Ruiz, Hamann, Mehl, & O'Connor, 2016). The differing health patterns that emerge among first-generation immigrants and their descendants, often linked to acculturation processes, have been cited as one potential explanation for this paradox (Alamilla et al., 2019). For instance, a large body of research has found an array of relationships between greater Anglo acculturation and negative health-related outcomes (e.g., obesity, depression) among the Latinos (Abraído-Lanza, Echeverría, & Flórez, 2016; Lara et al., 2005). In other words, less exposure to U.S. culture may coincide with protective cultural factors that facilitate positive health behaviors and, by extension, the well-documented health paradox. However, in spite of acculturation's prominence in the study of Latino health, the acculturation literature has been comparatively limited in the study of health behaviors and outcomes among sexual minority populations, including MSM.

The association between Anglo acculturation and increased HIV risk is also well documented, but this literature predominantly focuses on heterosexual Latinos (Guilamo-Ramos, Jaccard, Pena, & Goldberg, 2005; Haderxhanaj, Rhodes, Romaguera, Bloom, & Leichliter, 2015; Levy et al., 2005; Marks, Cantero, & Simoni, 1998; Meston & Ahrold, 2010). Our understanding of how elements of acculturation may shape HIV-related risk behaviors among Latino MSM remains underdeveloped. For example, lower levels of Anglo acculturation have been associated with both more (Nakamura & Zea, 2010; Zea, Reisen, Poppen, & Bianchi, 2009) and less (Poppen, Reisen, Zea, Bianchi, & Echeverry, 2004) receptive condomless anal sex among Latino MSM. Given the comparatively sparse literature, it is vital to strengthen our understanding of the more complex role that acculturation may play in shaping HIV risk among Latino MSM.

For Latino MSM, acculturation may create distinct lived experiences that shape how both beneficial and adverse influences impact their engagement in HIV-related risk behaviors (Diaz, 1998). Due to the multidimensional nature of acculturation, different elements (i.e., language use, nativity status, ethnic identification) may not only exert a direct influence on HIV-related risk behaviors, but may also attenuate or potentiate the influence of other drivers of sexual risk. As a result, we must examine how processes of acculturation may differentially shape the effect of other influences on HIV-related risk behaviors among Latino MSM. To that end, we consider notable correlates of HIV risk among Latino MSM: sexual minority stressors and peer condom use norms.

Minority stress theory posits that exposure to prejudice, discrimination, and stigma creates a hostile environment that, absent stress-reducing factors like social support, broadly contributes to population-level health disparities (Meyer, 2003). Sexual minority stressors in particular encompass the unique multiple manifestations of stigma experienced by sexual minorities because of their sexual orientation (Meyer, 2003; Rosario, Schrimshaw, Hunter, & Gwadz, 2002). Two prominent stressors, internalized homophobia (i.e., negative feelings

about one's own sexual orientation or behavior) and interpersonal experiences of sexual orientation-based discrimination, have been shown to play an adverse role in the well-being of sexual minority groups (Hatzenbuehler & Pachankis, 2016; Meyer, 2003).

Evidence of the direct relationship between these two sexual minority stressors and HIV risk, however, remains mixed. Although a number of studies document an association between greater levels of internalized homophobia and engagement in more sexual risk behaviors (Hatzenbuehler, Nolen-Hoeksema, & Erickson, 2008; Huebner, Davis, Nemeroff, & Aiken, 2002; Meyer & Dean, 1998; Rosario, Hunter, Maguen, Gwadz, & Smith, 2001), others find no direct effect (Dudley, Rostosky, Korfhage, & Zimmerman, 2004; Preston, D'Augelli, Kassab, & Starks, 2007). This unclear relationship encourages an investigation of the circumstances under which internalized homophobia may influence sexual risk behaviors (Newcomb & Mustanski, 2011). In addition, experiences of sexual orientation-based discrimination have been associated with increased HIV risk behaviors among Latino MSM (Díaz, Ayala, Bein, Henne, & Marin, 2001; Mizuno et al., 2012; Ryan, Huebner, Diaz, & Sanchez, 2009). However, recent research indicates that experiences of homophobic discrimination alone may not be as strongly linked to sexual risk as earlier studies suggest (Mizuno, Borkowf, Ayala, Carballo-Diéguez, & Millett, 2015). As a result, it becomes vital to explore factors that may explain the inconsistent relationships between internalized homophobia, sexual orientation-based discrimination, and HIV risk.

Acculturation may play a key role in shaping the unclear relationship between sexual minority stressors and HIV risk among Latino MSM. Past research documented an association between experiences of discrimination and the processes of acculturation, including an increased affiliation with one's ethnic group (Berry, Phinney, Sam, & Vedder, 2006). Additionally, past research shows that stronger ethnic identification may strengthen the relationship between overt racial/ethnic discrimination and psychological distress among Latinos (Torres, Yznaga, & Moore, 2011). Taken together, this may indicate that elements of acculturation alter how stressors, like discrimination, contribute to HIV risk among Latino MSM. For example, recent work among Latino MSM also found that the association of social discrimination (i.e., both sexuality- and ethnicity-based discrimination together) with condomless anal sex was stronger for foreign-born men than among U.S. born men (Mizuno et al., 2015). Limited work, however, has comprehensively examined how multiple indicators of acculturation may moderate the link between sexual minority stressors and HIV risk among this population.

Another noted factor associated with HIV risk behaviors is peer social norms related to condom use. Social norms theory states that perceptions of normative practice within relevant social groups will influence an individual's own behavior (Schultz, Nolan, Cialdini, Goldstein, & Griskevicius, 2007). Research broadly shows that social norms are integral to a number of health-related behaviors, including alcohol and substance use (Neighbors, Lee, Lewis, Fossos, & Larimer, 2007; Latkin, Kuramoto, Davey-Rothwell, & Tobin, 2010). A large number of studies also show that perceived group norms favoring condom use are associated with lower levels of sexual risk behavior (Kelly et al., 1997; Latkin, Forman, Knowlton, & Sherman, 2003; O'Donnell, Myint-U, O'Donnell, & Stueve, 2003; Waldo, McFarland, Katz, MacKellar, & Valleroy, 2000), including among Latino MSM specifically

(Bedoya et al., 2012; Carlos et al., 2010). Moreover, a meta-analysis found that positive peer condom use norms may exert a stronger association with condom use behavior among both males (compared to females) and ethnic minority (compared to White) samples (Albarracín, Kumkale, & Johnson, 2004). This may be because an individual's perceived peer group may differentially shape the influence of broader group-level norms on behavioral outcomes (Schultz et al., 2007; Linnehan, Chrobot-Mason, & Konrad, 2006; Holley, Kulis, Marsiglia, & Keith, 2006). Since Latino MSM may be integrated into both the Latino and gay communities, it thus becomes important to explore how peer norms related to condom use may influence their sexual risk behavior while also attending to factors that may shape their perceived peer groups.

Theories have long noted that the influence of norms on behavior may shift due, in part, to the processes of acculturation (Abraído-Lanza et al., 2006; Berry, 1997). For example, evidence suggests that the strength of ethnic identification may differentially shape the influence of norms on behaviors (e.g., Holley et al., 2006). Because Latino MSM sit at the intersection between the Latino and gay communities, distinct patterns of acculturation may expose them to, and cause them to identify more strongly with, normative behaviors more prominent within their preferred community (Diaz, 1998; Bruce et al., 2008). As a result, it becomes vital to further explore how elements of acculturation may alter the relative importance of perceived peer condom use norms for some Latino MSM.

The present study seeks to examine the association of sexual minority stressors (i.e., internalized homophobia, sexual orientation-based discrimination), perceived peer condom use norms, and acculturation indices (i.e., language use, nativity status, ethnic identification) with HIV risk behavior (i.e., number of serodiscordant condomless anal intercourse encounters [SDCAI]) among Latino MSM. In line with trends in recent evidence, we hypothesized that exposure to greater sexual minority stressors would not be associated with more SDCAI. Next, we hypothesized that perceptions of positive peer condom use norms would be associated with a less SDCAI. In light of inconsistent evidence among Latino MSM, we hypothesized that greater levels of Anglo acculturation (i.e., more English use, U.S. born, lower ethnic identification) would each be associated with more SDCAI. Further, this study will expand upon the existing literature by exploring the potential role of acculturation indices in mitigating or potentiating the unique relationships between sexual minority stressors and SDCAI and between peer condom use norms and SDCAI. In particular, we hypothesized that the effect of sexual minority stressors (i.e., internalized homophobia, sexual orientation-based discrimination) on SDCAI would be strongest among those with high Anglo acculturation (i.e., more English language use, born in the US, lower levels of ethnic identification) compared to those with low Anglo acculturation. We also hypothesized that positive peer condom use norms would be associated with less SDCAI among those with lower levels of Anglo acculturation.

Method

Participants

The data for this study came from the NYCM2M study, a cross-sectional study that assessed how urban neighborhood environments may contribute to sexual risk behaviors, alcohol and

substance use, and anxiety and depression among MSM (Cerdá et al., 2017; Frye et al., 2015; Koblin et al., 2017; Tieu et al., 2014). This report is based on the subsample of 412 Latino MSM who reside in New York City. Eligible participants were assigned male at birth, at least 18 years of age, lived in NYC, spoke English and/or Spanish, reported engaging in anal sex with another man in the past three months, and were able and willing to provide informed consent to participate in the study. The present study included only those participants who self-identified as Hispanic/Latino and who reported their HIV serostatus as either positive or negative. Due to a focus on serodiscordant sexual behavior, participants who reported an unknown HIV status were excluded from the study and subsequent analyses.

Procedure

The methods utilized for study recruitment have previously been discussed in detail (Koblin et al., 2013). Briefly, gay, bisexual, and other men who have sex with men (MSM) living in New York City were recruited using a modified venue-based time-space sampling method. Starting in July 2012, men were also recruited via banner and pop-up ads placed on select websites (i.e., Facebook, BGCLive.com) and geospatial smartphone apps (i.e., Grindr). Interested men who clicked on these ads were redirected to the study's website and subsequently screened for preliminary eligibility.

A total of 450 Latino MSM enrolled in the study in the sample between 2010 and 2013. For the present analyses, 38 men were excluded due to missing data related to their HIV status, sexual behavior, and other relevant covariates. The final sample for the present analysis was 412 Latino MSM.

After providing written informed consent, participants completed a set of quantitative measures via audio computer-assisted self-interviewing (ACASI). They also completed interviewer-administered questionnaires related to their birthplace, upbringing, and their social and sexual networks. Lastly, participants were offered both HIV counseling and testing. All participants received a round trip Metrocard and $50 for their participation in the study. The parent study received approval from the Institutional Review Boards (IRB) at New York Blood Center and participating institutions. The present analyses were approved by the IRB at Columbia University Medical Center.

Measures

Serodiscordant condomless anal intercourse (SDCAI): SDCAI encounters were defined as the number of condomless anal sex encounters that participants had with casual male sexual partners of opposite or unknown serostatus in the past three months.

Internalized homophobia: A 7-item measure was adapted from Herek and Glunt (1995) to measure respondents' negative thoughts and attitudes regarding their attraction towards other men (e.g., "If someone offered me the chance to be completely heterosexual, I would accept the chance."). A 5-point Likert scale ranging from 1 (*Disagree strongly)* to 5 (*Agree strongly)* was used, with higher average scores indicating higher levels of internalized homophobia (α = .86).

Lifetime sexual orientation-based discrimination: A 16-item modified version of the Heterosexist Harassment, Rejection, and Discrimination scale (Szymanski, 2006) was used to assess the cumulative burden of sexual orientation-based discrimination. Participants were asked how often in their lives they had been treated unfairly by various individuals (e.g., teachers, supervisors, friends) based on their sexual identity or same-sex sexual behavior. A 5-point Likert scale ranging from "never" to "most of the time" was used, with higher average scores indicating greater frequency of sexual orientation-based discrimination (α = .91).

Peer condom use norms: The 7-item Norms subscale of the Sexual Risks Scale (DeHart & Birkimer, 1997) assessed peer social norms regarding safer sex practices. Respondents were asked to rate their responses to questions assessing their perceptions of friends' beliefs related to condom use (e.g., "My friends talk a lot about 'safer' sex"). A 4-point Likert scale ranging from 1 (*Strongly disagree*) to 4 (*Strongly agree*) was used. After recoding the one negatively worded item, higher average scores represented more positive condom use norms among friends (α = .84).

Acculturation factors

Language use: A modified version of the Language subscale from the Short Acculturation Scale for Hispanics (Marin, Sabogal, Marin, Otero-Sabogal, & Perez-Stable, 1987) was used to assess language use and preference, including questions such as "In what language do you usually think?" and "What language do you usually speak at home?". Responses ranged from 1 *(English only)* to 5 *(Only another language than English)*. Scores were reverse coded and averaged to create an overall language-based acculturation score, with higher scores representing more English language use (α = .83).

Nativity status: Respondents were asked about the region of the world in which they were born with one multiple choice item, with response options including the United States, Caribbean, Puerto Rico, Other US territories, Asia, Europe, South America, Central America, Africa, Canada, and Australia/Oceania. Consistent with past research (e.g., Mizuno et al., 2015), men born within the United States were grouped together; all others, including those from US territories, comprised the foreign-born group.

Ethnic identification: The 12-item Multigroup Ethnic Identification Measure (MEIM; (Roberts et al., 1999) is a widely used global composite index of ethnic identity that focuses upon the exploration of cultural practices (e.g., "I have spent time trying to find out more about my ethnic group, such as its history, traditions, and customs") and a sense of commitment to one's own ethnic group (e.g., "I am happy that I am a member of the ethnic group that I belong to"). A 4-point Likert scale was used, ranging from 1 (*Strongly disagree*) to 4 (*Strongly agree*), with higher average scores indicating greater ethnic identification. The MEIM demonstrated strong reliability in the current sample (α = .89).

Social support: A 19-item shortened form of the Inventory of Social Supportive Behaviors (Barrera, Sandler, & Ramsay, 1981) was used to assess the frequency within the last 3 months participants received various types of assistance. A 5-point Likert scale

ranging from 1 (*Not at all)* to 5 (*About every day*) was used, with higher average scores indicating a greater frequency of support received (α = .92). Social support was included as a covariate in these analyses due to both its theoretical relevance and correlations with variables of interest.

Demographic Covariates

The following demographic characteristics were assessed: age (in years), annual income (less than $10,000, $10,000 to $19,999, $20,000 to $59,999, greater than $60,000), education level (completed high school/GED or less, some college or more), relationship status (single, married / partnered in the past 3 months), sexual orientation (gay, bisexual, heterosexual/other), and HIV status (positive, negative).

Data Analysis

First, univariate distributions of each independent and moderator variable, as well as the outcome variable (i.e., number of SDCAI encounters), were examined. Each continuous predictor variable of interest was mean centered, while any dichotomous variables were recoded with a reference group of −1 (instead of 0) to facilitate the calculation and interpretation of interaction effects. Due to the overdispersed nature of the count data, the subsequent regression analyses were conducted using generalized linear modeling using a negative binomial distribution with a log link. The model was then built in steps. First, the bivariate relationships between each independent and dependent variable were examined through a set of unadjusted negative binomial regressions. Next, all of the factors that were significantly associated at the bivariate level with our outcome were entered into a multivariable model after controlling for age, annual income, education, relationship status, sexual orientation, and HIV status. We also controlled for social support in spite of its non-significant relationships due to its theoretical relevance and correlations with other significant predictors. We then simultaneously tested the possible role of the three acculturation indicators as moderators of the relationships between the three risk-related factors that were significant at the bivariate level with the outcome: internalized homophobia (model 2), sexual orientation-based discrimination (model 3), and peer condom use norms (model 4). Lastly, any significant interactions found in the models 2–4 were entered into a final model (model 5) to simultaneously test the moderating effects while controlling for other potentially overlapping moderated relationships.

Results

The demographic characteristics of the sample (n = 412) are presented in Table 1. The sample had an average age of 31 years, while just over one-fifth did not complete high school (21.8%). Four out of five participants self-identified as gay (83.3%), and just over half of the sample reported currently being single (54.4%). Roughly 30% also reported an HIV positive serostatus. Nearly one in three participants was born outside of the U.S. (31.1%). Participants also predominantly reported high levels of English language use (mean = 3.82, SD = 0.93) and ethnic identification (mean = 3.07, SD = 0.56). In the past three months, roughly twenty percent reported at least one SDCAI encounter.

The bivariate associations between each of the predictor variables are presented in Table 2. These relationships support the inclusion of each indicator of acculturation as a separate items that capture distinct elements of acculturation.

Bivariate analyses

We conducted separate unadjusted negative binomial regression analyses to examine the bivariate relationships between each demographic factor, predictor, and SDCAI (Table 3). In the unadjusted models, having a recent partner or being married (unadjusted incidence rate ratio [uIRR]=0.48, 95% CI 0.35, 0.67), annual personal income ($20–59,999 vs. less than $10,000; uIRR=0.44, 95% CI 0.29, 0.66), higher education (uIRR=0.61, 95% CI 0.43, 0.87), more positive peer condom use norms (uIRR = 0.43, 95% CI 0.32, 0.58), and more frequent sexual orientation-based discrimination (uIRR = 0.71, 95% CI 0.55, 0.93) were each associated with fewer SDCAI encounters, while age (uIRR=1.03, 95% CI 1.01, 1.05), positive HIV serostatus (uIRR=1.97, 95% CI 1.43, 2.71), and being born in the US (uIRR=1.43, 95% CI 1.01, 2.02) were each associated with more SDCAI encounters.

Multivariable analyses

Table 4 presents the multivariable negative binomial regression analyses predicting SDCAI. After controlling for age, education, annual income, sexual orientation, HIV status, and social support, model 1 demonstrated that perceiving more positive peer condom use norms [adjusted IRR (aIRR=0.39, 95% CI 0.27, 0.55)], lower English language use (aIRR=0.71, 95% CI 0.55, 0.91), and, in terms of nativity status, being born outside the US (US-born = 1; aIRR=1.99, 95% CI 1.23, 3.21) were each associated with fewer SDCAI encounters.

Moderation: Acculturation and internalized homophobia

In model 2, when entered simultaneously, we found that language use (aIRR=3.05, 95% CI 2.13, 4.37), nativity status (US-born = 1, aIRR=0.17, 95% CI 0.08, 0.36), and ethnic identification (aIRR=1.72, 95% CI 1.10, 2.68) each moderated the relationship between internalized homophobia and SDCAI. Figures 1 through 3 present a calculation of the simple slopes when −1 SD/+1 SD are entered into the equation for internalized homophobia with the values for language use (−1 SD/+1 SD), nativity status (foreign-born = −1, US-born = +1), ethnic identification (−1 SD/+1 SD), separately. For language use (Figure 1), the positive association between internalized homophobia and SDCAI exists only for those who tend to speak more English; among those who speak less English, internalized homophobia was not associated with SDCAI. For foreign-born men (Figure 2), higher levels of internalized homophobia were associated with engaging in more SDCAI, while the opposite (fewer SDCAI encounters) was found among US-born men. Lastly, the association between higher levels of internalized homophobia and engaging in more SDCAI encounters was stronger for men with high levels (versus low levels) of ethnic identification (Figure 3).

Moderation: Acculturation and sexual orientation-based discrimination

In model 3, we found that language use (aIRR=1.82, 95% CI 1.22, 2.72) and nativity status (US-born = 1, aIRR=0.34, 95% CI 0.14, 0.84) each moderated the association between sexual orientation-based discrimination and SDCAI. Figures 4 & 5 present a calculation of

the simple slopes when −1 SD/+1 SD are entered into the equation for sexual orientation-based discrimination with the values for language use (−1 SD/+1 SD) and nativity status (foreign-born = −1, US-born = 1), separately. For those who spoke more English, there was a strong association between greater discrimination and more SDCAI encounters; no such association was found among those with lower levels of English use (Figure 4). Higher levels of discrimination were also associated with more SDCAI encounters for foreign-born men, but were associated with less SDCAI among US-born men (Figure 5).

Moderation: Acculturation and peer condom use norms

In model 4, we found the association between positive peer condom use norms and SDCAI was moderated by language use (aIRR=0.60, 95% CI 0.36, 0.99) and ethnic identification (aIRR=0.28, 95% CI 0.15, 0.52). Figures 6 & 7 show the calculation of simple slopes when −1 SD/+1 SD are entered into the equation for both peer condom use norms with the values for nativity status (foreign-born = −1, US-born = 1) and ethnic identification (−1 SD/+1 SD), separately. Perceiving more positive peer condom use norms was protective for all men, but the association was stronger for those who spoke more English (Figure 6). For men with high levels of ethnic identification, the association between positive peer condom use norms and SDCAI was strong and protective. Among men with lower levels of ethnic identification, positive peer condom use norms were less associated with the number of SDCAI encounters (Figure 7).

Comprehensive moderation model

In Model 5, we re-ran the model and entered the seven significant (out of nine tested) interaction terms simultaneously. As shown in Table 4, five of the potential seven moderation effects remained significant when added to the final model; two moderated relationships were no longer significant (internalized homophobia by ethnic identification; peer condom use norms by language use).

Among the significant interactions, a comparison of the interaction plots from the comprehensive model (controlling for all significant interactions) with those from the individual models (2 through 4) revealed no substantive differences in appearance and interpretation of the relationships, and, therefore, are not presented here.

Discussion

In the present study, we examined factors associated with SDCAI among a large sample of Latino MSM in NYC. We first examined the main effects of two sexual minority stressors (i.e., internalized homophobia, experiences of sexual orientation-based discrimination), peer condom use norms, and indicators of acculturation (i.e., language use, nativity status, ethnic identification) on the number of SDCAI encounters. We found no significant main effect of either of the two sexual minority stressors on HIV risk. Additionally, consistent with our hypotheses, peer condom use norms were significantly associated with fewer SDCAI encounters. Among the indicators of acculturation, we also found that language use and birthplace were significantly associated with our outcome, while ethnic identification was not. Lastly, when simultaneously controlling for the tested interaction effects, we found that

acculturation indices consistently moderated the associations between sexual minority stressors, peer condom use norms, and SDCAI.

Consistent with our hypothesis, we found that acculturation moderated the influence of sexual minority stressors on the number of SDCAI encounters. Contrary to expectations, however, we found that the associations between sexual minority stressors and SDCAI differed depending on the acculturation variable examined. For instance, sexual minority stressors were associated with an increased number of SDCAI encounters among those with high levels of English use and among those who are foreign-born — groups considered to be high and low, respectively, on acculturation. There are a number of potential explanations for the role that acculturation plays in shaping these relationships. For instance, the contexts in which English-speaking and foreign-born Latino MSM experience discrimination may help us understand the patterns of sexual risk behaviors that emerged among these distinct two groups. For English speaking men, sexual risk may be linked to their inclusion in, and attachment to, the gay community (Diaz, 1998), which itself is associated with both increased exposure to multiple forms of social discrimination (Diaz, Ayala, & Bein, 2004; Huebner & Davis, 2005; Ryan et al., 2009). For these men, the anxious expectation of sexual orientation-based discrimination based on past exposure may negatively impact their subjective well-being, which may lead them to engage in riskier sexual behaviors (Wang & Pachankis, 2016). Conversely, among predominantly Spanish-speaking Latino MSM, the impact of discrimination-based rejection may be mitigated by expectations surrounding homophobia and homophobic discrimination. Among these men, belief in the unavoidable nature of homophobic discrimination, perhaps influenced by their own levels of internalized homophobia, may unexpectedly build resilience against the cumulative influence of homophobic discrimination on, thereby potentially reducing their engagement in high-risk sexual encounters.

Among foreign-born men, many immigrate to the US from nations with anti-gay social and political environments (e.g., Morales, Corbin-Gutierrez, & Wang, 2013). For these men, direct experiences with the homonegative messages found in a highly discriminatory society may facilitate greater levels of sexual risk post-immigration. Specifically, moving to a region that is perceived as more gay-friendly may encourage more post-migration sexual exploration, which may lead to HIV-related risk behaviors (Bianchi et al., 2007; Egan et al., 2011). Additionally, having a diminished exposure to discrimination in gay-friendly environments may be protective for SDCAI among foreign-born men. For example, reducing the exposure to, and internalization of, these discriminatory messages may reduce their need to engage in riskier sexual behaviors post-migration. Importantly, among US born men, greater exposure to homophobic discrimination (compared to less exposure) trends towards reducing the engagement in SDCAI. This may be due, in part, to these men concealing their sexual orientation in the presence of family, requiring that sexual partnering efforts be fewer and more calculated so as to avoid outing oneself (Schwitters & Sondag, 2017; Murray, Gaul, Sutton, & Nanin, 2018). Since the present study indicates that sexual minority stressors have different associations with HIV risk based on language use and nativity status, further research is needed to examine the potential different mechanisms through which sexual minority stressors influence sexual risk behavior among both English speaking and foreign-born Latino MSM.

It is important to note that the association between nativity status and SDCAI differs when it is entered as a predictor and as a moderator variable. In particular, our results show that being born in U.S. (a unidimensional indicator of greater Anglo acculturation) is associated with more SDCAI encounters in our first multivariable model. Only when nativity status is entered as a moderator of the association between sexual minority stressors and SDCAI do we find that foreign-born men (but not US-born men) exhibit associations between sexual minority stressors and SDCAI, and that these patterns similar to those found among predominant English speakers. These findings are broadly consistent with the literature documenting the differing influences on sexual risk behavior among US- and foreign-born Latino MSM (Mizuno et al., 2015). One potential explanation for these findings is the distinct ways that acculturation-related stress uniquely manifests for foreign-born individuals as a result of immigrating to a new culture (Martinez-Donate et al., 2018). In particular, the trauma and stressors Latino immigrants experience before, during, and after migrating may work cumulatively with added sexual minority stressors to impede their practice of protective health behaviors (Lee, 2019; Martinez-Donate et al., 2018). Being born in the U.S. may thus, alone, be linked to more HIV risk behavior, but the cumulative stress of migration, acculturation, and sexual minority status may work together to enhance HIV risk among foreign-born men. As a result, it becomes vital to further examine the complex role that nativity status and related stressors may play in driving and potentiating HIV risk among Latino MSM.

We also found evidence that ethnic identification, but no other acculturation indices, acts as a moderator of the relationship between positive peer condom use norms and sexual risk behaviors. Among men higher in ethnic identification, negative condom use norms among peers were associated with greater HIV risk, while positive norms were associated with less HIV risk. For men with lower levels of ethnic identification, the relationship between positive peer condom use norms and HIV risk behaviors was not significant. These findings are intuitive and may reflect the greater influence of peer networks on Latino MSM with a stronger sense of ethnic identity. Past research shows, for instance, that ethnic identity and ethnic identification may increase the importance of peer group social norms among Latinos (Ndiaye, Hecht, Wagstaff, & Elek, 2009; Sauceda, Wiebe, & Simoni, 2016). When positive norms related to condom use are not available, highly identified Latino MSM may instead be influenced by normative elements ingrained in Latin culture. In particular, past research shows that Latino MSM may link condom use to a loss in sexual pleasure or intimacy (Balán, Carballo-Diéguez, Ventuneac, & Remien, 2009), which may be partly rooted in cultural influences that place male sexual control and pleasure, rather than HIV prevention, as paramount (Jarama et al., 2005; Parker, 1996). On the other hand, given that norms are important for highly identified Latinos, when condom use appears normative amongst one's peers, the influence of such norms may be strong. These norms may supplant cultural influences by allowing men the possibility of exploring sexual intimacy in the context of condom use. Further research should explore how ethnic identification may further shape the influence of norms related to HIV prevention efforts among Latino MSM.

The present study provides evidence that HIV prevention efforts require tailored approaches that address the individual, interpersonal, and broader cultural influences on HIV-related risk among Latino MSM. In particular, interventions that aim to diminish the influence of sexual

minority stressors and further build perceptions of positive peer condom use norms may require deeper attention to acculturation and its indicators in efforts to reduce the HIV burden felt by Latino MSM. By attending to heterogeneity among these men through disaggregating them into relevant groups (e.g., foreign-born, predominantly English speaking), interventions at any level can target and address the multi-faceted needs of Latino MSM. For example, recent individual-level (Rhodes et al., 2017) and community-level (Rhodes, Leichliter, Sun, & Bloom, 2016) interventions targeting rural Spanish-speaking, foreign-born Latino MSM with strong ties to the Latino community saw significant decreases in HIV risk behaviors. For instance, lay health advisors, particularly men within existing social networks, educated and advocated for consistent condom use among their peers to much success (Rhodes et al., 2016). An intervention of this nature may be strengthened among urban foreign-born Latino MSM by adding a stigma reduction component coupled with the utilization of strong ethnic peer norms could reduce the deleterious impact of sexual minority stressors on HIV related risk among that population. Additional interventions targeting foreign-born Latino MSM are needed to further enhance HIV prevention among this population.

We also found evidence of the need for interventions directly targeting English-speaking and monolingual English Latino MSM. These men are often integrated into studies and interventions with ethnically-diverse samples, limiting our ability to target their needs in a culturally-sensitive manner. For instance, for men who may feel excluded from the Latino and gay communities, community- or multi-level interventions that create space to build community understanding may reduce HIV risk among this population. One such intervention, Project CHHANGE (Frye et al., 2017), is a multi-component, community-level anti-stigma and –homophobia intervention in Brooklyn, New York City that provides, among other notable elements, community residents skills to reduce to damaging and discriminatory actions and was found to be associated with increased HIV testing at the intervention site. By building spaces to connect with family and community members, this intervention may work to reduce the experiences of rejection that may underlie elements of sexual risk for these Latino MSM. Future research should further elucidate areas of need among English-speaking Latino MSM to enhance our ability to tailor targeted interventions for that population.

Limitations

The results of the present study should be viewed in light of its limitations. We did not use a validated, multidimensional scale of acculturation in the present study, making it difficult to compare our results to other studies that may use such measures. However, the use of separate unidimensional factors related to acculturation is similarly well-grounded in the literature and our findings highlighted a need to consider each indicator in separately. Additionally, the study was carried out in NYC and had a large number of men who were predominantly born in the United States and high in Anglo acculturation. This may make these findings less generalizable to Latino MSM who recently immigrated or are monolingual Spanish speakers. Furthermore, we relied on self-reported sexual behavior which may have elicited social desirability bias in light of the sensitive nature of the

questions asked. ACASI, which has been shown to reduce such biases, was used to reduce social desirability bias in participant responses.

The study also did not assess the use of biomedical prevention strategies such as pre-exposure prophylaxis (PrEP) and post-exposure prophylaxis (PEP). PrEP received FDA approval towards the end of this study, and thus was not a prominent method of HIV prevention at the time. Still, PrEP remains underutilized by Latino MSM in particular (Ya-lin, Zhu, Smith, Harris, & Hoover, 2018), encouraging further research into how acculturation may relate to PrEP usage as a form of HIV prevention. Moreover, it is possible that the viral loads of the men engaging in SDCAI (including non-participant partners) were suppressed, limiting the risk of HIV transmission or acquisition in those encounters. The present analyses also did not include method of recruitment (i.e., online vs. in-person) as a potential confounder, but a previous study utilizing these data found no differences in HIV risk behavior by recruitment method (Frye et al., 2015). Lastly, the present study utilized cross-sectional data, thereby limiting our ability to identify how acculturation may shape any causal pathways that might exist between sexual minority stressors, condom use norms, and HIV-related risk. Future research should use longitudinal methods to prospectively explore how changes in acculturation might directly influence changes in sexual risk behaviors, as well as shape the influence of sexual minority stressors and peer condom use norms over time.

Conclusion

The results from this study extend prior research on Latino MSM by examining the moderating role of acculturation on a number of potential drivers of sexual risk behavior, including sexual minority stressors (i.e., internalized homophobia, sexual orientation-based discrimination) and peer condom use norms. Importantly, we found that neither of the two sexual minority stressors exerted an influence on SDCAI until we included the moderating role of acculturation. We also found that perceived peer norms related to condom use differed in their importance based on one's level of ethnic identification. Elements of acculturation may shape the lens through which individuals view and approach the world. As a result, it vital that future research and interventions attend to the role that acculturation may play in promoting or inhibiting HIV prevention among Latino MSM.

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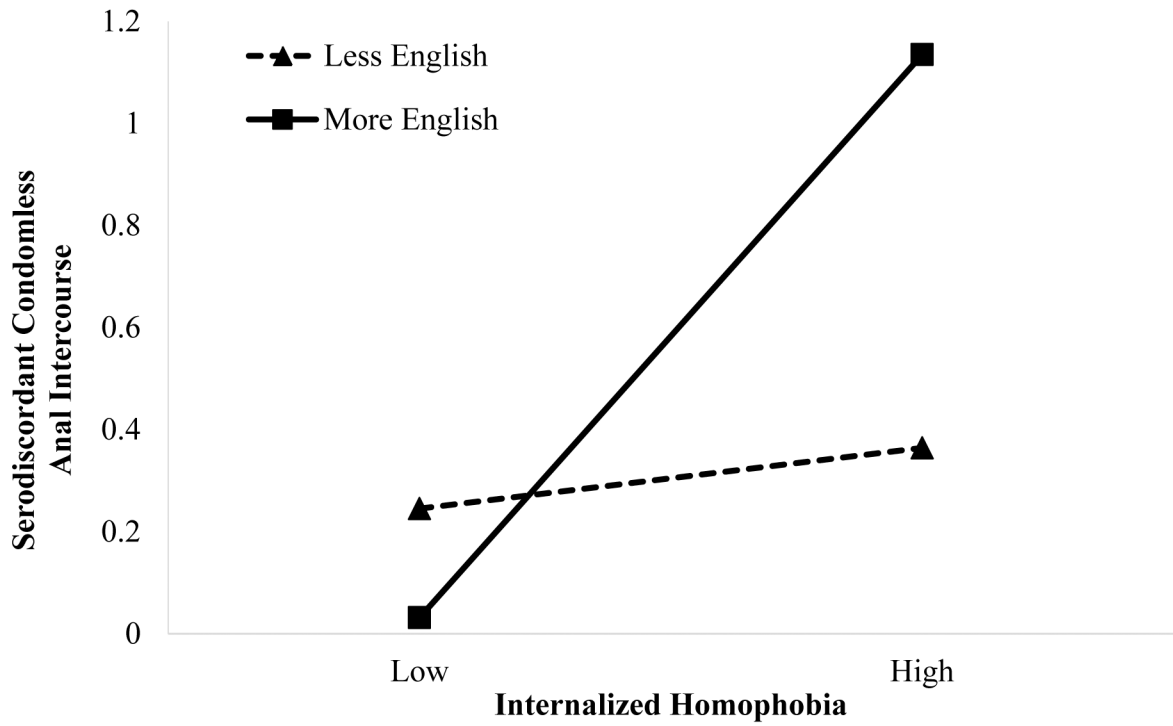
Fig. 1.

Interaction plot of language use (±1 SD) by internalized homophobia (±1 SD) on the number of serodiscordant condomless anal intercourse encounters, controlling for demographics, social support, and main effects.
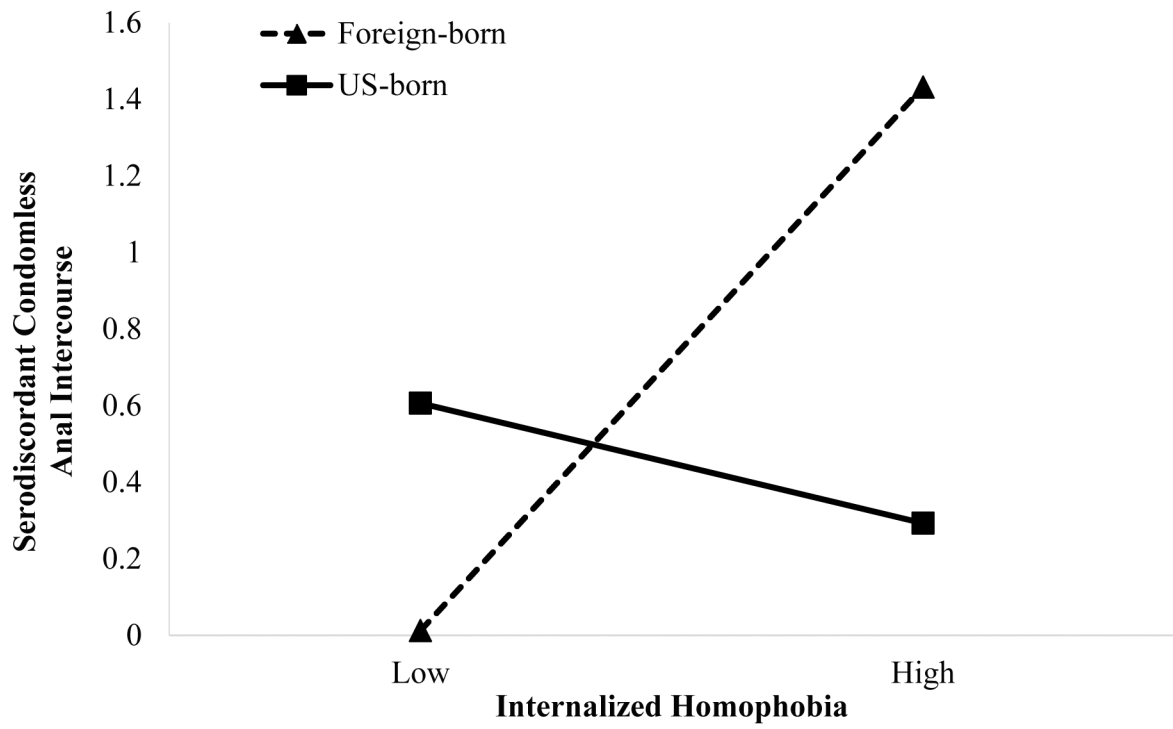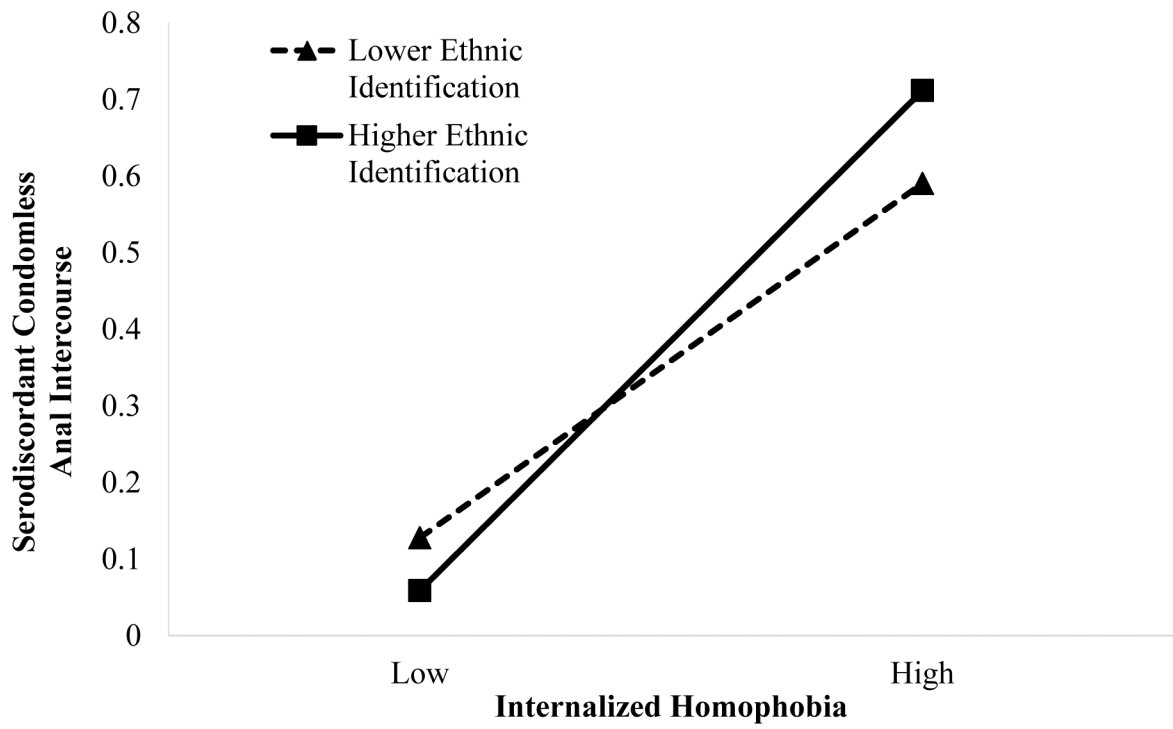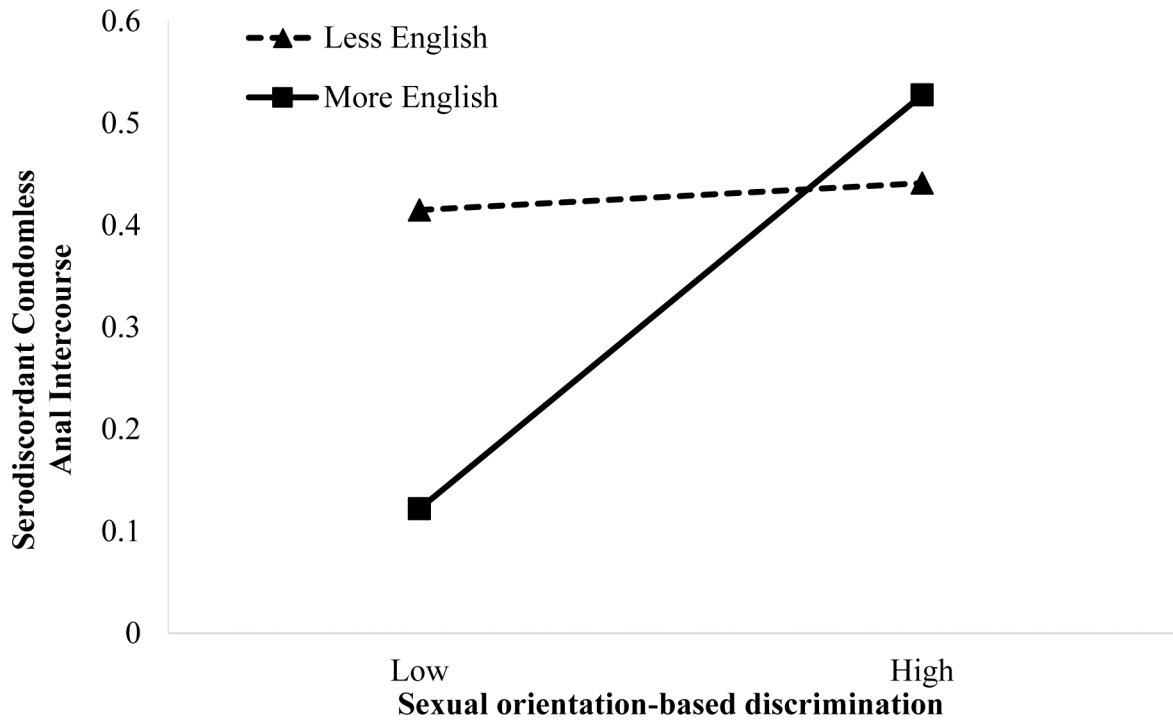
Fig. 2.
Interaction plot of nativity status (foreign-born vs. US-born) by internalized homophobia (±1 SD) on the number of serodiscordant condomless anal intercourse encounters, controlling for demographics, social support, and main effects.
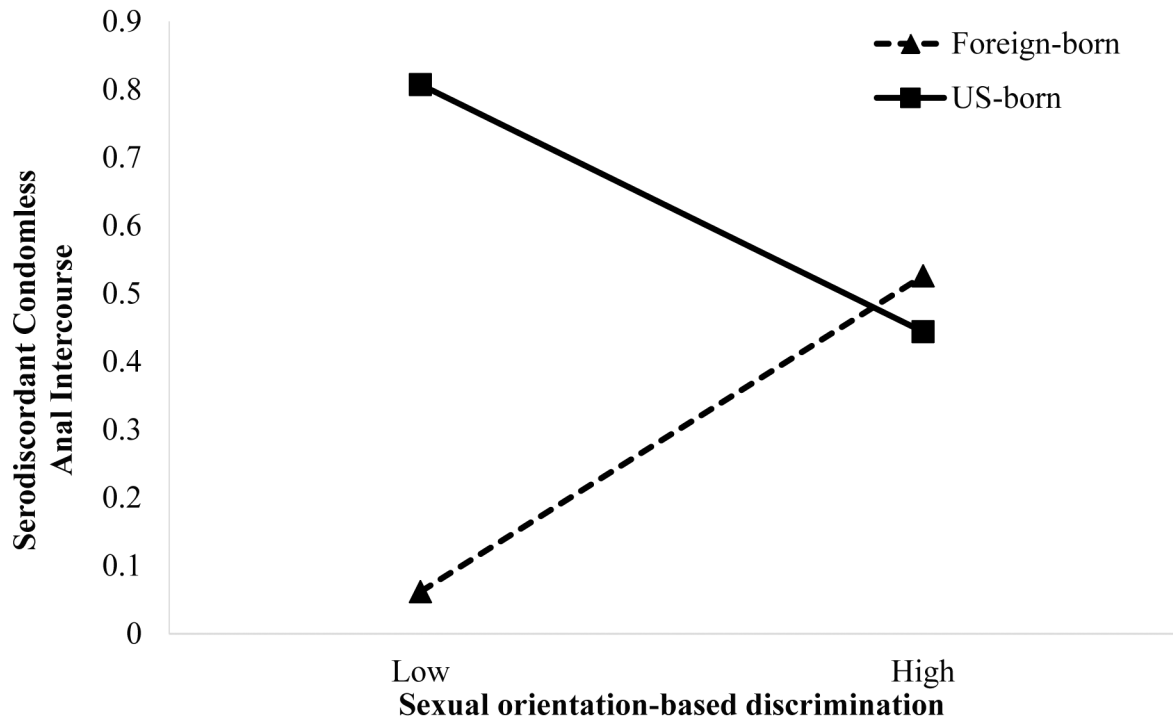
Fig. 3.
Interaction plot of ethnic identification (±1 SD) by internalized homophobia (±1 SD) on the number of serodiscordant condomless anal intercourse encounters, controlling for demographics, social support, and main effects.

Fig. 4.
Interaction plot of language use (±1 SD) by experiences of sexual orientation-based discrimination (±1 SD) on the number of serodiscordant condomless anal intercourse encounters, controlling for demographics, social support, and main effects.
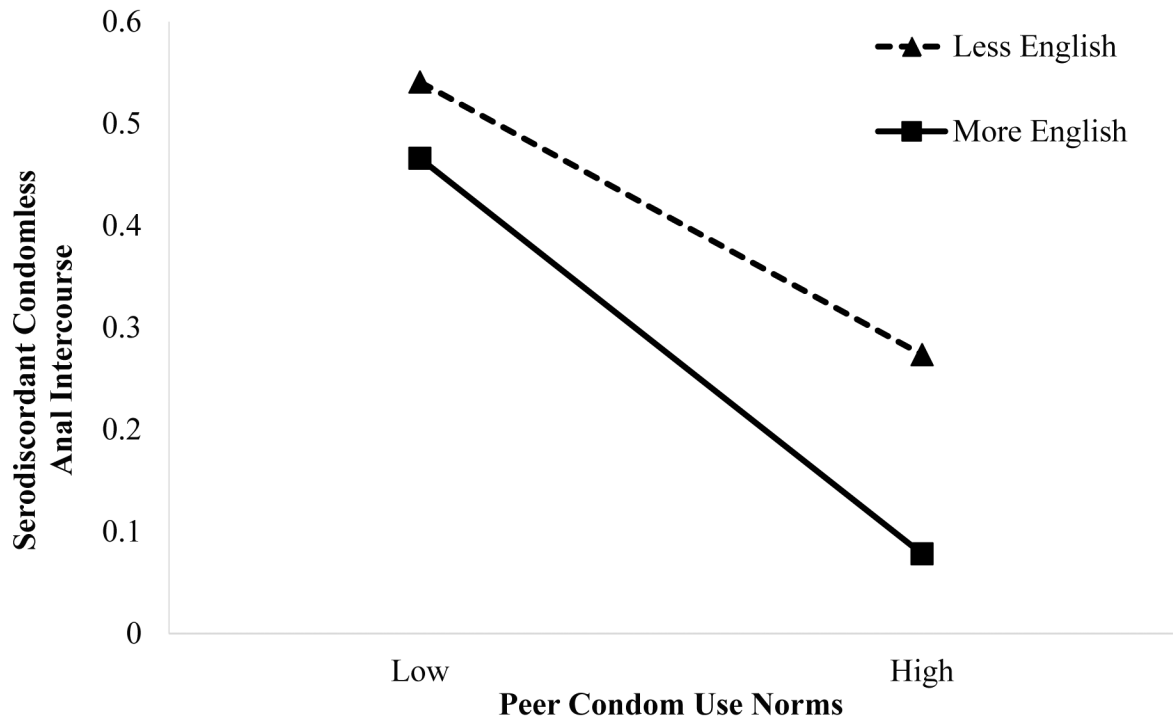
Fig. 5.
Interaction plot of nativity status (foreign-born vs. US-born) by experiences of sexual orientation-based discrimination (±1 SD) on the number of serodiscordant condomless anal intercourse encounters, controlling for demographics, social support, and main effects.

Fig. 6.
Interaction plot of language use (±1 SD) by peer condom use norms (±1 SD) on the number of serodiscordant condomless anal intercourse encounters, controlling for demographics, social support, and main effects.
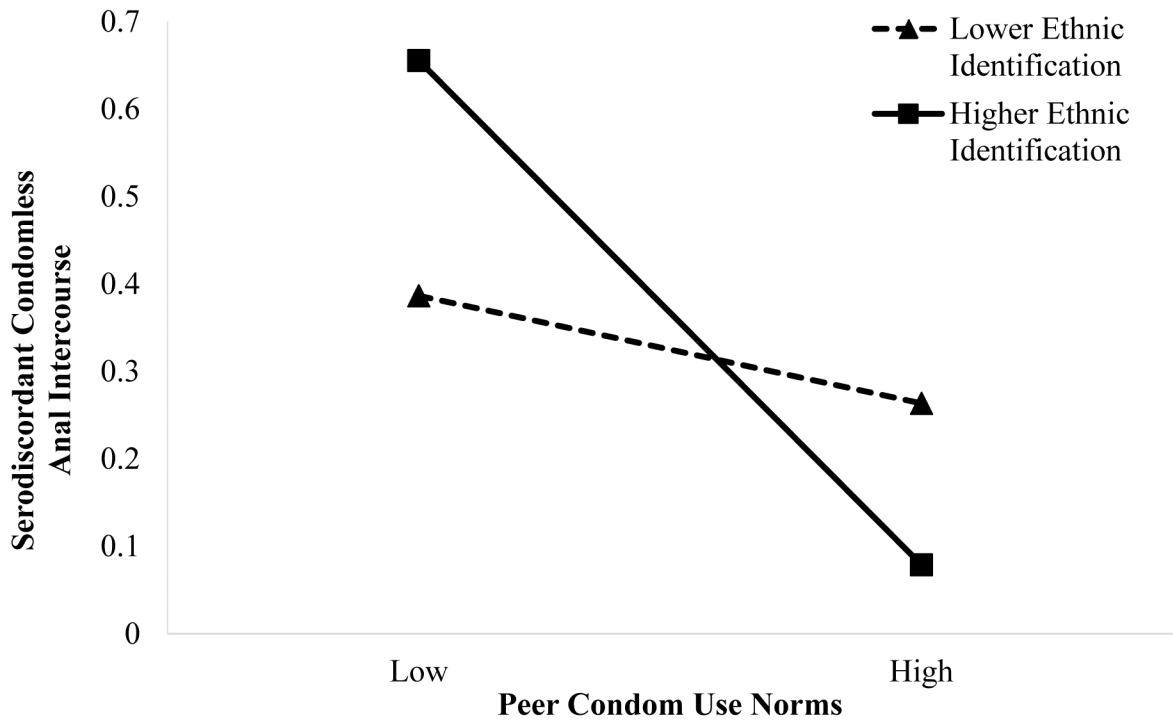
Fig. 7.
Interaction plot of ethnic identification (±1 SD) by peer condom use norms (±1 SD) on the number of serodiscordant condomless anal intercourse encounters, controlling for demographics, social support, and main effects.

Table 1.

Sample characteristics (n = 412)

	n	%
Education		
High school, GED, or less	90	21.8%
Some college or more	322	78.2%
Annual personal income		
< $9,999	136	33.0%
$10,000-$19,999	95	23.1%
$20,000-$59,999	140	34.0%
> $60,000	41	10.0%
Relationship status		
single	224	54.4%
Married or recent partner	188	45.6%
Sexual identity		
Gay or homosexual	343	83.3%
Bisexual	42	10.2%
Heterosexual/other[a]	27	6.6%
HIV status		
HIV-negative	290	70.4%
HIV-positive	122	29.6%
Nativity status		
US-born	284	68.9%
Foreign-born	128	31.1%
SDCAI encounters[b]		
At least one in past 3 months	81	19.6%
	Mean	**SD**
Age in years	30.6	9.53
Social support	2.93	1.92
Language use	3.82	0.93
Ethnic identification	3.09	0.58
Sexual orientation-based discrimination	0.81	0.63
Internalized homophobia	1.75	0.77
Peer condom use norms	2.98	0.58

[a]A small minority of participants reported self-identifying as heterosexual. Heterosexually-identified men may engage in same-sex sexual behavior, including anal sex, without identifying as gay or bisexual.

[b]SDCAI = serodiscordant condomless anal intercourse.

Table 2.

Correlations between indicators of acculturation, sexual minority stressors, and peer condom use norms.

Measures	1	2	3	4	5	6
1. Language use	--					
2. Nativity status	0.54**	--				
3. Ethnic identification	−0.24**	−0.06	--			
4. Internalized homophobia	−0.02	−0.01	−0.05	--		
5. Sexual orientation-based discrimination	−0.06	−0.002	0.39	.098*	--	
6. Peer condom use norms	−0.08	0.01	0.23**	−0.12*	−0.01	--
7. Social support	−0.05	0.05	0.18**	0.19**	0.03	0.12*

Note: Spearman's correlation coefficients are presented above due to skewness present in the data.

Table 3.

Unadjusted incidence rate ratios of serodiscordant condomless anal intercourse encounters by demographic and psychosocial factors.

	Serodiscordant condomless anal intercourse	
	uIRR	95% CI
Age	1.03 ***	(1.01, 1.05)
Income[a]		
$10,000-$19,999	1.06	(0.72, 1.56)
$20,000-$59,999	0.44 ***	(0.29, 0.66)
> $60,000	0.66	(0.37, 1.17)
Education[b]		
Some College or More	0.61 **	(0.43, 0.87)
Relationship status[c]		
Married / recent partner	0.48 ***	(0.35, 0.67)
Sexual orientation[d]		
Bisexual	1.08	(0.65, 1.79)
Heterosexual/other	1.50	(0.85, 2.65)
HIV status[e]		
HIV-positive	1.97 ***	(1.43, 2.71)
Social support	0.99	(0.90, 1.08)
Internalized homophobia	1.13	(0.93, 1.37)
Peer condom use norms	0.43 ***	(0.32, 0.58)
Sexual orientation-based discrimination	0.71 *	(0.55, 0.93)
Language use	0.89	(0.75, 1.05)
Ethnic identification	0.82	(0.61, 1.10)
US-born[f]	1.43 *	(1.01, 2.02)

Note.

[a] Versus less than $10,000

[b] versus high school diploma, GED, or less

[c] versus single

[d] versus gay or homosexual

[e] versus HIV negative

[f] versus foreign-born

[*] $p < .05$

[**] $p < .01$

***
$p < .001$

Table 4.

Adjusted incidence rate ratios of serodiscordant condomless anal intercourse encounters by minority stressors, peer condom use norms, acculturation indices, and interaction terms.

	Serodiscordant condomless anal intercourse				
	Model 1	Model 2	Model 3	Model 4	Model 5
	IRR	IRR	IRR	IRR	IRR
Internalized homophobia (IH)	1.08	3.67	1.06	1.11	3.51
Sexual orientation-based (SO) discrimination	0.79	0.81	1.84	0.82	2.06
Peer condom use norms	0.39***	0.34	0.38	0.35	0.34
Language use	0.71**	0.79	0.76	0.68	0.83
US-born[a]	1.99**	1.76	1.81	2.10	1.65
Ethnic identity	0.86	0.78	0.92	0.75	0.75
Moderation					
IH x language use	-	3.05***	-	-	2.78***
IH x US-born[a]	-	0.17***	-	-	0.18***
IH x ethnic identity	-	1.72*	-	-	1.57
SO discrimination x language use	-	-	1.82**	-	1.76*
SO discrimination x US-born[a]	-	-	0.34*	-	0.31*
SO discrimination x ethnic identity	-	-	1.04	-	-
Norms x language use	-	-	-	0.60*	0.71
Norms x US-born[a]	-	-	-	1.11	-
Norms x ethnic identity	-	-	-	0.28***	0.35**
−2 Log likelihood	−135.50	−177.89	−144.97	−153.94	−196.11

All models controlled for age, education, annual income, sexual orientation, HIV status, and social support.

[a] Versus foreign-born

*
$p < .05$

**
$p < .01$

***
$p < .001$