

Influences of Economic, Social and Cultural Marginalization on the Association Between Alcohol Use and Sexual Risk Among Formerly Incarcerated Latino Men

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Abstract Formerly incarcerated Latino men (FILM) have been significantly impacted by the HIV/AIDS and alcohol abuse epidemics in the United States. In this analysis, we examine the role of social, economic and cultural marginalization in the likelihood of alcohol-related sexual risk taking behavior among FILM. We recruited a non-random sample of FILM, ages 18–49 (n=259). We performed logistic regression modeling to test four hypotheses examining the direct and moderating effects of socio-cultural factors. Drinking before sex was strongly associated with high likelihood of condomless intercourse (adjusted odds ratio, AOR = 2.93; 95% CI 1.74, 4.94). Low acculturation and social marginalization factors were significant moderators of the association between high-risk alcohol use and sexual risk behavior among FILM. Our data suggest that risk reduction initiatives geared towards reducing alcohol-related sexual risk taking among FILM should target FILM with low levels of acculturation, and those with high levels loneliness, anxiety, and/or depression.

Keywords Alcohol use · Acculturation · Formerly incarcerated Latino men · Men · Latinos · Sexual risk behavior

Introduction

Alcohol abuse and HIV/AIDS are intersecting epidemics affecting ethnic minority men in the United States [1–4]. Biological and behavioral factors explaining the interconnections between these epidemics are well-documented, with estimates of the co-occurrence of alcohol dependence among individuals infected with HIV ranging from approximately 30–70% in different samples [5–8]. However, what remains relatively unanswered is how social-cultural factors may influence the associations between alcohol abuse and HIV risk-taking. In this analysis, we examine the roles of economic, social marginalization, and cultural factors in exacerbating or restraining alcohol-induced sexual risk-taking behaviors among particularly vulnerable group, formerly incarcerated Latino men (FILM). The rise of globalized economic restructuring, and the multiple global recent economic crises in the first decade of the twenty-first century, have resulted in tremendous economic polarization, that is the distancing between the rich and the poor as middle classes shrink, affecting multiple areas of the human experience, and marginalizing from the formal economy entire sectors of the population globally [9–14]. Yet, limited attention has been given to the effects of economic marginalization in the association between alcohol use and HIV risk-taking behavior. This analysis provides us an opportunity to examine these effects and the potential to design intervention HIV/alcohol abuse risk reduction strategies among socially and economically marginalized groups such as FILM.

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We examine economic marginalization through the lenses of low educational attainment, low annual income, and a self-perceived low socio-economic status in comparison to others in society [15]. Similarly we examine the effects of social marginalization through the following indicators: loneliness, anxiety, and depression in alcohol-induced risk-taking within the context of protective social and cultural factors (focusing on acculturation, familism and machismo). Before presenting our findings, it is important to first understand the context and magnitude of the alcohol abuse and HIV epidemics among Latino men.

Intersecting Epidemics

Twenty-five percent of Latino men binge drink (defined for males as drinking five standard drinks per occasion, within 2 h), second only to Native Americans at 29.6% [16, 17]. One in ten deaths among working-age adults, 20–64 years, (regardless of race/ethnicity) in the U.S. is due to excessive alcohol use [18]. In 2013, alcohol-induced, age-adjusted, death was the fifth leading cause of death for Latino males in the U.S. [19]. Approximately 17 million adults in the United States have an alcohol use disorder (AUD) diagnosis (as defined by the diagnostic and statistical manual of mental disorders (DSM) of the American Psychiatric Association) yet only a fraction (two out of twenty-five) of people who could benefit from treatment receive help [16, 20]. Approximately 9.5% of Latinos will have at least one type of AUD at some point in their lives. Latinos who become alcohol dependent are almost 1.5 times more likely to experience recurrent or persistent problems when compared to non-Latino Whites (33.1% vs. 22.8%) [16, 20, 21].

While high-risk alcohol consumption is a cause for concern in and of itself, recent evidence suggests that alcohol abuse (and AUD) might be associated with the likelihood of HIV risk behavior, HIV infection, and late AIDS diagnosis [22–27]. HIV/AIDS is the sixth leading cause of death for Latino men ages 25–44 [19, 28, 29]. Major disparities affecting Latinos include low levels of HIV knowledge, testing, and retention in care, as well as, late HIV diagnosis (AIDS diagnosis within 6 months of HIV diagnosis) which affects approximately 44% of Latinos [29]. These disparities are aggravated by an insufficient understanding of how social and cultural environments influence both alcohol abuse and the acquisition of HIV/AIDS. It is not clear what the multiple effects that acculturation and economic and social marginalization may have in the association between HIV risk-taking behavior and alcohol use. This is particularly important since HIV screening practices and uptake of HIV treatments remain low among Latino men [28, 30].

Previous studies exploring the relationship between alcohol use and sexual risk behaviors have also identified a similar association. For example, O'Hara and Cooper [31]

conducted a longitudinal study over the course of 15 years that demonstrated a bidirectional association between alcohol use and sexual risk behaviors [31]. They suggest that interventions must target both simultaneously. Additionally, O'Hara and Cooper [31] provide evidence for differences in this association across race and gender, supporting our targeting of specific populations at higher risk for alcohol use and sexual risk behaviors [31]. Claxton et al. [32] also provide evidence for a significant link between alcohol use and sexual risk behaviors. They assert that the strength of this association can vary depending on how it is measured [32]. The bi-directionality of alcohol use and unprotected sex indicated by O'Hara and Cooper [31] suggests that alcohol use in combination with other stressors in the social and cultural environment may lead to sexual risk-taking [31].

Social and Economic Marginalization

The HIV/AIDS and alcohol abuse epidemics intersect profoundly in the lives of FILM. Exposure to long and short-term imprisonment dramatically increases an individual's vulnerability towards HIV, STIs, and potentially aggravate the severity of pre-existing (or onset of) drug use, alcohol use, and mental health disorders [33, 34]. High levels of HIV/AIDS and alcohol abuse are well-documented among formerly incarcerated populations and have been attributed to issues of re-entry: difficulty re-entering the workforce, adapting to new cultural environments, stigma, and isolation [35, 36]. These high levels of risk behaviors among FILM can be attributed to unemployment. As Maldonado-Molina and Jennings [38] indicated in their commentary on Caetano et al. [37] study, there seems to be an interaction between gender and employment with respect to mental health outcomes [37, 38]. Being male for Latinos seems to be a protective factor against major depression among Latinos, yet, employed part-time Latino men were almost five times more likely than women employed fulltime to be depressed [37, 38]. This gender-employment interaction may have similar effects in the mental health of FILM given the challenges that represent having a criminal record for entering the workforce [39].

The social-economic context in which Latinos live has been demonstrated to affect the health of Latino communities, particularly those in contact with the criminal justice system. For example in a longitudinal study linking social and human capital to longitudinal offending trajectories in a sample of 460 serious adolescent Hispanic offenders (ages 14–17) from mid-adolescence into early adulthood, Piquero et al. [40] found that major differences between three life-course trajectories of criminal offenses were often associated with the internationalization of the effects of economic marginalization [40]. Specifically, youth in the high frequency offending trajectory had significantly lower human

capital (defined as adolescent's prediction of his/her future adult economic-social success) than those in the lower frequency offending trajectories [40]. Furthermore, youth who resided in neighborhoods with greater problems had a higher likelihood of being in the high frequency offending trajectory compared to those in the very low offending trajectory [40]. Taking the above into consideration, it is likely that the intersections of economic and social isolation, prejudice, stigma, loneliness, depression, and anxiety create a syndemic effect increasing the likelihood of HIV risk acquisition and the development of severe AUD among vulnerable groups, such as FILM [41–43].

The Role of Culture

The pathways toward alcohol abuse and HIV risk-taking seem to be influenced by cultural factors. Familism is found to be a strong social factor in cultures characterized by the orientation toward the welfare of one's larger community or collectivism (as opposed to the orientation toward one's own welfare, i.e., individualism) [44]. Individuals who report higher levels of familism are more likely to engage in healthy behaviors and less likely to practice risky ones. For example, the higher the level of familism, the lower the frequency of substance use among Latino adolescents and children [45–47]. Higher levels of familism have been associated with higher self-esteem among Latino adolescents and higher self-efficacy with respect to negotiating sex and condom use among Latino and non-Latino college students [48–50].

Machismo refers to the expression of hyper masculinity including the internalization of the following: (a) ideologies of a perceived ideal masculinity (such as gender power inequity, men's respect, and reputation maintenance); (b) low personal agency including relinquishing locus of control regarding sexual-decision making; and (c) expressing positive experiential attitudes regarding sexual transgressions reinforcing notions of manhood and virility [51]. High machismo has been found to be associated with higher levels of arrests, fights, alcohol consumption, a lower level of satisfaction with life, affiliation and emotional connectedness with others, and lower problem-solving coping styles than those with lower machismo [51]. High machismo can be characterized by myopic decision-making; making decisions that guarantee instant gratification without taking short- or long-term consequences (or the costs of their decisions) into consideration [52]. We draw this concept from behavioral economics, which is primarily concerned with the bounds of rationality of market participants. Low machismo can be viewed as a protective factor against alcohol-related sexual risk taking [53].

In summary, familism being associated with protective behaviors operates to provide emotional closeness and

connectedness to one's kinship networks, thus providing the social resources to the general management of one's life [54]. Machismo, on the other hand, has been associated with risk taking behaviors [55]. Therefore, dominant, aggressive, power-driven dimensions of expressing hyper-masculinity may lead an individual to engage in risky, unprotected encounters as an expression of his virility thereby regaining control over his post-prison life.

In a study with a large national sample of the US adult population, Blanco et al. [56] examined AUD among a subsample of 6359 Latinos and found that the prevalence of AUD increases with acculturation in a dose–response relationship [56]. However, in another study along the Texas–Mexico border, the relationship between AUD and acculturation was bimodal, those in the poles of the acculturation spectrum were more likely to report AUD [57]. Just as acculturation may affect Latino men's alcohol use in a dose–response or bimodal pattern; variation in acculturation may intensify or diminish associations between alcohol use and HIV risk. In this analysis, we will explore how cultural-social dimensions (including acculturation) in the lives of FILM may accelerate or restrain engagement in alcohol-related sexual risk behavior. Acculturation can be conceptualized into four general stages: (1) cultural marginalization where individuals reject both their culture of origin and the dominant host culture; (2) assimilation occurs when individuals adopt the cultural norms of a dominant or host culture, over their original culture; (3) separation occurs when individuals reject the dominant or host culture in favor of preserving their culture of origin; and (4) integration occurs when individuals are able to adopt the cultural norms of the dominant or host culture while maintaining their culture of origin [58, 59]. Because of the hyperincarceration of ethnic minorities in the US, FILM can be at any of the above stages of acculturation [60]. It is also likely that through incarceration itself and the length of imprisonment may alter processes of acculturation, yet this gap remains in acculturation research. Nonetheless, it is known that acculturation and cultural factors matter in criminal involvement and recurrent criminal offenses trajectories for Latinos. In a longitudinal study of Puerto Rican youth ($n=1138$) offenders in New York, Maldonado-Molina et al. [61] found that parenting coercive discipline practices, that being male and having a preference for thrill and adventure-seeking behaviors were associated with offending [61]. Youth who reported experiencing higher levels of cultural stress and parents used coercive disciplining techniques had a higher likelihood of victimization [61]. Using the same sample, Jennings et al. [62] found in their multivariate models that frequency of violent behaviors was associated with holding pro-delinquent attitudes, having delinquent peers, being exposed to violence, and being acculturated [62]. They also found that the more

prevalent protective factors against violence were high academic achievement, not being physically abused, not being sexually abused, and not having cultural stress [62]. Processes of acculturation seem to have an effect together with other factors in initiating and maintaining criminal behavior among Latino youth after their first criminal offense. Migration status also matters in this regard. For example Piquero et al. [40] found that among Latino youth being first-generation immigrant was a protective factor for youth in their likelihood of a high frequency offending trajectory from mid-adolescence to young adulthood [40]. Maldonado-Molina et al. [63] found a similar protective effect in the likelihood of driving under the influence (DUI) of alcohol or drugs among Latino youth, where those US-born Latinos had higher likelihood of DUI than immigrant youth [63].

The effects of acculturation and cultural factors post-imprisonment have not been fully examined among Latino men. In this analysis, we take the scientific premise that acculturation would have a different effect than during mid-adolescence and young adulthood, that FILM who are more acculturated should theoretically have less pressures to become acculturated, be more likely to manage their re-entry from prison/jail, and less likely to engage in risky behaviors as coping mechanisms. Moreover, acculturated FILM might be more aware of the local HIV/AIDS epidemic, thus, more likely to use condoms consistently in spite of alcohol level.

Objectives

We want to examine the impact of social and economic marginalization and cultural factors on alcohol-related sexual risk taking behavior, defined as having an unprotected (condomless) sexual intercourse event within 2 h (post consumption) of alcoholic drinks. We operationalize this analysis through the following hypotheses:

H₁ Economic marginalization hypothesis—The likelihood of experiencing an alcohol-related sexual risk-taking event in the past 30 days will be associated with one or more of the following: low levels of education completed, low income, and/or low self-perception of socio-economic positioning within society among FILM.

H₂ Cultural protective factors hypothesis—The likelihood of not experiencing an alcohol-related sexual risk-taking event in the past 30 days will be associated with one or more of the following: high levels of familism, and/or low levels of machismo among FILM.

H₃ Social marginalization hypothesis—The likelihood of experiencing an alcohol-related sexual risk-taking event in

the past 30 days will be associated with one or more of the following: high levels of loneliness, anxiety, and/or depression among FILM.

H₄ Acculturation hypothesis—The likelihood of experiencing an alcohol-related sexual risk-taking event in the past 30 days will be associated with one or more of the following indicators of acculturation: birthplace outside the U.S. (excluding the territory of Puerto Rico), low length of time in the US (excluding the territory of Puerto Rico), and/or low score in acculturation scale among FILM.

We will use empirical evidence to argue that a closer examination of these processes is needed in order to address the dual needs of FILM with regards to alcohol abuse and HIV risk-taking.

Methods

In order to examine the associations between alcohol use and sexual risk behavior among FILM, we used data generated from the study *Social Network Determinants of Risk among Formerly Incarcerated Latino Men* (#1RC1MH088636-01; 2009-11). The analyses presented in this manuscript focus exclusively on the quantitative data component with a non-random sample of FILM (n=259), ages 18–49, who had been in jail or prison within the past 5 years [64].

Five peer FILM trained community field researchers, who worked with the principal investigator in a prior study served as recruiters and facilitators of the self-administered computer-based surveys. They trained in research methods, research ethics, and completed and passed the Collaborative Institutional Training Initiative (CITI) certifications. Additionally, they were trained in this study's protocol. Participants were recruited from the three geographic areas of New York City with the highest proportion of Latinos. One quarter of participants (n=65) were recruited from referrals from flyers posted in the research sites. The remaining participants (n=194) were recruited in public venues. Fieldworkers did not target specific individuals during outreach, rather through groups of men hanging out on street corners, at public venues, and Latino cultural community events. In brief, they offered a general description of the study following a script approved by the Columbia University IRB and offered potential participants the choice of answering the screening questionnaire which was used to determine eligibility. Individuals were included in the study if they were male, between the ages of 18–49, and had been in jail or prison within the past 5 years. Individuals on probation or parole were included in the self-administered survey portion of the study.

Most data collection took place during data collection events organized by the investigative team at the facilities of Columbia University, during weekends. Individuals that had been deemed eligible were invited to these data collection events where they first underwent thorough individual informed consent procedures with trained staff in a private office. They were then asked to complete the survey on a desktop computer within a larger computer lab only available to study participants. Participants who were not able to attend community data collection events answered the survey through a laptop computer in a private setting. The survey took 45–90 min to complete. Before initiating the survey participants were again asked to indicate their consent to participate by agreeing to a voluntary participation statement on the computer screen. Each survey participant was compensated \$50. Additionally, a Certificate of Confidentiality was obtained from the National Institute of Mental Health in order to protect the privacy and confidentiality of the study participants and any contact information linking study participants to participation in the cross-sectional survey phase of the study was destroyed after completion of the survey. Of the 350 men recruited, 88.6% ($n=310$) met the eligibility criteria for the study, of those, 12.9% refused to participate due to time constraints or a lack of interest, and 3.5% began but did not completed the survey.

Sampling Limitations

We did not randomly recruited from correctional facilities because our aims were to examine FILM already relocated into their communities, thus, self-selection bias and over-representation of certain networks are potential sampling limitations for this study [65, 66]. We minimized self-selection bias by not sharing the eligibility criteria for the study; however, our study is limited by potentially having limited representation of two sectors of FILM. One potentially underrepresented group is full-time employed men with limited time to participate in the study or who avoided being engaged in the study as they may not have had time to socialize at the recruitment street points. The latter was addressed by recruiting during the evening and weekends. The second potential group is severely physically disabled FILM who may not have been present at the recruitment venues for the study. The second sampling limitation is the over-representation of Puerto Ricans in the sample (see Table 1). Although the proportion of Puerto Ricans in the sample is consistent with the demographic distribution of two recruitment areas, all but one of the community field researchers who served as recruiters was Puerto Rican. Since we did not have a recruiter of Dominican or Mexican descent, it is likely that Dominicans and Mexicans are potentially under-represented in this study.

Measures

In this analysis we examined the variables within the survey conceptually corresponding to our analytical hypotheses.

Condomless Intercourse

Participants were asked about their sexual activity and sexual partner characteristics (sex, age, meeting place, and place of sex) in the past 30 days including three main types of sexual behaviors: masturbation (mutual or received), oral (receiving or performing fellatio, performing cunnilingus; performing or receiving analingus), and vaginal and/or anal intercourse (insertive or receiving). For each of the sexual intercourse encounters, participants were asked if condoms were used partially or during the entire act. We determined the proportion of condomless intercourse (intercourse acts where partial or no condoms were used) ranging from 0% (meaning condoms used consistently and correctly at each intercourse act) to 100% (meaning condoms were not used partially or fully during all intercourse acts) in the prior 30 days. The above measures have been used in similar HIV/STI risk behavioral studies with Latinos [67, 68].

Heavy drinking right before sex (HDRBS) was calculated based on number of alcoholic drinks in the 2 h before each sexual encounter in the past 30 days. An alcoholic drink was defined as two 12 oz. beers of 5% ABV or less, one glass of wine, or one mixed drink (with 80 proof distilled alcohol). If the person had three or more drinks in the 2 h prior to initiating the sexual encounter, then it was considered a HDRBS episode. We calculated the proportion of HDRBS in the prior 30 days ranging from 0 to 100% (with the highest value representing that every sexual encounter was preceded by heavy drinking).

Acculturation Factors

We used three indicators to help assess FILM's exposure to the dominant Anglo culture (for those not born in the U.S. contiguous states, Alaska, or Hawaii) and where in the process of acculturating FILM were: (1) a well-known validated acculturation scale (SASH Brief Scale, 13 items related to three factors: (a) "Language Use," (b) "Media," and (c) "Ethnic Social Relations" with higher value indicate higher acculturation, $\alpha = 0.91$) [69]; (2) Birthplace (U.S. mainland born vs. Foreign and US territories born); and (3) Length of stay in the U.S. (if not U.S. born).

Cultural protective factors potentially influencing the association between alcohol and sexual risk were examined through two constructs: (1) Machismo, the extent to which FILM agree with statements that denote dominant-aggressive masculinity (Cuellar, Arnold and Gonzalez' Scale; 22 items higher values indicate greater adherence to male

Table 1 Sample background characteristics of formerly incarcerated Latino men (FILM, n = 259, 2009–2012; New York, New York)

Characteristic	%
Age (years)	
Below 29	25.1
30–49	74.9
Education (highest attainment)	
Elementary, middle school or incomplete high school	49
High school or graduate equivalency degree (GED) with/without vocational/specialized education (plumbing, carpeting)	31.2
1–2 years college or completed college/university degree	3.8
Employment (current status/type)	
Unemployed	74.9
Administrative or managerial	–
Sale and retail	–
Protective, household or other services	25.1
Daily workers, mechanics, repairers, construction workers, farmers or groundskeepers	–
Technicians	–
Annual individual income (salaries, wages, official and unofficial sources)	
<USD \$14,999	75.3
USD \$15,000–\$49,000	24.7
>USD \$50,000	–
Birthplace	
United States (mainland, Hawaii and Alaska)	76.8
Born in U.S. territory or foreign born	23.2
Nationality/ethnicity/generation	
Puerto Rican (first generation)	19.7
Puerto Rican (second generation)	37.8
Puerto Rican and African American (second generation)	10.8
Puerto Rican and White (second generation)	7.3
Mexican (first generation)	1.2
Mexican (second generation)	2.3
Dominican (second generation)	9.3
Salvadorian (first generation)	2.3
Cuban (second generation)	9.3

privilege ideology, $\alpha = 0.87$) [70]; and (2) Familism, the level of agreement with emotional and physical connectedness to one's families, (Steidel and Contreras's familism scale, 18 items related to 4 factors: familial support, familial interconnectedness, familial honor, and subjugation of self for family; $\alpha = 0.93$) [71].

Economic Marginalization Factors

We measured indicators of economic marginalization: (1) education level (number of years completed); (2) employment status at the point of the interview (Yes/No employment in formal economy); (3) annual personal income from all sources; and (4) self-rating scale of economic positioning within society was determined using the perceived socio-economic status of the Add Health Survey Wave IV In-Home Interview, variable H4EC19 [72]. Measure four

had the following instructions: "Think of this ladder as representing where people stand in the United States. At the top of the ladder are the people who are the best off—those who have the most money, the most education, and the most respected jobs. At the bottom are the people who are the worst off—who have the least money, least education, and the least respected jobs or no job. The higher up you are on this ladder, the closer you are to the people at the very top; the lower you are, the closer you are to the people at the bottom. *Where would you place yourself on this ladder?* Please place a large "X" on the rung where you think you stand at this time in your life, relative to other people in the United States."

Social marginalization factors were measured through three indicators: loneliness, depression, and anxiety. Loneliness was measured using the revised UCLA loneliness scale (a 20-item scale designed to measure one's subjective

feelings of loneliness as well as feelings of social isolation. Participants rate each item on a scale from 1 (Never) to 4 (Often); $\alpha=0.88$ [73]. Depression (6 items, $\alpha = 0.92$) and anxiety (6 items, $\alpha = 0.95$) were measured using the Brief Symptom Inventory (BSI). The BSI consists of 53 items covering nine symptom dimensions, two of which are depression and anxiety. Participants ranked each feeling item (e.g., “your feelings being easily hurt”) on a 5-point scale ranging from 0 (not at all) to 4 (extremely true). Rankings characterized the intensity of distress during the past 7 days. The BSI is the short version of the SCL-R-90 [74, 75], which measures the same dimensions. Items for each dimension of the BSI were selected based on a factor analysis of the SCL-R-90, with the highest loading items on each dimension selected for the BSI [76–78]. BSI score cutoffs are highly correlated with being symptomatic of the mental health disorder dimension, in our case, chronic depressive disorder and chronic anxiety disorder. Raw scores from participant responses were converted to T scores using the tables provided in the BSI manual and interpreted by comparison to age-gender appropriate normative data of non-clinical samples of adults. We determined the cutoff score for depression at 2.20 and for anxiety at 2.40 [76–78].

Analytical Plan

Data were extracted from the survey database and imported into IBM SPSS Statistics version 23. We performed logistic regression modeling to examine our hypotheses. We first examined the association between heavy drinking right before sex and the likelihood of condomless intercourse (Model 1). Then we examined the direct effects of the economic marginalization factors (Model 2), cultural protective factors (Model 3), social marginalization factors (Models 4 and 5), and acculturation indicators (Models 7 and 8), on the likelihood of condomless intercourse. Factors that were significant were included in one final set of models (Models 6 and 9) to examine interaction effects on the primary association of interest. We reported the adjusted odds ratios (AOR) for logistic regression models together with 95% confidence intervals.

Prior to testing our hypotheses, we verified that our variables met the basic assumptions for logistic regression modeling: (1) our independent variables were linearly related to the log odds—a violation of this assumption underestimates the strength of the relationship and rejects the relationship too easily, that is being not significant (not rejecting the null hypothesis) where it should be significant; (2) although the independent variables do not need to be multivariate normal, 80% of our independent variables had a normal distribution, yielding more stable models; (3) logistic regression models should be fitted correctly,

thus we used a stepwise method to estimate each of the logistic regressions; (4) we calculated the “tolerance” and “VIF” (*variance inflation factor*) values for each predictor as a check for multicollinearity. “Tolerance” is an indication of the percent of variance in the predictor that cannot be accounted for by the other predictors, hence very small values indicate that a predictor is redundant. The values for each of the nine models ranged between 0.15 and 0.86 (i.e., less than 0.10 is generally recommended to pursue a correctional strategy). The calculated VIF values for each of our nine models were below 10 (i.e., a variable with VIF values greater than 10 may merit further investigation) [79]. (5) Finally, based on our sample size of 259 we calculated our power for each of the models ranging between 0.82 and 0.96. We followed the general recommendation of at least ten cases per independent variable, thus, we had a sufficient sample size to carry out our proposed analyses [79].

Results

Sample Characteristics

The men in our study resided in zip codes corresponding to communities below the city and national poverty levels. The mean age of participants was 37.5. The majority of participants recruited were unemployed (74.9%). The most commonly reported reason for unemployment was inability to find work (42.2%), followed by illness, disability, or inability to work (30.7%). Nearly half of the participants (49.0%) had not completed high school. In our full sample ($n=259$), 29.7% of FILM had 1–5 lifetime female partners, 37.1% had 6–20 female partners, and 33.2% had 20+ female partners. More than one quarter (27.9%) of the sample reported at least one STI in the prior 12 months. The majority of the sexual intercourse encounters were condomless with 75.1% having had at least one unprotected vaginal intercourse in the past 30 days; and out of those who reported having anal sex ($n=32$) in the past 30 days, 62.5% reported having unprotected anal intercourse. Mixing alcohol with sex was commonly reported with 71.1% reported at least one instance of not using a condom during vaginal intercourse after drinking alcohol in the 2 h prior to sex. Of the 32 FILM who reported using alcohol during/ before anal intercourse in the past 30 days, 53.1% reported not using a condom. Heavy drinking right before sex was calculated at 41.7% in the past 30 days.

Overall, 61.2% reported having two or more drinks daily in the past 30 days, 30.5% and 26.9% met the cutoff criteria for major anxiety and depressive symptoms in the prior 7 days; and 41.7% reported major feelings of loneliness (scoring in the top twentieth percentile of the scale). Please see Table 1 for additional demographic information.

Heavy Drinking Before Sex (HDRBS) and Condomless Intercourse

HDRBS was consistently associated with the likelihood of a condomless intercourse (AOR = 2.93; 95% CI 1.74, 4.94; see Table 2, Model 1).

Economic Marginalization Factors (Hypothesis #1)

Levels of education, income, and self-rating socio-economic positioning were not associated with differences in the likelihood of condomless sexual intercourse (see Table 2, Model 2). Therefore, we could not test the influence of these factors in the association between HDRBS and condomless intercourse.

Cultural Protective Factors (Hypothesis #2)

Low machismo and high familism were not associated with differences in the likelihood of condomless sexual intercourse (see Table 2, Model 3). Therefore, we could not test the influence of these factors in the association between HDRBS and condomless intercourse.

Social Marginalization Factors (Hypothesis #3)

High levels of loneliness, anxiety, and depression were associated with a higher likelihood of condomless intercourse (see Table 2, Model 4). After taking loneliness, anxiety, and depression into account, heavy drinking remained a significant factor associated with condomless intercourse

Table 2 Economic, cultural and social marginalization factors associated with condomless intercourse among FILM in the past 30 days [adjusted odds ratio (AOR); 95% confidence intervals; n = 259; New York City; 2009–2012]

Economic and cultural factors	Model 1	Model 2	Model 3	
Heavy drinking right before sex (HDRBS) ^a	2.93** (1.74, 4.94)	–	–	
Education ^b	–	1.89 (0.74, 4.85)	–	
Income ^c	–	1.02 (0.95, 1.08)	–	
Self-ranking in economic ladder ^d	–	1.02 (0.95, 1.08)	–	
Machismo scale ^e	–	–	1.02 (0.93, 1.11)	
Familismo scale ^f	–	–	1.03 (0.53, 1.48)	
Age (years)	1.00 (0.95, 1.04)	0.99 (0.95, 1.04)	1.01 (0.98, 1.04)	
Chi square (model)	37.94**	0.27	0.31	
Nagelkerke R-square (model)	0.41	0.01	0.03	
Social marginalization factors	Model 1	Model 4	Model 5	Model 6
HDRBS	2.93** (1.74, 4.94)	–	2.99** (1.75, 5.11)	1.99* (1.08, 3.63)
Loneliness ^g	–	1.05** (1.01, 1.09)	1.06** (1.01, 1.10)	1.05* (1.01, 1.10)
Anxiety ^h	–	2.03** (1.02, 4.02)	2.11** (1.06, 4.22)	2.26* (1.09, 4.72)
Depression ⁱ	–	1.53** (1.04, 2.25)	1.71** (1.14, 2.56)	0.94 (0.45, 1.96)
Age (years)	1.00 (0.95, 1.04)	0.99 (0.95, 1.04)	1.02 (0.95, 1.08)	0.97 (0.93, 1.02)
HDRBS × loneliness	–	–	–	1.03 (0.99, 1.01)
HDRBS × anxiety	–	–	–	1.19 (0.66, 2.13)
HDRBS × depression	–	–	–	0.79 (0.37, 1.69)
Chi square (model)	37.94**	16.78**	39.62**	41.33*
Nagelkerke R-square (model)	0.41	0.14	0.42	0.43

*p < 0.01

**p < 0.001

^aReference group for HDRBS = 2 or less drinks before each sexual encounter in the past 30 days

^bReference group for education = high school, GED or higher

^cReference group for income = >\$14,000 USD from all sources at household level per year

^dHigher self-ranking in socio-economic ladder means higher placement in socio-economic status in comparison to others in the country

^eHigher score means higher agreement with aggressive masculinity and traditional division of male/female sex roles

^fHigher score means higher agreement with familism values (e.g., emotional connectedness with family, family honor)

^gHigher score means higher sense of loneliness in UCLA loneliness scale

^hReference group for anxiety = scoring below BSI cutoff for indicator of major anxiety disorder

ⁱReference group for depression = scoring below BSI cutoff for indicator of major depressive disorder

(see Table 2, Model 5), and the magnitude of the association remained at the same level. Loneliness, depression, and anxiety remained significant in the multivariate model 5 (Loneliness AOR=1.06; 95% CI 1.01, 1.10; Anxiety AOR=2.11; 95% CI 1.06, 4.22; Depression AOR=1.71; 95% CI 1.14, 2.56). We included three interaction terms (depression × heavy drinking; anxiety × heavy drinking; and, loneliness × heavy drinking) in Model 6 (see Table 2); however, none of these were statistically significant. Furthermore, the inclusion of the interaction terms resulted in depression no longer being statistically significant and it significantly reduced the magnitude of the association between heavy drinking and condomless intercourse (from AOR of 2.93 to AOR of 1.99). After finding that the interaction terms in the above model were not statistically significant, we explored the possibility that social marginalization factors were potential causes of both our outcome variable (as demonstrated already in Models 4 and 5) and our main independent variable, HDRBS. We found that the proportion of HDRBS events was positively associated with severity of major depressive and anxiety symptoms (Adjusted B for depressive symptoms=0.32, SE 0.16, $p < 0.05$; Adjusted B for anxiety symptoms=0.34, SE 0.15, $p < 0.05$) but not for variations in levels of loneliness.

Acculturation Factors (Hypothesis #4)

Length of stay in the U.S. and birthplace were not associated with differences in the likelihood of condomless intercourse (see Table 3, Model 7). Therefore, we could not test the influence of these factors in the association between HDRBS and condomless intercourse. We did however find that high levels of acculturation were associated with high likelihood of condomless intercourse (AOR 2.93, 95% CI

1.74, 4.94; see Table 3, Model 7). After taking acculturation into account, HDRBS remained a significant factor associated with condomless intercourse (AOR 3.01, 95% CI 1.77, 5.11; see Table 3, Model 8) and the magnitude of the association remained at the same level. Acculturation remained significant in the multivariate model 8. We included one interaction term (acculturation × HDRBS) in Model 9 (see Table 3); however, this interaction term was not statistically significant. The inclusion of the interaction term resulted in slightly reducing the magnitude of the association between HDRBS and condomless intercourse (from AOR of 2.93 to AOR of 2.22). After finding that the interaction term in the above model was not statistically significant, we explored the possibility that acculturation was a potential cause for both our outcome variable (as demonstrated already in models 7, 8, and 9) and our main independent variable, HDRBS. We found that HDRBS was not statistically associated with differences in acculturation level.

Discussion

For FILM in our study, heavy drinking right before sex (HDRBS) was associated with condomless sexual intercourse. In summary, our evidence does not support rejecting or accepting the economic marginalization and cultural protective factors hypotheses. However, we found evidence to support our low acculturation and high social marginalization hypotheses. In this section, we will discuss the limitations of our study in assessing the first two hypotheses and discuss the results of the latter two hypotheses within the broader context of the literature on alcohol and sexual risk-taking.

Table 3 Acculturation factors associated with condomless intercourse among FILM in the past 30 days [adjusted odds ratio (AOR); 95% confidence intervals; n=259; New York, New York; 2009–2012]

Acculturation factors	Model 1	Model 7	Model 8	Model 9
HDRS ^a	2.93** (1.74, 4.94)	–	3.01** (1.77, 5.11)	2.22* (1.32, 3.71)
Acculturation scale ^b	–	0.93** (0.88, 0.98)	0.96** (0.92, 0.98)	0.91* (0.85, 0.98)
Birthplace ^c	–	2.03 (0.78, 2.13)	–	–
Length of stay in US (years)	–	0.99 (0.95, 1.04)	–	–
Age (years)	1.00 (0.95, 1.04)	0.99 (0.95, 1.04)	1.02 (0.95, 1.08)	1.02 (0.95, 1.08)
HDRS × acculturation	–	–	–	1.01 (0.96, 1.06)
Chi square (model)	37.94**	14.33**	39.03**	18.71*
Nagelkerke R-square (model)	0.41	0.25	0.41	0.37

* $p < 0.01$

** $p < 0.001$

^aReference group for HDRBS = 2 or less drinks before each sexual encounter in the past 30 days

^bHigher score means higher level of acculturation to Anglo–American culture

^cReference group for birthplace = born in the US mainland, Alaska or Hawaii (excluding territories)

We found that acculturation was inversely associated with alcohol-related sexual risk behavior. Low acculturation might be an indicator of the impact of some FILM living transnational lives pre- and post-incarceration. Most FILM in the U.S. live in a transnational context characterized by cultural and economic exchanges transcending national and state boundaries, including ideological exchanges on health seeking, and the treatment and management of illnesses through cyclical migratory patterns and remittances [80–85]. For FILM in the New York City metropolitan area, this often means living lives in cultural, transnational spaces with set boundaries separating the ideological dominant cultural space (e.g., affluent, middle, and upper social classes) from the community dynamics of low-income neighborhoods [86, 87]. This may be a process of actively rejecting acculturating to what might be perceived as “White” culture, which is relevant for FILM because imprisonment in U.S. correctional facilities involves a re-racializing/re-ethnification process. Racial and ethnic identity identification is central to prison life organizing as prison gangs (also known as “street families”) are often divided or organized around racial-ethnic lines [88, 89]. For some (or most) first and second-generation Puerto Ricans going through long-term imprisonment, the process of incarceration means a re-identification with “being Boricua” (Taino language term for natives of the Island of Puerto Rico, which native name was Boriquen) and a symbolic and tangible re-engagement with their sending communities [90, 91]. These processes, we argue, help maintain a lower level of acculturation or resistance to become acculturated among FILM.

Nationality matters with regards to alcohol abuse and heavy drinking [92]. Using data from a national sample that oversampled ethnic minorities, Rios-Bedoya and Freile-Salinas [19] found that both Mexican-Americans and Puerto Ricans had significantly higher rates of AUDs than non-Hispanic Whites [19]. Whereas only 0.6% of Cuban-Americans fit the diagnostic criteria for AUD, 3.6% of Puerto Ricans fit the criteria [19]. This difference becomes more pronounced when taking gender into account as nearly 10% of Puerto Rican men fit the criteria for an AUD [19, 93]. As our study was not designed to examine variations in nationalities, we did not have evidence to prove or reject our cultural protective hypothesis or to determine the effects of nationality on alcohol-related sexual risk. Given our sampling limitations (e.g., the over representation of Puerto Ricans in the sample), we suggest that future studies use either community-based cross-sectional samples by nationality or recruit longitudinal samples by nationality and type of correctional facilities. For example, state prisoners serve long-sentences and potentially may have higher levels of social marginalization upon community re-entry than those in county jails. Conversely those in county jails

might be incarcerated because of drug related offenses, thus potentially exacerbating the association between alcohol abuse and disorders to HIV/AIDS vulnerability.

Social learning of alcohol usage at social events as a form of expression of masculinity seems to be central to the development of young manhood in Latin America [94–96]. From the bodegas on street corners across the urban U.S. to the cantinas in peri-urban Mexico or “chinchorros” (bars on the side of the road) in Puerto Rico, low-income Latino communities are characterized by male-centric/alcohol-centered social environments [97, 98]. Although our machismo hypothesis was not sustained, based on our data this may have been the result of low construct validity, i.e., having only one measure of masculinity, the general literature on masculinity have documented how expressions of hypermasculinity relate to the use of alcohol and sex to express gender dominance [99–104]. In the transnational context of cities like New York, there is a form of global surveillance of masculinity (within the local and sending communities) that creates challenging, stigmatizing environments (e.g., gossip about incarceration, poor fatherhood practices, or judgment on potential same-sex encounters while incarcerated) that may contribute to internalized stigma and in turn towards HIV risk-taking [100, 105, 106]. Therefore, masculinity (moving beyond our limited measure of it) must remain a critical element for continuing research on the association between alcohol abuse and sexual risk behavior.

In our analysis of social marginalization factors, we found that loneliness (a marker of social isolation), anxiety, and depression were positively associated with alcohol-related sexual risk behavior. However, our data does not support the interaction effects of these mental health indicators in moderating the association between alcohol intake and sexual risk behavior (see Limitations below). It is known that the relationship between stress, anxiety, depression, and sexual risk behaviors is complex and far from linear. As Miller et al. [105] concluded in their recent review, anxiety and depressive symptoms instigate cognitive and motivational processes that may alter risk perception, can lead to cognitive distortions which can deter rational decision-making, or can lead to self-gratifying behaviors that distract from negative feelings associated with psychological symptoms [107]. High levels of stress, anxiety, and depression have been associated with both high sexual desire leading to risk (high number of sexual partners, alcohol use prior to sex, and inconsistent condom use) [108, 109] and to low sexual activity that is highly risky, i.e., hypoactive sexual desire (low libido) and erectile dysfunction in combination with no condom use (to reduce likelihood of losing erections) [110–113]. High stress, depression, and anxiety have also been linked to high levels of acquiring sexually transmitted infections [110–113].

Although we did not measure the impacts of depression and anxiety on sexual functioning, our findings suggest strong associations between the severity of anxiety, depressive symptoms, and alcohol-related sexual risk behavior.

Our interaction models were not statistically significant. This is likely due to important limitations that need to be addressed: (1) the cross-sectional design of this study is a limitation in understanding the causal relationships between alcohol use, sex, and factors that may influence this association; (2) our analyses may be limited by potential endogeneity in our independent variables in relation to our outcome variable (i.e., the estimated effect of a regressor on an outcome is inconsistent when that regressor is determined simultaneously with that outcome) [114]. For example, an individual's chance of depression could potentially be jointly determined by the variables that we identified in the models (e.g., alcohol use, sexual behavior) and unspecified factors. Using instrumental variables estimation (i.e., in essence conducting statistical modeling using variables that are uncorrelated with the outcome variable but correlated with the independent variable) is a means of obtaining consistent parameter estimates in this situation. Unfortunately, this procedure cannot be extended to non-linear models such as logistic regression modeling used in this analysis. Although there are other methodologies that use instrumental variables, they are most adequate when the data collected is longitudinal [114]; and (3) a potential limitation is related to our measures. We measure frequencies of alcohol use and alcohol use before sexual encounters; however, clinical measures that may serve as indicators to detect the severity of problematic drinking or alcohol use disorders (such as the AUDIT) were not used [115]. Furthermore, we did not include a measure of acculturative stress in addition to our acculturation indicators when this research study was implemented. Acculturative stress refers to reactions to intercultural contact or the cultural adaptation process [49, 116–118]. It includes the pressures of learning a new language, balancing differing cultural values, and having to broker between American and Latino ways of daily living [49, 119]. Acculturative stress can result in psychological health problems, including higher levels of depression and anxiety [116, 120, 121].

Finally, our study represents a small sector of those Latino men affected by the U.S. criminal justice system (formerly incarcerated individuals) when also taking into account those under community supervision for probation (i.e., a court-ordered period of correctional supervision in the community, generally as an alternative to incarceration) or parole (i.e., a period of conditional supervised release in the community following a prison term). There are approximately 3.8 million and 857,000 individuals on probation and parole, respectively, in the U.S. with Latinos representing close to 17% [122]. Future studies interested in

examining the combined impacts of criminal justice, social and economic marginalization on substance use disorders and HIV/AIDS vulnerability must include individuals who are formerly incarcerated, and, under probation and parole.

Conclusion

Our findings must be taken with caution and as foundational. Further longitudinal research designs are needed to examine the potential influences of acculturation processes in including measures of acculturative stress and their influence on alcohol use and sexual risk among FILM.

Historian Fernando Picó in his book, “El día menos pensado: Historia de los presidiarios en Puerto Rico (1793–1993)” *The Day that One Least Expected: History of Prisoners in Puerto Rico (1793–1993)*, found that imprisonment was ingrained in the ideology of masculinity and social development for many young Puerto Rican men particularly since the early 1970s to the present [123]. In his oral history interviews with maximum-security prisoners in Puerto Rico, Picó [123] found a deterministic collective ideology among young men in low-income communities that can be summarized as a statement rather than a question of imprisonment (“at some point I will serve time in prison”) [123]. This is a transnational ideology that it is also present in poor urban Puerto Rican communities [124]. Thus, examining alcohol-related sexual risk behavior among FILM, serves as an opportunity to address the needs of a group that represents the end of the lines in the axes of social-economic marginalization processes affecting low-income Latino men. Our data suggest the use of post-release, parole visits mental health screenings, and HIV/STI, alcohol abuse screenings to increase early access to treatment among FILM. Targeting FILM for Furthermore, initiatives geared towards reducing alcohol-related sexual risk-taking among FILM might be more impactful by targeting those with low levels of acculturation, high levels of loneliness, anxiety, and/or depression. Taking the above approach may potentially decrease the disease burden, excess mortality, and economic impacts of high-risk alcohol use and HIV/AIDS [125–128]. Following Viruell-Fuentes and Schulz [130] and Tamaki [129] conceptualization of transnationalism and health [129, 130], we suggest that research and interventions on FILM in urban settings utilize a transnational framework to increase early detection practices, linkage to and retention into HIV care, and an integration of AUD early detection into HIV/AIDS prevention and treatment services for economically and socially marginalized Latino men such as FILM.

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Compliance with Ethical Standards

Conflict of interest Miguel Muñoz-Laboy declares that he has no conflict of interest. Omar Martínez declares that he has no conflict of interest. Vincent Guilamo-Ramos declares that he has no conflict of interest. Jeffrey Draine declares that he has no conflict of interest. Karin Eyrich Garg declares that she has no conflict of interest. Ethan Levine declares that he has no conflict of interest. Alexandra Ripkin declares that she has no conflict of interest.

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

Ethical approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional research committees of Temple University and Columbia University, and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. This study was approved by Columbia University (CU IRB protocol # AAE4697) and Temple University (TU IRB protocol #20641) Institutional Review Boards.

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