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Prevalence, patterns and predictors of substance use among Latino migrant men in a new receiving community

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Abstract

Background—The purpose of this study was to evaluate the prevalence, patterns and predictors (individual, social, cultural, and environmental) of illicit drug use and binge drinking in a cohort of Latino migrant men (LMM) in a new receiving community.

Methods—A cohort of LMM in New Orleans (n = 125) was assembled in 2007 using respondent driven sampling and interviewed quarterly for 18 months regarding past month substance use and other potential covariates. Baseline frequencies were weighted using RDSAT and longitudinal analyses included generalized estimating equations (GEE) and the Cochran–Armitage test for trends.

Results—At baseline, substance use behaviors were: drug use 15.0% (range 7.3–25.0%) and binge drinking 58.3% (range 43.6–74.6%). All three of these behaviors decreased over follow-up ($P < 0.01$). Baseline alcohol dependence and drug problem were 11.8% (range 5.6–24.3%) and 0.08% (range 0.00–2.7%) and both remained the same over time. Baseline rate of chlamydia was 9% (range 0.00–22.4%); all men tested negative for gonorrhea, HIV, and syphilis. For both binge drinking and drug use, having sex with a female sex worker was associated with increased risk, whereas belonging to a club or organization was associated with less risk. Additional factors associated with increased drug use were: having a friend in New Orleans upon arrival, symptoms of depression, and working in construction. An additional factor associated with less binge drinking was having family in New Orleans upon arrival.

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Contributors

Meghan Althoff and Nicole Burton contributed to the analysis of the paper. All others contributed to the design of the study and assisted in the write up of the study.

Conflict of interest

No conflict declared.

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Conclusion—Among LMM, substance use is influenced by social and environmental factors. Interventions increase community connectedness may help decrease usage.

Keywords

Latino migrant men; Substance use; Binge drinking; Respondent driven sampling; Cohort STI

1. Introduction

There are over 7.7 million undocumented Latino migrants in the United States and 68% are men (Worby and Organista, 2007). Migration, particularly for undocumented persons, creates numerous stressors such as social, cultural and linguistic isolation, separation from family and other support systems, gender ratio imbalance, lack of non-alcohol-centered recreational activities, discrimination, housing issues, physical ailments from manual labor, wage theft and uncertain employment (Duke et al., 2010; Finch et al., 2003; Organista, 2007; Watson et al., 1985; Watson, 1997). Substance use has been identified as a coping mechanism used by Latino migrant men (LMM) to mitigate the depression, anxiety and boredom that are associated with these stressors (Alaniz, 2002; Hernandez et al., 2009; Hersch et al., 2002; Kim-Godwin and Bechtel, 2004; Rachlis et al., 2007; Weatherby et al., 1999). Substance use, particularly alcohol, has been associated with myriad health issues including injury (Steinhorst et al., 2006) and HIV infection (Varela-Ramirez et al., 2005), as well as social problems such as intimate partner violence and incarceration (Kim-Godwin and Fox, 2009).

Wide ranges of drug use among LMM have been reported in the literature: crack (1.6–60%), marijuana (16.6–48.3%) and heroin (less than 1–7.3%; Inciardi et al., 1999; Kissinger et al., 2008; Organista and Kubo, 2005; Valdez et al., 2009). The amount of injection drug use (IDU) among LMM varies in the literature from less than 1% to 28% (Denner et al., 2005; Inciardi et al., 1999; Organista and Kubo, 2005). The prevalence of alcohol use, however, appears to be more consistently high. The prevalence of alcohol consumption in any quantity has been estimated to be greater than 77–90% among Latinos in migrant worker communities (Inciardi et al., 1999; Valdez et al., 2009) and 20–52% report binge drinking in the last month (Rhodes et al., 2010; Watson et al., 1985; Watson, 1997).

Examing the patterns of substance use can help inform intervention development. Most studies suggest that drug use is initiated in the U.S., while binge drinking, a more socially sanctioned behavior, is carried over from the country of origin (Alaniz, 2002; Borges et al., 2009; Davis and Winters, 2002; Hernández et al., 2004; Magis-Rodriguez et al., 2009; Mills et al., 2012; Persichino and Ibarra, 2012; Valdez et al., 2009; Worby and Organista, 2013). These studies suggest that the environment in the U.S. may play a role in increased substance use. Wider availability and acceptability of drug use in the U.S., particularly in urban areas, compared to sending countries could be a factor in this increased use (Center for Disease Control and Prevention, 2013; Magis-Rodriguez et al., 2009). While several individual level risk factors for substance use have been identified including young age, multiple sex partners or sex with female sex workers (Hernández et al., 2004; Hernandez et al., 2009; Rachlis et al., 2007; Weatherby et al., 1999), environmental and social factors have been less well examined and are the focus of this study.

1.1. Individual, social, cultural and environmental influences on substance use in new receiving communities

Stressors that migrants are not accustomed to can be magnified in new receiving communities and the appropriate infrastructure may not be available to accommodate migrants particular needs. New receiving communities are increasingly becoming desirable migration destinations for finding new opportunities for employment. In the last decade, Latino migration to the U.S. has changed from more traditional destinations such as Florida and New York, which saw a 200% decrease in immigration unauthorized migrants to areas like Louisiana and Oklahoma which saw a 240% increase (Passel and Cohen, 2011).

Until 2005, Louisiana was among the least common destinations for undocumented Latino migrants (Passell, 2006). This changed substantially after Hurricane Katrina devastated metropolitan New Orleans in August of 2005 after which many LMM came to work in reconstruction, comprising nearly half of the construction work-force (Donato and Hakimzadeh, 2006; Fletcher et al., 2006; Fussell, 2009) and resulting in a 77% increase in Latinos to the area (Passell, 2006). Like other new receiving communities, post-disaster New Orleans had little infrastructure to support the cultural, legal and linguistic challenges that are often available in more traditional receiving communities. And like other new receiving communities, migrants in New Orleans were predominantly male, young, recent arrivals to the U.S., and traveling unaccompanied by women (Kissinger et al., 2008; Kochhar et al., 2005; Painter, 2008), thus lacking both the social support and social structure of those migrating to more traditional destinations.

We posit that: behavior is a confluence of social, cultural and contextual factors that exist within environments and these factors interplay with individual factors that will influence substance use. We base this model on Bronfenbrenner's Ecological Theory and Sweat and Denison's model of HIV causation (Fig. 1; Sweat and Denison, 1995).

The purpose of this study, therefore, was to examine the evolution of substance use over an 18 month period among a group of Latino migrant men in a new receiving community and to determine which individual, contextual, and environmental factors were associated with substance use. We hypothesized that: (1) migration of any sort is disruptive to social ties and support and may place a man at higher risk for substance use and (2) that factors that increase social order (such has having family in the home and belonging to club/organizations) would be protective (Denner et al., 2005; Rachlis et al., 2008; Stein et al., 2008).

2. Methods

2.1. Respondent driven sampling recruitment

A cohort of 125 male Latino migrant workers was developed using respondent-driven sampling (RDS) between October 2007 and December 2007. Methods have been described elsewhere (Kissinger et al., 2011), but briefly, eight initial recruits ("seeds"), who lived in the metropolitan New Orleans area and who represented the nationalities targeted were recruited and given three coupons to distribute to eligible men in their social network. Seeds were chosen by country of origin because of the known heterogeneity of nationalities among

LMM in New Orleans. Pilot work revealed the three most common nationalities were: Honduran, Mexican, and Salvadorean, thus two seeds were chosen from each of these nationalities and two were chosen to represent the other nationalities of Central America.

Fig. 2 depicts the recruitment chains, whereby 8 seeds recruited 117 participants. There were two large chains; the longest chain was comprised of 7 waves and the shortest comprised of wave. There were no isolates. Homophily is the ratio of the observed number of like ties over the number of like ties due to chance. Higher homophily scores would indicate a greater preference to for relationships with people of that same characteristic. The homophily by country of origin was: 0.14 for Hondurans, 0.26 for Mexicans and 0.24 for others indicating that participants recruitment was heterogenious. The composition of our sample was similar to census data from New Orleans (Plyer, 2011).

2.2. Eligibility and enrollment

Men were eligible if they were: 18 years or older, arrived in New Orleans after Hurricane Katrina (August 29, 2005) for the purpose of work, born in Mexico or Central America, and were Spanish speaking. The arrival time was chosen to assure that the migrants were newly arrived to the area, as there was a small but established community of Latinos residing in New Orleans prior to the hurricane. Upon referral to the study staff, the study was explained to the participant, informed consent was obtained, participants were interviewed, and biological specimens were collected. Biological testing was done for HIV, syphilis, Chlamydia trachomatis (Ct) and N. gonnorheae (Gc) using OraQuick for saliva, IgG for blood, and NAAT for urine testing respectively. All testing was conducted in the field during baseline, 6 and 12 month visits. HIV test results were given to the participant after completion of the interview and reported to the Louisiana Office of Public Health. Participants were informed of their syphilis, CT and GC results by study staff at their next follow-up. Men with positive test results were referred to clinics in the area that did not require documentation and where they could receive services in Spanish for free or at low-cost.

LMM who contacted study personnel within the time allowed, presented a coupon, and met the eligibility criteria were offered admission into the study, consented, and given three coupons to recruit additional persons. Participants received an incentive worth $25 for every eligible referral enrolled.

2.3. Human subjects

Informed consent was obtained from all participants prior to entry into the study. The study received Institutional Review Board approval from Tulane University and a Certificate of Confidentiality was obtained from the Department of Health and Human Services, National Institutes of Health.

2.4. Follow-up visits

There were two types of follow-up visits: (1) quarterly surveys included core individual, social, cultural, and environmental questions, (2) brief monthly contacts between quarterly visits were used to refresh contact information and pilot new questions. Because this was a

pilot study, we evaluated a battery of factors. To avoid participant burden during the quarterly surveys, we pilot tested some scales or questions on a one time basis during these monthly visits (see Tables 3 and 4). Selected questions were asked every 6 months. Lost-to-follow-up information is found in Section 3.2.

Recruitment and follow-up visits were conducted during non-traditional hours at a site of the participant's choice. Participants who had moved more than 60 miles from metropolitan New Orleans remained in the study and were interviewed over the phone (14.4% of interviews). At each contact, men received a $30 incentive in the form of international calling cards or Walmart gift cards. In addition to the baseline interview in the fall of 2007, six quarterly follow-ups were completed between February 2008 and October 4, 2009.

2.5. Survey instrument

The survey instrument was informed by formative work (previous qualitative and quantitative interviews) and was translated and back translated by native Spanish speakers from Honduras and Mexico. The instrument was pilot tested on 20 men in an iterative test-revise-test manner to ensure content validity (Behling and Law, 2000; de la Puente et al., 2003). Interviews consisted of questions pertaining to individual, social, cultural and environmental factors. The individual level predictors measured include age, education, country of origin, employment, monthly income, number of sexual partners in the last month, and sex with a sex worker. Social and cultural factors were assessed using a variety of scales (see Section 2.7). Environmental level predictors measured were residence change in the past month, involvement in an club/organization, family and/or friends in New Orleans upon arrival, children in the home, and women ≥18 in the home. To assess involvement in an club/organization participants were asked "Do you belong to any organizations or clubs in the area (for example, church groups, sports clubs, etc.)" and if they said yes, they were asked to describe it. English language skills were measured by asking self-assessed speaking and comprehension levels.

Interviewers were trained to ask questions in a non-judgmental manner. The superviser randomly observed interviews to assure the fidelity of the interviews. Privacy was assured by conducting interviews in a private setting (a room, mobile unit, van or car).

2.6. Outcome variables

2.6.1. Drug use—Self-reported drug use in the last month was measured at each quarterly survey using the National Survey on Drug Use and Health tool (SAMHSA, 1991). The men were asked questions regarding the use and frequency of cocaine, crack, heroin, and marijuana. We focused on these drugs because they were the most commonly used during pilot work (Kissinger et al., 2008).

2.6.2. Alcohol consumption—Alcohol consumption frequency and quanity was elicited every quarter. The standard definition of binge drinking for men is ≥5 alcoholic drinks in one sitting was used (Courtney and Polich, 2009). More detailed information was measured every 6 months using the Alcohol Use Disorders Identification Test (AUDIT) tool

(Cherpitel and Bazargan, 2003). Problem drinking was defined as AUDIT ≥ 8 and alcohol dependency was defined as AUDIT ≥ 15.

2.7. Scales

Nine scales used to measure individual characteristics that were either hypothesized to be, or have been shown to be associated with substance use were examined cross-sectionally. These scales were asked either at various monthly interim visits or at quarterly visits and associations on a one-time basis were examined with outcomes on the closest quarterly interview. The following scales were asked: HIV fatalism (month 7), *familismo*, *fatalismo*, religiosity (month 15), sensation seeking (month 16), acculturation, *machismo* (month 12), social support (months 6, 12 18), and depression (all follow-up surveys).

2.7.1. The HIV Fatalism Scale—Developed by Rosanna Hess (Hess and McKinney, 2007), is a modification of the Powe Fatalism Inventory (PFI) for cancer. The scale examines a person's beliefs about the role of fatalism, or the influence or control of external forces on one's life, on HIV infection. For example, the scale includes questions such as, "I believe that if a person gets HIV/AIDS it was meant to happen" and, "I believe that if a person gets HIV/AIDS it is because that is the way he or she was meant to die." The scale consists of 15-items, with responses of yes, no, and not sure. The total number of yes answers is a person's fatalism score (i.e., the more participants answered yes, the higher his level of fatalism about HIV infection; alpha = 0.89).

2.7.2. Familismo—This scale was designed to measure familial support, familial interconnectedness, familial honor, and subjugation of self for family on an 18 point Likert scale with a higher sore signifying higher endorsement. The instrument was developed and validated for use with relatively less acculturated Latinos (alpha = 0.83; Steidel and Contreras, 2003).

2.7.3. Fatalismo—Multidimensional Fatalism Scale is a 30 item scale uses a 5 point Likert from "strongly disagree" to "strongly agree" that examines endorsement of five factors: ineluctable destiny, helplessness, internality, luck, and divine control and has been validated among Mexican immigrants (Esparza and Wiebe, 2008). A higher score indicates more fatalism (alpha = 0.76–0.92).

2.7.4. The Hoge Religiosity Scale—This scale is a 10 item scale with 4 point Likert responses from 1 "strongly agree" to 4 "strongly disagree." The scale is non-sectarian and includes both intrinsic (religion defining sense of self and identity) and extrinsic (religion as a practice that is external to sense of self) measurements. The three extrinsic items are reverse coded then added to the remaining seven responses; a higher score indicates a greater intrinsic religiosity (Hoge, 1972; Kuder–Richardson reliability score = 0.90).

2.7.5. The Brief Sensation Seeking Scale (BSSS-8)—This scale measures that personality trait which has been found to be associated with risky behaviors. The scale includes two items for each of four components: thrill and adventure seeking, experience seeking, disinhibition and boredom susceptibility. Responses are along a 5 point Likert

scale: strongly disagree, disagree, neither disagree nor agree, agree and strongly agree. A higher score indicates greater sensation seeking trait (alpha = 0.70; Stephenson et al., 2007).

2.7.6. Machismo—Machismo was measured using Traditional and Caballerismo Machismo Scale (Arciniega and Anderson, 2008). This scale was selected because it considers both the positive aspects or caballerismo (protectionism, chivalry, hard work) and negative or traditional aspects (sexism, chauvinism, hypermasculinity) of *machismo*. The scale contains 20 items with ten each measuring the two factors. The responses are on a 5 point Likert scale from “strongly agree” to “strongly disagree”. The scale has demonstrated good internal reliability among Mexican populations (alpha = 0.85).

2.7.7. Acculturation—Measured in two dimensions, ethnic society immersion (ESI) and dominant society immersion (DSI) using the Stephenson Multigroup Acculturation Scale (SMAS; Stephenson, 2000), a 32-item scale (alpha = .86) which has been previously validated in Hispanic populations. The items include questions about, language, perceived acceptance, knowledge of current events, and social networks.

2.7.8. Social support—An abbreviated Medical Outcomes Social Support examining 6 items (alpha = 0.77; Sherbourne and Stewart, 1991). The questions asked if the participant had the following: someone to loan you $50, someone to help you with tasks, someone you felt close to, someone ot teach you social norms of the United States, someone to give you a ride, and someone to talk to. Men who answered that they did not need an item were classified as if they had that item. Scores were calculated by adding the Likert responses and calculating a percentage of total points the participant could have. The scores were then cutpointed to the mean social support score.

2.7.9. Depression—Measured on all follow-up surveys, using the Center for Epidemiologic Studies Depression Scale (CES-D 10; Roberts and Vernon, 1983). Participants were considered to have depressive symptoms indicating depression if they scored 10 or more (alpha = 0.88). Participants who expressed interest in care were given referral information.

2.8. Analytic techniques

At baseline, weighted prevalences and 95% confidence intervals (CI) were calculated using the RDS Analysis Tool (RDSAT) version 7.1 (Table 1). To determine the change in substance use over time, the quarterly frequencies of drug use and binge drinking were plotted and Chi squared test of trend was calculated (Fig. 3a and b). To examine the association of core variables collected at the quarterly interviews, bivariate associations were measured using generalized estimating equations (GEE; PROC GENMOD SAS 9.2, Table 2). Baseline measurement was used as the reference with a logit link function and an exchangeable working correlation matrix to account for correlation between subjects over the study period. Separate analyses were done for drug use and binge drinking.

Factors that were found to be associated with the drug use and binge drinking from Table 2 were included in a multivariate GEE analysis. Because having sex with a FSW, having sex

with 2 or more FSW and having multiple sex parnters were highly correlated, only having sex with FSW was included in the model (Table 5).

3. Results

3.1. Baseline characteristics

Of the 125 enrolled at baseline, the mean age in the cohort was 30.1 years (s.d. 7.8 years). The majority of men in the cohort were born in Honduras (79.7%), followed by Mexico (6.6%) and other countries (13.7%) including Nicaragua, Guatemala, El Salvador, and the Dominican Republic. About one-third (34.7%) could speak English somewhat/well and 46.1% could understand somewhat/well. Most men (64.6%) reported working in construction, working in cleaning (13.1%) or in a other jobs (22.4%). The median income was $425 per week ($0–$2400) and 12.6% worked less than 40 h per week. The rate of depressive symptoms was 30.9% range 16.4–43.2.

The majority of men (69.2%) migrated to New Orleans from outside of the U.S. Of the men who came from outside the U.S., 87.6% came from their home country and the remaining came from another country in Central America or Mexico. Men who lived elsewhere in the U.S. before arriving in New Orleans reported migrating from predominantly Texas (47.6%) with 4.0% coming from Florida, 5.5%, and the remaining coming from other states. Men had been in the United States for a median of 2 years (range 1 month to 10 years) and had been in New Orleans a median of 14 months (range 1–27 months).

Nearly half (45.4%) of the LMM reported being married or having a long term partner, but only 25.9% of the wives/term partners were living with them in New Orleans. Most LMM (71.4%) reported having children, but only 13.0% had their child living with them. At baseline, 46.5% LMM were living with a women (not necessarily their partner) and 36.3% were living with a child (not necessarily their child). 24.1% had a place to live when they arrived in New Orleans, 27.4% migrated with friends or family, 10.0% had friends in New Orleans upon arrival. The majority of men (54.8%) had sex with a woman in the last month at baseline, with a median of 2.0 partners (range 1–21). Of the men who had sex with a women, 71.7% reported having sex with a female sex worker. Of the 44 participants who reported multiple sexual partners, 93.2% reported one of the sex partners was a FSW.

At baseline, 19.0% of men report belonging to an club/organization and of these men, 78.8% reported belonging to a church, 8.2% to a workers union, 4.9% to Alcoholics Anonymous, and 8.2% to a local soccer club. Eight men reported belonging to more than one club/organization. For social support, most respondents answered ‘yes’ to all of the questions: having someone to loan you $50 (89.9%), someone to help you with tasks (90.0%), someone you felt close to (86.4%), someone to teach you social norms of the United States (85.3%), someone to give you a ride (87.3%), and someone to talk to (86.4%).

Baseline drug use in the past month was 15.0% including marijuana (9.7%), crack (1.6%), cocaine (15.3%). All men denied heroin use and intravenous drug use. Few men reported marijuana use without concurrent use of other drugs (n = 5 at baseline). All men reporting

using crack, also used cocaine. Of the 125 men, 5 were problem drug users per the CAGE criteria.

At baseline, the majority of men reported some alcohol consumption in the past month (77.6%), 58.3% binge drank, 41.5% were considered problem drinkers and 11.8% were considered to have alcohol dependence. Of those who drank alcohol, the median number of days drank in the last month was 4.0 (ranged 1–30) and the median number of drinks on those days was 10 (range 2–48).

3.2. Follow-up

Of the 125 men enrolled, 57.6% were interviewed at all 7 follow-up visits and 86.4% completed at least 5 of the visits. The majority of participants (72%) were followed at 18 months. There was no difference among those who were not followed at 18 month compared to those who were followed at 18 months by baseline characteristics including: mean age (31.3 vs. 29.6, $P = 0.27$), binge drinking (60.8% vs. 68.5%, $P = 0.37$) or drug use (17.1% vs. 20.0%, $P = 0.71$), coming from another area in U.S. (51.4% vs. 41.6%, $P = 0.32$), coming from home country (74.0% vs. 70.0%, $P = 0.27$), living with a woman at baseline (37.1% vs. 42.4%, $P = 0.60$). However, those who were not followed were somewhat more likely to work in construction (85.7% vs. 70.0%, $P = 0.07$), less likely to have friends in New Orleans upon arrival (11.4% vs. 23.3%, $P = 0.14$), and to belong to a club (2.9% vs. 12.4%, $P = 0.11$). Of the 35 who were not interviewed at 18 months, 16 (46%) returned to their home country voluntarily, 3 (9%) were deported, 1 (3%) went to jail, 5 (14%) went to other sites in the U.S. and 10 (29%) were whereabouts unknown.

3.3. Drug use

Over the 18 months, 53.6% reported any drug use and 46.4% abstained. Sixteen men (12.8%) initiated drug use after arriving in New Orleans (and all before entering the study). Of the 52 men who used drugs during the study, 51.9% used them more than once. Of those who used drugs, the mean rate of use in the last 3 months/number of visits was 38.7% (s.d. 25.7%). Drug problem (per CAGE criteria) was found in 0.08% (range 0.0–2.7%) and remained the same over time ($P = 0.15$).

None of the behavioral scales were statistically associated with drug use, though there was a trend for drug users to score lower on traditional maschismo scale and the dominant society immersion component of the acculturation scale and on the divine control component of the *fatalismo* scale and to have higher mean scores on the destiny component of the *fatalismo* scale (Table 3). Factors associated with drug use in GEE analysis after adjusting for time were: binge drinking, having 2 or more sex parnters in the last month, having had sex with a FSW, having symptoms of depression, having a friend in New Orleans upon arrival, migrating with friends or family, and working in construction. Time in New Orleans and belonging to a club were protective for drug use.

3.4. Alcohol use

Binge drinking decreased over time (66.1–50.5%, $P < 0.05$) (Fig. 3a) as did problem drinking (62.7%, 57.1%, 35.8%, 50.8%, $P = 0.001$), whereas alcohol dependence remained the same (18.6%, 26.4%, 16.5%, 19.0%, $P = 0.34$).

None of the behavioral scales were statistically associated with binge drinking, though binge drinkers had higher fatalism scales, sensation seeking and lower extrinsic religiosity scores (Table 4). In GEE analysis, after adjusting for time, factors associated with binge drinking were: using drugs, 2 or more sex partners in the last month, having sex with a FSW. Factors that were protective were time, belonging to a club and having a woman in the home (Table 2). None of the items in social support were associated with binge drinking or alcohol dependence, however, those who binge drank were somewhat more likely to have a person from whom they could borrow $50 than those who did not binge drink (95.1% vs. 85.7%, $P = 0.07$).

Of those who answered questions on both drug and alcohol use in the past month ($n = 123$), 20 men (16.2%) report both binge drinking and drug use, 61 report binge drinking but no drug use (49.6%), 4 report drug use but no binge drinking (3.3%), and 38 report using neither drugs nor binge drinking (31.0%).

3.5. HIV and STI results

All 125 accepted HIV/STI testing at baseline. Of these, there were 4 CT positives. The weighted rate was 9.0% (range 0.00–22.4%). No one tested positive for GC, syphilis or HIV. At 6 months, 101 men were tested for CT and GC and 95 were tested for HIV. Two men were positive for CT, one of whom was also positive at baseline and none tested positive for GC or HIV. At 12 months, 101 men were tested for CT/GC/syphilis/HIV. Two men re-tested positive for CT and all tested negative for the other organisms.

4. Discussion

Latino migrant men are a highly vulnerable and understudied group who exhibit high rates of substance use. Indentifying specific factors that can serve as points of intervention is crucial to developing appropriate interventions. In our sample, social factors were highly influential on LMM substance use behavior. The prevalence of binge drinking and drug use was high at baseline, but significantly decreased over time and was inversely proportional to the prevalence of belonging to a club/organization and living with a woman. The multivariate data demonstrated that belonging to a club/organization was associated with less substance use, where as having sex with a FSW was associated with more use. The presence of friends in New Orleans upon arrival was associated with drug use, whereas the presence of family in New Orleans upon arrival was associated with less binge drinking. Clearly, social influences are important in substance use among LMM.

Declines in substance use in this sample contradicts what is commonly found in the literature whereby health tends to deteriorate after migration for Latino migrants (Worby and Organista, 2007) and cross-sectional studies that found increased risk for substance use after immigration (Vega et al., 1998a,b). The findings, however, corroborate a more recent

prospective study of Latinos who were mostly of Central and South American origin that found declines in alcohol use over time among recent immigrants (De La Rosa et al., 2013).

While we had excellent retention of the cohort (72%), loss-to-follow-up is always a concern. It is unlikely that the decline in substance use can be explained by the "salmon bias" or the likelihood for migrants who are ill or having social problems to return home (Abraido-Lanza et al., 1999), since there were no differences in key baseline variables by follow-up status (see Section 3.2). There was some indication that those who were lost were more transient (e.g., did not have friends in New Orleans upon arrival and did not belong to clubs/organizations) and qualitative work suggested they were the subset of LMM who follow disasters for employment. But the loss of this group was unlikely to have influence the outcome since those who were followed were similar to those lost by key baseline factors, including the outcomes of interest (i.e., drug use and binge drinking).

Like others, we found high rates of heavy, sporadic use of alcohol (Worby and Organista, 2007). Binge drinking in this cohort was more than 3 times higher than the U.S. national reported rate for binge drinking of 18.3% (Center for Disease Control and Prevention, 2013) and higher than rates of Latino immigrants commonly reported in the literature (Worby and Organista, 2007). These data highlight the need for substance use intervention among LMM, which may be even more magnified in new urban receiving environments such as New Orleans.

Positive influences such as organization or club membership should be fostered among LMM. Belonging to an organization or club may decrease the risk of substance abuse because it provides a venue for recreation and forming relationships with their peers that is not predicated on drugs or alcohol and may provide empowerment, such as a worker's rights group, or spiritual support (church groups). Approaches to strengthening communities have been successful for this population in HIV prevention and could be applied to substance use. Examples of these types of interventions are *HOMBRES* and *HOMBRES II.* These randomized trials found that community-based HIV/STI peer educators could successfully reduce HIV/STI risk among LMW compared to a cancer education controls.

Having sex with a sex worker was associated with both drug use and binge drinking. In our prior research of this same cohort, we found that over the 18 months, there was a significant drop in patronage of female sex workers and an increase in main partnerships (Kissinger et al., 2011). It is possible that the non-FSW women provided some social control or that female sex workers provided or endorsed drugs and diminishing contact with them also diminished accessibility to drugs. Interventions that help men find non-sex worker partners may have an impact on substance use as well as HIV/STI risk.

The only environmental risk factor found to be associated with increased odds of drug use was working in the construction industry. Those who worked in construction were more likely to be single, which could explain increased risk, since younger persons are more likely to engage in drug use (Blanco et al., 2013). It does not appear that availability of drugs at the workplace explains this phenomenon as only 1.8% of men reported their bosses and 3.5% of their friends brought drugs to work. It also does not appear that construction

work was a marker of higher income per week was similar for those in construction compared to those not in construction ($436 vs. $439, $P = 0.91$). Those who worked in construction, howerver, were somewhat less likely to work 40 h per week compared to those who did not work in construction (73.7% vs. 83.3%, $P < 0.06$), thus this could have been a proxy for unstable employment or more leisure time. Qualitative work is needed to better understand how the environment associated with construction work may promote drug use.

The majority of drug use was recreational, one time or infrequent use and no injection drug use was reported. For the majority of those who used drugs, use was opportunistic rather than addictive and therefore, interventions that use these social situations as a point of intervention may prove effective. There was, however, a small group of men that were problem substance users and social, cultural and environmental factors were less influential for those. For example, there were far lower rates of men who had alcohol dependence or problem drug use and these behaviors did not decline over time.

Our study, like all observational studies, has a few limitations. All of our exposure and outcome variables were self-reported. For example, for IDU, we did not check for track marks thus self-report injection drug use may have been underreported It is also possible that social desirability and recall bias may have been a factor in our results. However, we think this is unlikely due to the high level of training of our interviewers as well as high visibility and credibility in the community. We gained trust with the participants by visiting them every month, even though we only interviewed them quarterly. Also, since this was a pilot study, several items that would have been of interest to study longitudinally were only asked at one interview and we were therefore unable to analyze them longitudinally.

Although our study has limitations, it still provides valuable insight into the patterns of substance use among a newly arrived group of Latino migrants in a new receiving community. Our data suggests that intervention should occur early in the migration process and should promote the development of healthy social support networks, non sex worker relationships and community connectedness. These interventions are relatively low cost and are likely to be highly impactful.

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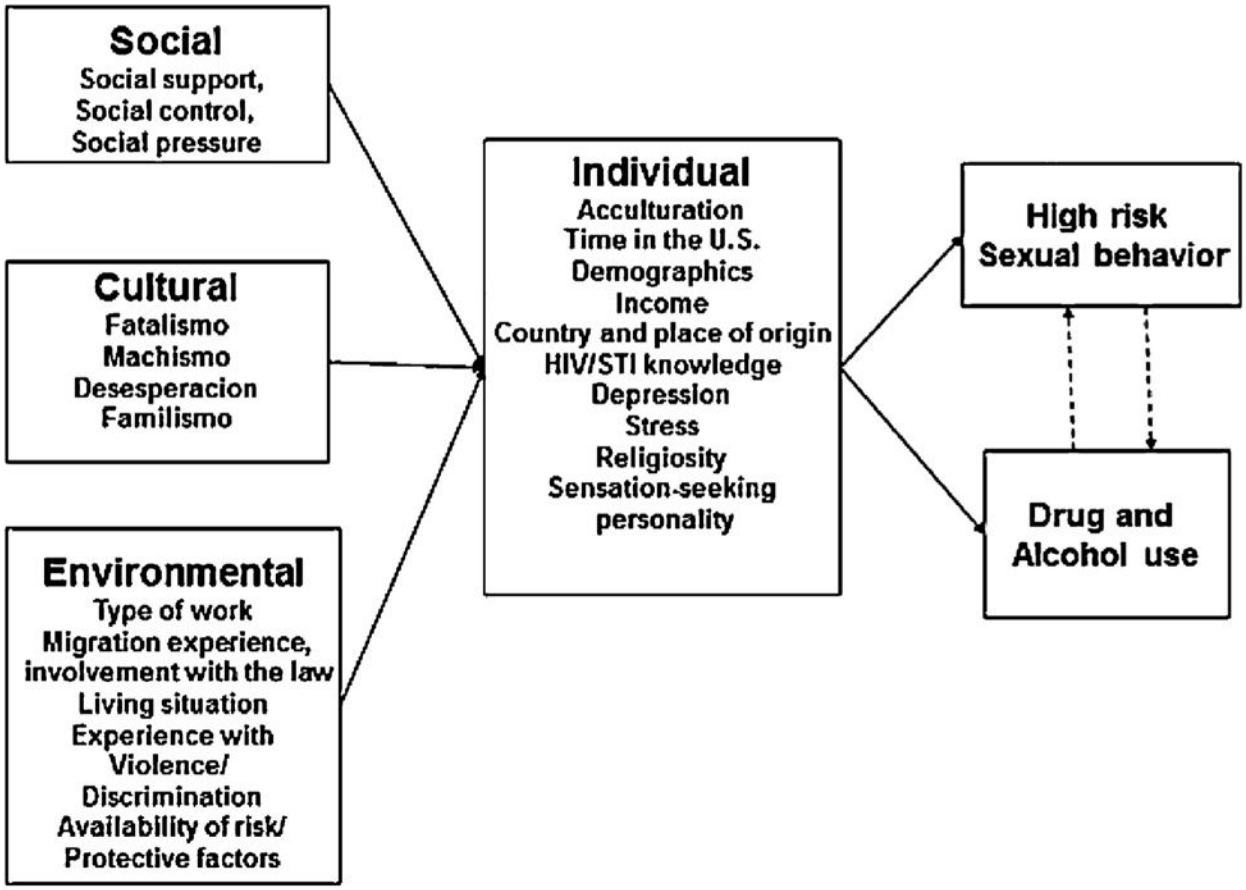

Fig. 1.
Theoretical framework.

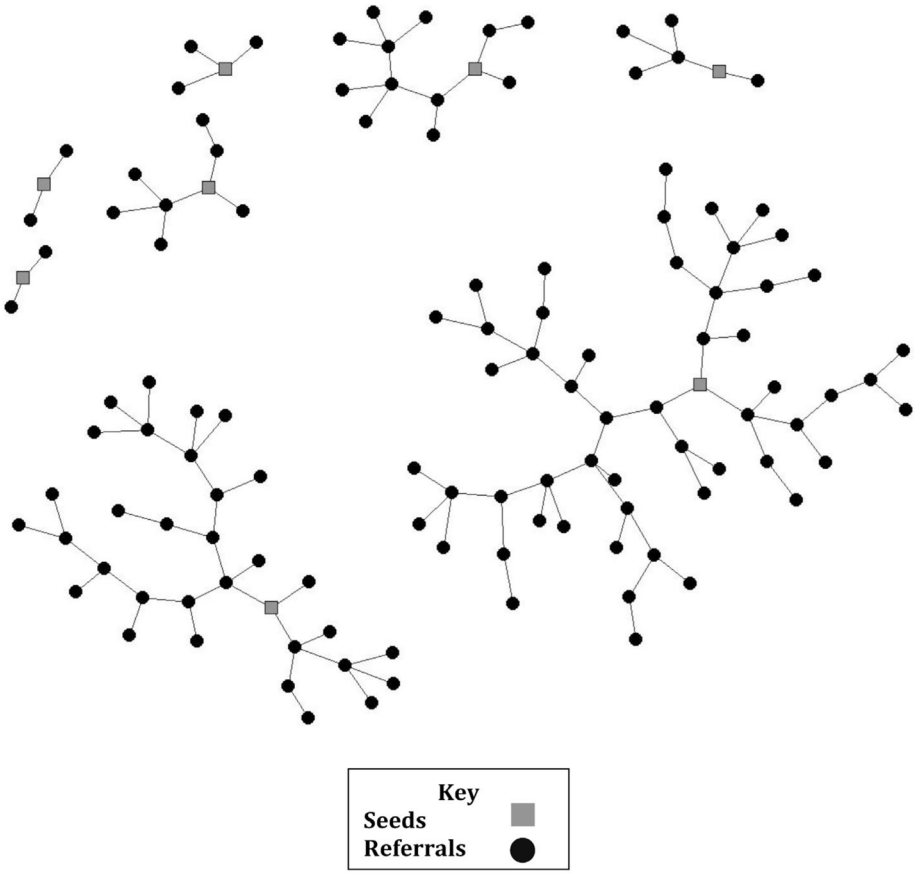

Fig. 2.
Respondent driven sampling recruitment chains (N = 125).

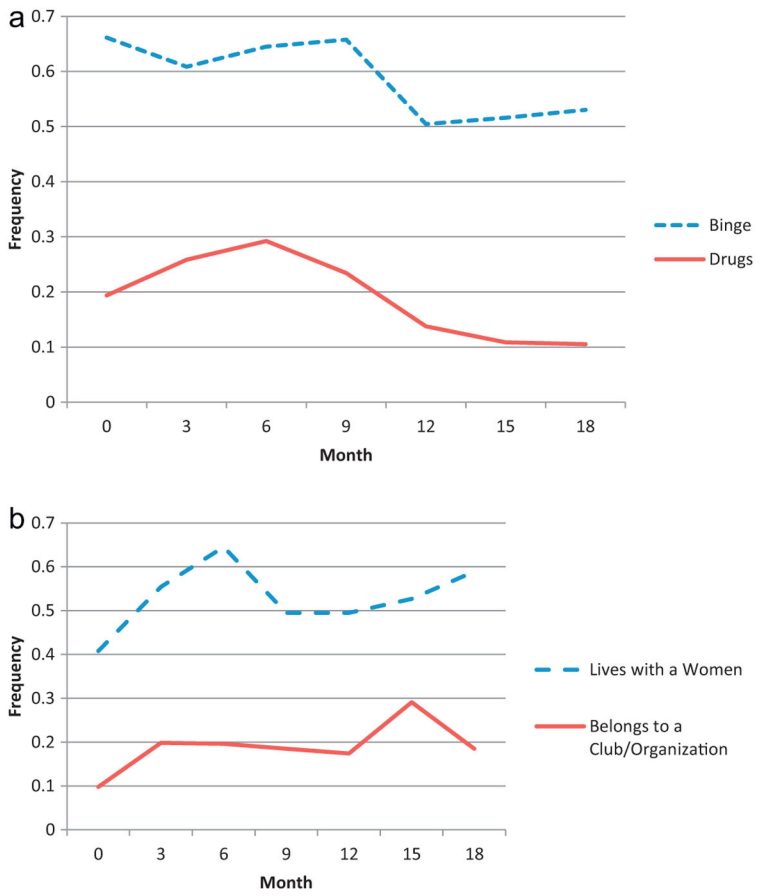

Fig. 3.

(a) Frequencies of substance abuse over time among Latino Migrants in New Orleans, 2007–2009. Binge drinking $P = 0.005$, drug use $P = 0.001$, two sided test. (b) Social factors over time of Latino migrants in New Orleans, 2007–2009. Lives with women $P = 0.02$, club/organization member $P = 0.01$, two sided test.

Table 1

Baseline characterstics of Latino migrant worker sample in New Orleans (weighted – using RDSAT).

	N	%	95% CI
Demographics			
Age category			
<30	69	59.3	(43.3, 72.6)
≥30	56	40.7	(27.4, 65.5)
Home country			
Honduras	89	79.7	(67.3, 90.1)
Mexico	14	6.6	(1.7, 13.4)
Other	22	13.7	(4.6, 25.9)
Marital status			
Married/long term partner	55	45.4	(30.7, 59.2)
Single/divorced/separated	70	54.6	(40.8, 69.3)
Education			
≥6th grade	37	40.0	(25.1, 62.4)
>6th grade	74	60.0	(37.6, 74.9)
Speaks English somewhat/well			
Yes	44	34.7	(21.5, 49.2)
No	81	65.3	(50.8, 78.5)
Understands English somewhat/well			
Yes	61	46.1	(32.5, 59.2)
No	64	53.9	(40.8, 67.5)
Legal resident or citizen			
Yes	4	5.0	(30.0, 13.8)
No	116	95.0	(86.2, 99.7)
Employment			
Past month work			
Construction	91	64.6	(47.5, 79.2)
Cleaning	15	13.1	(5.6, 23.5)
Other	19	22.4	(6.9, 39.3)
Hours worked per week			
<40	19	12.6	(4.3, 24.0)
≥40	106	87.4	(76.0, 95.7)
Weekly income			
>$425	63	49.5	(34.1, 63.6)
<$425	62	50.5	(36.4, 65.9)
Migration experience			
Migrated with family or friends			
Yes	28	27.4	(12.9, 42.2)
No	95	72.6	(57.8, 87.1)
Migrated from			

	N	%	95% CI
Outside of U.S.	69	64.0	(45.4, 76.5)
Other part of U.S., been in U.S. < 1 year	19	9.4	(5.1, 17.4)
Other part of U.S., been in U.S. ≥ 1 year	36	26.6	(14.1, 43.2)
Friends in New Orleans upon arrival			
Yes	25	10.00	(4.3, 16.9)
No	100	90.00	(83.1, 95.7)
Place to live upon arrival			
Yes	37	24.1	(12.2, 37.7)
No	88	75.9	(62.3, 87.8)
Months in NOLA			
<1 year	53	61.4	(46.5, 72.7)
≥1 year	72	38.6	(27.3, 53.5)
Social factors			
Belongs to club/organization			
Yes	12	19.0	(4.9, 34.0)
No	111	81.0	(66.0, 95.1)
Lives with a woman			
Yes	51	46.5	(30.5, 60.4)
No	74	53.5	(39.6, 69.5)
Lives with a child			
Yes	34	36.3	(21.7, 51.3)
No	87	63.7	(48.7, 78.3)
Lives with ≥6 people			
Yes	75	66.6	(54.2, 78.9)
No	46	33.4	(21.1, 45.8)
Lives with family			
Yes	55	56.1	(40.9, 65.1)
No	66	43.9	(34.9, 59.1)
Lives with men only, including family members			
Yes	52	49.1	(35.0, 63.3)
No	69	50.9	(36.7, 65.0)
Lives with men only, excluding family members			
Yes	31	29.0	(15.3, 43.2)
No	90	71.0	(56.8, 84.7)
Social support			
Below mean	50	39.9	(26.5, 54.9)
Mean or higher	75	60.1	(45.1. 73.5)
Substance use			
Binge drinks in past month			
Yes	82	58.3	(43.6, 74.6)
No	42	41.7	(25.4, 56.4)
Problem drinking			

	N	%	95% CI
Yes	38	41.5	(18.9, 47.6)
No	64	58.5	(52.4, 81.1)
Alcohol dependence			
Yes	19	11.8	(5.6, 24.3)
No	83	88.2	(75.8, 94.4)
Past month drug use			
Yes	24	15.0	(7.3, 25.0)
No	101	85.0	(75.0, 92.7)
Drug problem			
Yes	5	0.08	(0.00, 2.7)
No	120	99.2	(97.3, 100)
Sexual risk behaviors			
Female sex parters in the past month			
<2	81	73.4	(61.2, 81.8)
≥2	44	26.6	(18.2, 38.8)
Sex with a female sex worker			
Yes	59	36.4	(25.6, 52.6)
No	66	63.6	(47.4, 74.4)

Table 2

Individual and environmental factors associated with past month use of drugs or binge drinking among Latino migrant workers (n = 125), adjusted for time.

	Drug use POR (95% CI)	Binge drinking POR (95% CI)
Demographics		
Age (continuous)	0.98 (0.95, 1.02)	0.98 (0.95, 1.01)
Honduran vs. other	0.70 (0.42, 1.15)	0.89 (0.67, 1.20)
Married	0.91 (0.36, 2.38)	0.95 (0.51, 1.77)
≥6th grade education	1.45 (0.52, 4.08)	1.69 (0.74, 3.87)
Speak English somewhat/well	0.88 (0.62, 1.52)	0.76 (0.54, 1.08)
Understands English somewhat/well	0.83 (0.56, 1.24)	0.86 (0.61, 1.22)
Legal resident or citizen	2.97 (0.40, 22.01)	0.06 (0.01, 1.22)
Employment		
Works in construction	2.64 (1.73, 4.02)**	1.31 (0.94, 1.83)
Works < 40 h per week	0.92 (0.47, 1.79)	0.74 (0.52, 1.06)
≥$425 per week income	1.31 (0.93, 1.82)	1.03 (0.81, 1.31)
Migration experience		
Migrated with friends/family		
Migrated from home country[a]	0.77 (0.31, 1.88)	1.03 (0.49, 2.18)
Had friends in N.O upon arrival[a]	5.60 (2.83, 11.09)**	2.39 (0.83, 6.90)
Had family in N.O. upon arrival[a]	1.45 (0.70, 2.97)	0.42 (0.19–0.93)*
Had place to live upon arrival[a]	2.01 (0.99–4.07)	1.22 (0.73–2.04)
Months in U.S.	1.00 (0.99, 1.01)	1.00 (0.99, 1.01)
Months in New Orleans	0.98 (0.96, 0.99)*	0.98 (0.96, 0.99)*
Moved in last 3 months	1.14 (0.78, 1.66)	1.08 (0.83, 1.40)
Social factors		
Belongs to an club/organization	0.37 (0.18, 0.73)**	0.48 (0.30, 0.75)**
Lives with a woman	1.01 (0.67, 1.51)	0.67 (0.49, 0.91)**
Lives with a child	0.96 (0.40, 2.29)	0.96 (0.58, 1.60)
≥6 people in the home	1.42 (0.92, 2.20)	1.18 (0.91, 1.52)
Lives with family	0.77 (0.49, 1.17)	0.82 (0.58, 1.15)
Lives with men only, including family		
Lives with men only, no family		
Social support	0.79 (0.47, 1.34)	1.41 (0.94, 2.11)
Substance use		
Used drugs	n/a	3.17 (1.95, 5.15)**
Binge drank	4.15 (2.34, 7.39)**	n/a
Sexual risk behavior		
≥2 sex partners in the last month	3.23 (1.82, 4.28)**	2.47 (1.70, 3.59)**
Had sex with a female sex worker	2.79 (2.08, 5.01)**	2.46 (1.65, 3.68)**

	Drug use POR (95% CI)	Binge drinking POR (95% CI)
≥2 FSW in a month	3.29 (2.09, 5.18)**	2.65 (1.69, 4.16)**
Mental health		
Depressive symptoms	1.66 (1.00, 2.77)*	0.82 (0.53, 1.25)

[a] Measured at baseline only, unadjusted.

* $P < 0.05$.

** $P < 0.01$.

Table 3

Association between behavioral scales and past month drug use.

	n	Range	Drug users	Non-drug users	(df), test statistic	*P*-value
Individual						
Extrinsic religiosity,[b] *n* (%)	87	Cut point	8 (88.9)	71 (91.0)	(1), χ^2 0.04	0.834
HIV fatalism[a] median (IQR)	98	0–15	10.5 (5.0)	10 (5.0)	(1), *Z* 1.16	0.245
Sensation seeking[a] median (IQR)	57	0–5	3.0 (2.25)	3.31 (0.86)	(1) *Z* −1.22	0.223
Cultural						
Machismo range (1–5)	109	1–5				
Traditional machismo[a]			2.20 (1.40)	2.95 (1.55)	(1), *Z* −1.30	0.193
Caballerismo[a]			1.10 (0.30)	1.10 (0.40)	(1), *Z* 1.35	0.892
Familismo	91	1–10	8.33 (2.11)	8.83 (1.17)	(1), *Z* −1.05	0.295
Fatalism						
Total score	89	30–150	119.0 (19.5)	108.0 (21.0)	(1), *Z* 1.20	0.229
Divine control	98	5–30	26.0 (6.0)	29.0 (4.0)	(1), *Z* −1.46	0.143
Destiny	94	5–30	27.0 (5.0)	24.0 (7.0)	(1), *Z* 1.58	0.113
Luck	97	5–30	19.5 (14.0)	16.0 (12.0)	(1), *Z* 0.71	0.478
Helplessness	98	5–30	16.0 (6.0)	15.0 (7.5)	(1), *Z* 0.79	0.430
Internality	98	5–30	26.0 (6.0)	26.0 (8.0)	(1), *Z* 0.87	0.382
Acculturation	92					
ESI[a]		1–4	1.97 (0.53)	2.12 (0.47)	(1), *Z* −0.94	0.346
DSI[a]		1–4	2.27 (0.40)	2.47 (0.40)	(1), *Z* −1.66	0.097

[a] Wilcoxon rank sum test.

[b] Scores were cutpoint at ≥2 indicating more extrinsic religiosity vs. <2 indicating more intrinsic religiosity.

Table 4

Association between behavioral scales and past month binge drinking.

	n	Range	Binge drinkers	Non-binge drinkers	(df), test statistic	*P*-value
Individual						
Extrinsic religiosity n(%)	87	Cut point	36 (85.7)	43 (95.6)	(1), χ^2 2.52	0.112
HIV fatalism[a] median (IQR)	99	0–15	10 (5.0)	9 (5.0)	(1) Z −1.14	0.256
Sensation seeking[a] median (IQR)	57	0–5	3.06 (1.56)	3.50 (0.63)	(1) Z 1.51	0.129
Cultural						
Machismo range (1–5)	109	1–5				
Traditional machismo[a]			1.80 (1.60)	2.95 (1.40)	(1), Z −0.596	0.552
Caballerismo[a]			1.00 (0.40)	1.00 (0.40)	(1), Z 0.232	0.817
Familismo	91	1–10	8.83 (1.39)	8.69 (1.36)	(1), Z −0.08	0.934
Fatalism						
Total score	89	30–150	121.0 (20.0)	106.0 (23.0)	(1), Z −1.68	0.093
Divine control	98	5–30	29.0 (5.0)	28.0 (4.0)	(1), Z 0.55	0.583
Destiny	94	5–30	26.0 (7.0)	23.0 (8.0)	(1), Z 1.20	0.229
Luck	97	5–30	18.0 (13.0)	15.0 (11.0)	(1), Z 0.96	0.337
Helplessness	98	5–30	15.0 (8.0)	15.0 (7.0)	(1), Z 0.79	0.427
Internality	98	5–30	26.0 (7.5)	26.5 (7.0)	(1), Z −0.29	0.770
Acculturation	92					
ESI[a]		1–4	2.06 (0.45)	2.18 (0.53)	(1), Z −1.27	0.206
DSI[a]		1–4	2.47 (0.47)	2.33 (0.44)	(1), Z 1.02	0.308

[a]Wilcoxon rank sum test.

Table 5

Multivariate analysis of factors associated with drug use and binge drinking among Latino migrants in New Orleans.

Variable	Drugs			Binge drinking		
	^{Adj}OR	95% CI	*P*-value	^{Adj}OR	95% CI	*P*-value
Club/organization	0.33	0.13, 0.85	0.0213	0.54	0.32, 0.91	0.0197
Sex with female sex worker	2.41	1.49, 3.88	0.0003	1.76	1.07, 2.88	0.0252
Months in New Orleans	0.99	0.97, 1.02	0.6060	0.99	0.97, 1.01	0.4541
Friend in New Orleans at time of arrival	4.11	1.99, 8.48	0.0001	–	–	–
Family in New Orleans at time of arrival	–	–	–	0.56	0.31, 0.99	0.0493
Lives with a woman				0.83	0.53, 1.32	0.4346
Symptoms of depression	2.87	1.50, 5.51	0.0015	–	–	–
Works in construction	3.66	2.15, 6.23	<0.0001	–	–	–
Binge drank	2.49	1.30, 4.77	0.0059	–	–	
Drug use				3.11	1.65, 5.87	0.005

Drug use: *n* = 526 observations, 230 missing observations. Binge drinking: *n* = 401 observations, 355 missing observations. Analysis was conducted using generalized estimating equations. Variables with "–" indicate that it was not associated in bivariate analysis and not included in the mode.