

HIV Risk Behaviors and Correlates of Inconsistent Condom Use Among Substance Using Migrants at the Mexico/Guatemala Border

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Published online: 25 February 2017
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Abstract This study assessed correlates of inconsistent condom use with casual partners and the prevalence of sexual risk behaviors and STIs in the Mexico/Guatemala border region using a sample of 392 migrants (303 men, 85 women) who reported current substance use or problem drinking. We ran separate univariate logistic regression models for men and women, and multivariate logistic regression models for men only. Prevalence of syphilis was 1.2% among women and 2.3% among men; HIV prevalence was 2.4% among women and 1.3% among men. Inconsistent condom use with casual partners was higher in women with greater education and lower among women who sold sex. In men, less access to free condoms, drug use with sexual partners, and drug use before sex were independently associated with inconsistent condom use with casual partners. Sexual and substance use risk behaviors were common, and HIV/STI prevention efforts should target both genders and expand beyond most-at risk populations.

Resumen En este estudio se evaluó la correlación del uso inconsistente de los preservativos con parejas ocasionales y

la prevalencia de comportamientos sexuales de alto riesgo e ITS en la frontera entre México y Guatemala. Se utilizó una muestra de 392 migrantes (303 hombres, 85 mujeres), quienes reportaron consumir sustancias ilícitas o reportaron tener problemas con el consumo de alcohol. Realizamos modelos de regresión logística univariados para hombres y mujeres, de forma independiente, y modelos de regresión logística multivariantes sólo para los hombres. La prevalencia de sífilis fue de 1,2% entre las mujeres y 2,3% entre los hombres; la prevalencia de VIH fue de 2,4% entre las mujeres y de 1,3% entre los hombres. El uso inconsistente de condones con parejas ocasionales fue mayor en las mujeres con más educación y menor entre las mujeres que venden sexo. En los hombres, menos acceso a preservativos gratuitos, el uso de drogas con las parejas sexuales, y el uso de drogas antes de tener relaciones sexuales se asociaron independientemente con el uso inconsistente de condones con parejas ocasionales. Los comportamientos sexuales de riesgo y el uso de sustancias ilícitas son comunes entre esta población, son necesarios esfuerzos de prevención del VIH y las ITS que se dirijan a ambos sexos y que se expandan a otras poblaciones en riesgo.

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Keywords Latin America · Immigration · Drug · Sex

Introduction

Migration is a social and structural driver of both HIV and substance use vulnerability [1–4]. While the act of migration, either internationally or internally, is not inherently risky, factors before, during and after the journey may influence risk behaviors [5, 6]. Within Latin America, disruption of social networks, exposure to more liberal social norms, poverty, gender inequalities, stigma, and

discrimination have all been implicated as underlying mechanisms associating HIV/STI risk with mobility [3, 7–9].

Due to heightened violence and persistent economic inequality in Central America, increasing numbers of migrants are fleeing north to the United States; at the same time, deportations out of the US are increasing [10, 11]. Despite this shifting landscape, to date, most of the research on HIV risk factors among Latino migrants has been among Mexican migrants with a past or current history of living in the United States. For example, a study of male Mexican migrants found that after moving to the US, there were significant increases in rates of risky sex: as sex workers; with sex workers; while drunk or high; and with male partners [12]. Within Mexican states, research found that individuals who had previously lived in the US had more sexual partners than non-migrants [13]. Conversely, migration to the US may also have a protective effect, as seen by higher rates of condom use and history of HIV testing among Mexicans with a history of US migration [12–15]. Differing social norms and practices in the US, coupled with structural vulnerabilities of migration, drive these changes in sexual risk behaviors [16].

Although the HIV literature predominantly focuses on international migration between Mexico and the US, there are a few studies which suggest migration within Mexico and Central America may influence HIV risk behaviors as well. Studies in Guatemala found increases in STI symptoms and HIV seroprevalance among women who reported a sexual partner who was a migrant worker [17, 18]. Qualitative interviews with internal migrant female factory workers in Mexico found that unprotected sex was common and misconceptions about HIV transmission were high [19]. Finally, at the US/Mexico border, Mexican male migrants still in transit within Mexico had the highest rates of HIV compared to those in the pre-departure, interception or return phases [20]. However, it is unclear whether the underlying mechanisms driving this risk are the same as those found among Mexican migrants to the US.

In addition to sexual risk behaviors, migration may also affect substance use type and frequency. Mexican migrants to the United States have higher rates of illicit drug use, alcohol consumption, and substance abuse than their non-migrating peers [13, 21–23]. National Mexican statistics found that 21.5% of migrants to the US versus 7.2% of non-migrants had ever used an illicit drug [22]. Less is known about substance use among circular or internal migrants within Central America and Mexico. While injection drug use is not currently considered a major factor driving HIV in southern Mexico and Central America, substance use may indirectly drive HIV infections through increases in sexual risk behaviors [24]. Therefore, understanding the intersection of sexual risk, substance use, and

migration is critical to monitoring HIV in Mexico and Central America.

In Central America and Mexico, HIV is primarily transmitted sexually, and the epidemic is concentrated among most-at risk populations (MARPs)—men who have sex with men (MSM) and commercial sex workers. The HIV prevalence among MARPs is as high as 4–13%, compared to the regional rates among adults of 0.2–1.5% [25–27]. However, while commercial sex workers are at heightened risk of HIV and STIs, some studies have found that male migrants use condoms with female sex workers fairly consistently [28–30].

Among current and former Latino migrants to the US, consistent condom use was highest among commercial partners, followed by casual partners, then main partners [28, 29]. A study of HIV risk behaviors among male agricultural migrants within Mexico found a significantly higher sexual risk behavior score with casual partners than with main partners [31]. While condom use with casual partners is higher than with main partners, casual relationships may be culturally more amenable to condom-use interventions [32, 33]. Therefore the focus of the present analysis is on inconsistent condom use with casual partners.

The Mexico/Guatemala border region is at a nexus of poverty, rising availability of drugs, and increasing migration. This area bisects major Central American migration pathways and is home to circular seasonal agricultural migrants, as well as many deported migrants. A USAID report on Central America cites that the combination of unequal socioeconomic development and a highly mobile population may contribute to the spread of HIV/AIDS in the region [25].

Given the relative lack of information on HIV risk factors among migrants in this region, our study enrolled recent migrants on both sides of the Mexico/Guatemala border who reported active substance use or problem drinking. The first aim of this study was to report the prevalence of sexual risk behaviors, HIV and syphilis. The second aim was to analyze variables associated with inconsistent condom use with casual partners by gender.

Methods

Study Population and Recruitment

We recruited participants as part of a cross-sectional study within a larger NIH-funded study (*Cruzando Fronteras*, NIDA R01DA029899) of substance use and HIV risk. Recruitment sites were selected for their location along major migration routes at the Mexico/Guatemala border, in and around the cities of Ciudad Hidalgo and Tapachula in

Mexico and Quetzaltenango and Tecún Umán in Guatemala (Fig. 1).

Participants were recruited using a combination of modified time-location sampling of migrant “venues” (e.g., migrant shelters, border crossings) and peer referrals. Trained local outreach workers invited participants to participate and administered a brief screening questionnaire to assess eligibility. To be included, participants had to: (i) be at least 18 years of age; (ii) be Spanish speaking; (iii) be willing and able to provide informed consent; (iv) be willing to undergo testing for HIV, HCV, and syphilis; (v) have used an illicit substance or have had problem drinking in the past 2 months; and (vi) meet the definition of a recent regional, international, or seasonal migrant (see paragraph below). The Alcohol Use Disorders Identification Test Consumption (AUDIT-C), a standardized 12-point alcohol misuse screening tool, was used to assess problem drinking. We used recommended alcohol misuse thresholds of at least 4 for men or 3 for women [34].

Recent migrants included individuals with at least one of the following characteristics: (i) Moved states or countries (to live) within the past 5 years; (ii) Traveled to another country or state for work for a total of at least 3 months of the year; (iii) had a work trip that lasted at least 1 month at a time; (iv) Were deported (from any country) within the past 5 years. All study activities were approved by the

Human Research Protections Program of the University of California San Diego; the Comisión de Bioética del Estado de Chiapas, Mexico; and the Comité de Ética of the Universidad del Valle in Guatemala.

Quantitative Survey

After giving written informed consent, participants underwent a quantitative survey administered by trained local staff members. Local staff conducted interviews in Spanish using computer-assisted personal interviewing technology. The survey took approximately 90 min to complete and included questions about: sociodemographics; substance use; sexual behaviors and experiences; medical history; access to care; incarceration history; history of community and personal violence; and mental health.

Study Measures

The survey assessed four main sexual partner relationships: (1) *Steady*- partners with whom the participant had regular sex within a romantic or affectionate relationship (e.g., a spouse or girlfriend/boyfriend); (2) *Casual*-partners with whom the participant had sex with without any commitment (i.e., occasionally meet up with to have sex without an emotional attachment and without the exchange of

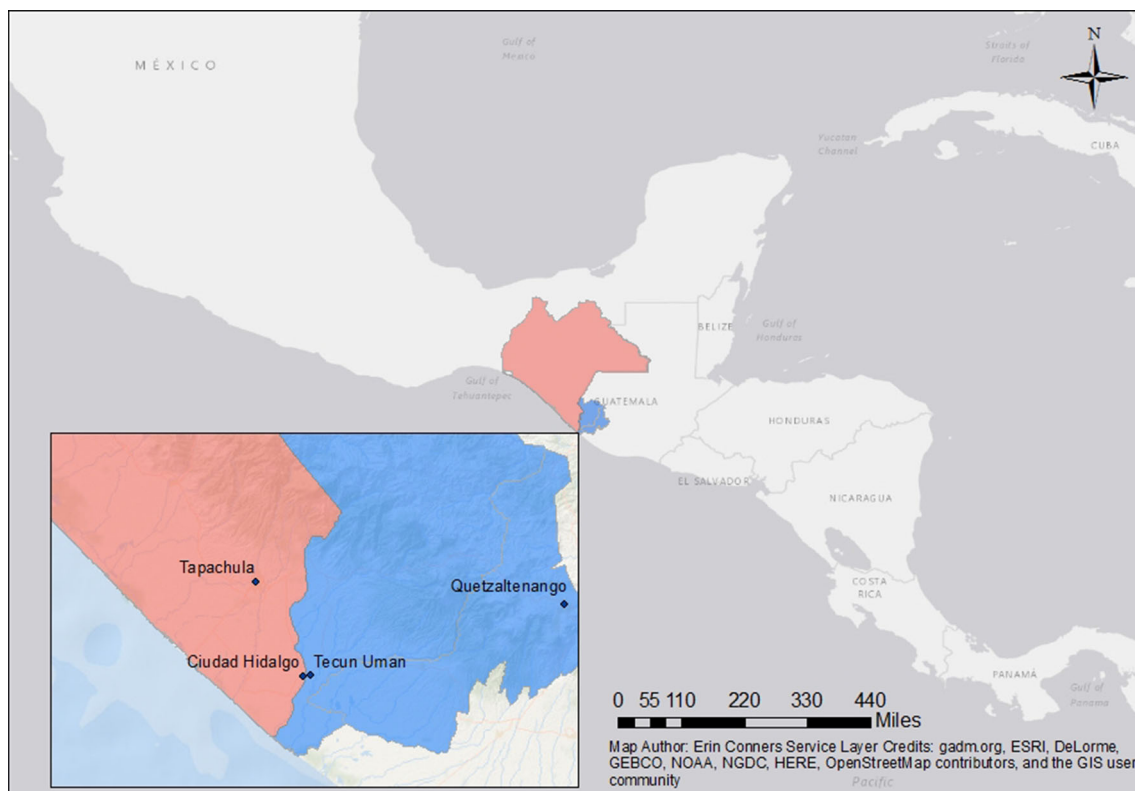


Fig. 1 Map of main recruitment locations in Mexico and Guatemala

money); (3) *Commercial*-partners who received money, drugs, shelter, or anything else from the participant in exchange for having sex; (4) *Clients*-partners who gave the participant something (e.g., money, transportation, food) in exchange for sex. An individual who exchanges sex for goods or services will be referred to in this paper as “engaging in sex work” or exchanging sex.

Condom use was measured by asking, how often (never, sometimes, about half of the time, often, always) participants used a condom during vaginal or anal sex in the past 6 months. We defined inconsistent condom use as not “always” using a condom during sexual encounters. The main outcome of interest was inconsistent condom use with casual partners.

We categorized education level into those who had less than a secondary level of education versus those who had some secondary school or above. Primary occupation was assessed by a multiple-choice categorical variable with an optional fill-in response. We classified the most common sources of income into the following categories: salaried; informal work; agricultural work; sex work; or assistance from family or government. Length of stay in interview city was dichotomized into less than 5 years versus 5 or more years and excluded mobile individuals who said “I’m not staying here/I’m just passing through”.

We asked participants about their drug consumption frequency (lifetime or past 6 months) for a variety of illicit drugs by different routes of administration. We also created separate variables for injection of any drug “injection drug use” and “hard drug” use, coded as any heroin, crack, cocaine, methamphetamine use by any route of administration. We estimated years using drugs by subtracting the age the participant started using drugs from their current age.

HIV knowledge was assessed using a modified HIV Knowledge Questionnaire (HIV-KQ-18) [35]. All items on the original scale were asked except, “A natural skin condom works better against HIV than does a latex condom”. That question was excluded during pilot testing because natural skin condoms were not available locally, nor were they widely known about. The HIV knowledge score was out of 17, with 1 point given for each correct answer and no points given for incorrect or “don’t know” responses.

In the survey, initiation of sex work or drug use was assessed in relation to migration, as either occurring: before I moved/migrated; during the journey; while at the destination of my travels; or after returning to my home state/country. The final dichotomized variable only compared those who initiated before they migrated versus those who initiated at their destination, as small cell sizes precluded comparing the other categories.

HIV seropositivity was detected by two positive HIV rapid test results: determine HIV 1/2 (Aler) and

SureCheck HIV 1/2 (Chembio). In the case of a discordant result (which did not occur in the present study), the SD Bioline HIV 1/2 3.0 test (Standard Diagnostics) was available to serve as a tie breaker. Syphilis was determined by a positive rapid test result (SD Bioline Syphilis 3.0, Standard Diagnostics), confirmed by a positive FTA-Abs result. Active syphilis was classified as any positive result with a VDRL titer $\geq 1:8$. All participants received pre- and post-test counseling and individuals receiving any positive test result were referred to local health services.

Statistical Analysis

We ran descriptive statistics on the total sample and by gender. All continuous variables had non-normal distributions, and therefore we calculated medians and interquartile ranges (IQR). We ran Pearson’s Chi square tests and Wilcoxon Rank Sum tests to compare differences in the variables of interest between groups.

Univariate logistic regressions were performed to identify factors associated with inconsistent condom use with casual partners. Among women, we did not run multivariate models due to the small sample size. For men, variables significant at a $p < 0.1$ cutoff were considered for inclusion in a final multivariable logistic regression model [36]. Statistical confounders were defined as any variable that resulted in a greater than 10% change in the odds ratios when added to the model. While we assessed for statistical confounding in our analysis, we did not find any. To reduce multicollinearity, variables that were highly correlated with each other (an $r > 0.4$) were not included in the same model; in the event of two highly correlated covariates, the one with the strongest relationship to the outcome was retained. Using a manual backwards procedure for model building, variables were removed from the model individually. Only variables significant at $p < 0.05$ were retained in the final model. Multicollinearity of the final model was assessed using a tolerance test using a minimum cutoff of 0.1. We ran all analyses using SPSS software (SPSS Inc., Chicago, Illinois).

Results

Sample Characteristics and Risk Behaviors

From April to August 2015, 392 individuals met the inclusion criteria of recent migration history and current substance use and were enrolled from sites along the Mexico/Guatemala border (175 in Mexico and 217 in Guatemala). Of these, 85 (22%) were women, 303 (77%) were men, and 4 (1%) were transgendered women. We excluded transgendered women from subsequent analyses because of the small sample size. Sociodemographic

characteristics are summarized in Table 1. Migrants were predominantly born in Guatemala (49%), with 45% from other Central American countries (Honduras, El Salvador, Nicaragua, and Panama). Women were more likely than men to rely on family or government assistance (12 vs. 4%, $p < 0.01$) or sex work (30 vs. 3%, $p < 0.01$) as their main source of income. Men were more likely than women to work in agriculture (11 vs. 4%, $p = 0.04$) or have informal jobs (32 vs. 20%, $p = 0.03$). Men were much more likely than women to have ever been to the United States (36 vs. 6%, $p < 0.01$). Men and women did not significantly differ on other demographic variables or type of migration.

Substance Use Prevalence

The drugs most commonly used by participants in the past 6 months were marijuana (53% men, 26% women), cocaine (non-injected) or crack (37% men, 18% women), and inhalants (7% men, 2% women). “Ever” injecting a drug was reported by 11% of men and 7% of women. Men were more likely than women to report hard drug use by any route of administration in the past 6 months (38 vs. 18%, $p < 0.01$).

Sexual Partners

Having a casual partner in the past 6 months was common (57%) and did not differ significantly by gender (Table 1). Most participants were married or had a steady partner (71%), but only 52% had a sexual relationship with that spouse/partner in the past 6 months. Concurrency (overlapping in time) of steady and casual sexual partners was 26% among women and 29% among men.

Exchanging sex for goods or services in the past 6 months was reported by 34 (41%) women and 58 (19%) men. Thirty-four (59%) men who exchanged sex reported having female partners, 31 (53%) reported male partners, and 11 (19%) reported transsexual partners. Thirty-seven percent of men reported paying for sex in the past 6 months. Among all men in the study, 13% reported having had sex with a man in the past 6 months.

Condom use with steady partners was extremely low, with only 6% of partnered participants reporting always or often using a condom. Of individuals with casual partners, 69% inconsistently used condoms. Men who reported having exchanged sex were much more likely than women who exchanged sex to inconsistently use condoms with clients in the past 6 months (74 vs. 29%, $p < 0.01$).

HIV and Syphilis Prevalence

The prevalence of current or past syphilis infection was 1.2% among women and 2.3% among men. Of those testing positive for syphilis, only one case was an active

infection. The HIV prevalence was 2.4% among women and 1.3% among men. Of the 6 individuals who tested positive for HIV, three had previously been tested: two reported their previous HIV test result was negative and one knew their positive status. An additional participant had a positive result on his first HIV rapid test, but refused the second test and was therefore unconfirmed. He reported knowing his HIV-positive status and that he was currently in care, but not on anti-retrovirals.

Condom Behaviors

When asked where they usually obtained condoms, women reported buying them from pharmacies/stores (34%), getting them from municipal clinics (28%) or from NGOs (15%). Men predominantly purchased condoms from a pharmacy/store (65%) or to a lesser extent obtained them from free municipal clinics (21%).

For both men and women, the top reason reported for not using a condom with casual partners was that they “did not want to”, or that they “did not like using them” (52% of women, 49% of men). For women, the second most cited reason (32%) was that their partner did not want to; whereas for men, it was because condoms are uncomfortable/“it’s not the same” (30%). In addition, for 18% of men and 28% of women “[partner] seemed healthy” was another common reason for deciding not to use a condom.

In regards to who usually decides whether to use a condom, 69% of women said that they decide and 17% said they decide in collaboration with their casual partners. Among men, 61% said that they decide and 25% said they decide with their casual partner.

Variables Associated with Inconsistent Condom Use: Women

In the sample, 63% of women with casual partners inconsistently used condoms in the past 6 months. Characteristics of women with casual partners are described in Table 2. Inconsistent condom use with casual partners was associated with reduced odds of having exchanged sex for money or goods (unadjusted odds ratio (uOR): 0.24, 95% confidence interval (CI): 0.06–0.98). Women with greater education were more likely to inconsistently use condoms with casual partners (uOR: 11.6, 95% CI: 2.11–63.10). We did not find any association between inconsistent condom use and migration history.

In a sub analysis exploring these differences, we found a statistically significant association between exchanging sex within the past 6 months and both always having access to free condoms (uOR: 11.30, 95% CI: 2.91–43.87) and lower education (uOR: 2.89, 95% CI: 1.12–7.45).

Table 1 Sociodemographic, migration history and selected risk behaviors of substance using recent migrants, by gender (N = 388)

	All (N = 388) N (%)	Female ^a (n = 85) N (%)	Male (n = 303) N (%)	Test statistic (p value) ^b
Country of interview				
Mexico	171 (44)	50 (59)	121 (40)	
Guatemala	217 (56)	35 (41)	182 (60)	9.6 (<0.01)
Sociodemographics				
Age [median, IQR]	31 [24–37]	32 [25–40]	31 [24–37]	−1.88 (0.06)
Current financial situation bad to extremely bad (ref: extremely good to neutral)	203 (52)	45 (53)	158 (52)	0.02 (0.90)
Sexual orientation				
Heterosexual/straight	366 (95)	80 (95)	286 (95)	
Homosexual/Gay/Lesbian	2 (1)	0 (0)	2 (1)	
Bisexual	17 (4)	4 (5)	13 (4)	–
Less than secondary education (ref: secondary or above)	227 (59)	51 (60)	176 (58)	0.10 (0.75)
Married/common law (ref: Single, divorced, separated, widow)	274 (71)	63 (74)	211 (70)	0.58 (0.45)
Top sources of income				
Salaried	133 (35)	28 (33)	105 (36)	0.13 (0.72)
Informal work	113 (30)	17 (20)	96 (32)	4.66 (0.03)
Agricultural work	36 (10)	3 (4)	33 (11)	4.38 (0.04)
Sex work	33 (9)	25 (30)	8 (3)	60.41 (<0.01)
Assistance (family/government)	22 (6)	10 (12)	12 (4)	7.39 (<0.01)
Country of birth				
Mexico	23 (6)	7 (8)	16 (5)	1.04 (0.31)
Guatemala	191 (49)	36 (42)	155 (51)	2.06 (0.15)
Honduras	92 (24)	21 (25)	71 (23)	0.06 (0.81)
El Salvador	70 (18)	19 (22)	51 (17)	1.37 (0.24)
Nicaragua	11 (3)	2 (2)	9 (3)	0.09 (0.76)
Panama	1(<1)	0 (0)	1(1)	–
Member of indigenous group	38 (10)	4 (5)	34 (12)	3.10 (0.08)
Migration history				
Recent international migrant (w/n 5 years)	260 (68)	51 (61)	209 (69)	1.79 (0.18)
Recent regional migrant (w/n 5 years)	213 (55)	45 (54)	168 (56)	0.05 (0.82)
Seasonal migrant country or state (w/n 1 year)	233 (62)	47 (58)	186 (63)	0.68 (0.41)
Current undocumented migrant	197 (51)	39 (46)	158 (52)	1.04 (0.31)
Been to the United States, ever	115 (30)	5 (6)	110 (36)	29.62 (<0.01)
Sexual partners				
Had a steady partner, past 6 months	195 (52)	46 (57)	149 (51)	1.00 (0.32)
Inconsistent condom use steady partner, past 6 months (ref: always use condom)	178 (94)	42 (93)	136 (94)	0.08 (0.78)
Had a casual partner, past 6 months	216 (57)	41 (50)	175 (59)	2.09 (0.15)
Median number of casual sex partners, past 6 months [IQR]	3 [1–5]	3 [1–5]	3 [1–5]	0.00 (1.00)
Inconsistent condom use casual partner, past 6 months (ref: always use condom)	148 (69)	25 (63)	123 (70)	0.92 (0.34)
Bought sex, past 6 months	111 (29)	1 (1)	110 (37)	39.6 (<0.01)
Median number commercial partners [IQR]	–	–	2.5 [2–4]	–
Exchanged sex, past 6 months	92 (24)	34 (41)	58 (19)	17.1 (<0.01)
Median number clients [IQR]	6 [2–24]	22.5 [7–58]	3 [1–7]	−5.31 (<0.01)
Inconsistent condom use client, past 6 months (ref: always use condom)	52 (57)	10 (29)	42 (74)	17.04 (<0.01)

Table 1 continued

	All (N = 388) N (%)	Female ^a (n = 85) N (%)	Male (n = 303) N (%)	Test statistic (<i>p</i> value) ^b
MSM, past 6 months	–	–	40 (13)	–
Tested for HIV, ever	200 (52)	53 (62)	147 (49)	5.09 (0.02)
Substance use				
Hard drug use any route, past 6 months	131 (34)	15 (18)	116 (38)	12.64 (<0.01)
Injection drug use, ever	32 (11)	3 (7)	29 (11)	0.60 (0.44)
STI testing results				
HIV	6 (2)	2 (2)	4 (1)	0.47 (0.49)
Syphilis	8 (2)	1 (1)	7 (2)	0.43 (0.51)

Bold values are significant at $p < 0.05$

^a Only included biological females, not transgender women

^b Test statistics and *p* values are based on Chi square tests, non-parametric Wilcoxon rank sum tests or Fisher's Exact test

Variables Associated with Inconsistent Condom Use: Men

Characteristics of men with casual partners are described in Table 3. In the sample, 70% of men with casual partners inconsistently used condoms in the past 6 months. In the univariate analyses, inconsistent condom use was associated with: lower education (uOR: 2.21, 95% CI: 1.14–4.26), problem drinking (uOR: 6.44, 95% CI: 1.21–34.33), ever injecting drugs (uOR: 4.70, 95% CI: 1.05–21.12), using drugs with a sexual partner (uOR: 3.63, 95% CI: 1.18–11.15), homelessness (uOR: 2.23, 95% CI: 1.13–4.40), and inconsistent condom use with a client (uOR: 13.07, 95% CI: 2.50–68.29). Inconsistent condom use with casual partners was less likely among men who had previously been tested for HIV (uOR: 0.49, 95% CI: 0.25–0.94) or who were able to always get condoms for free (uOR: 0.30, 95% CI: 0.12–0.72).

After adjusting for other significant variables in the multivariate model, inconsistent condom use was independently associated with using drugs with sexual partners (adjusted odds ratio (aOR): 3.38, 95% CI 1.04–10.96) and using drugs before sex (aOR: 2.59, 95% CI: 1.14–5.91) (Table 4). Inconsistent condom use with casual partners was less likely among men who always had access to free condoms (aOR: 0.26, 95% CI 0.08–0.72).

Discussion

In this study of migrants who use illicit substances or have problem drinking, there was a high prevalence of concurrent risk factors for HIV, including inconsistent condom use during casual sexual encounters, commercial sex work,

and male sex with men. The overall HIV prevalence was 1.5%.

We found that more educated women were less likely to use condoms on a consistent basis with their casual partners, which is contrary to what we would have predicted given past research showing higher education is correlated with greater condom use [37–39]. However, we also found that women who had exchanged sex for goods or services in the past 6 months were less educated and more likely to use condoms on a regular basis. While the small sample size precluded us from testing multivariate models, it is plausible that sex work explains the inverse relationship between condom use and education. Past studies among Latinos have found higher rates of condom usage among sex workers or reported by clients of sex workers [28–30, 40]. Given that there is often a lack of formal sex education in school, women engaging in sex work may be more likely to have received messages about condom use through peers or public health outreach. This result is also in line with qualitative work among Mexican female migrants not engaged in sex work, which found that the use of condoms was often stigmatized because condoms were perceived as being used by “unclean” or “loose” women [19]. These findings highlight the need for programs to increase the acceptability and use of condoms among all women. The engagement of women is especially critical in this population considering that we found that 69% of women with casual partners said that they made decisions about when a condom would be used.

Men who reported that they use drugs with sexual partners or that they had been high within 2 h prior to sex with a casual partner were significantly more likely to use condoms inconsistently. Having sex with casual partners, coupled with alcohol and drug use, has also been

Table 2 Variables associated with inconsistent condom use of recent female migrants with their casual partners, past 6 months (n = 40)

	Consistent condom use N = 15 N (%)	Inconsistent condom use N = 25 N (%)	Test statistic (p value) ^a	UOR [95% CI]
Sociodemographics^d				
Age [median, IQR]	29 [22–31]	25 [24–37]	−1.43 (0.16)	1.08 [0.98–1.19]
Youths(<25 years)	5 (33)	8 (32)	0.01 (0.93)	0.94 [0.24–3.68]
Sexual orientation			0.61 (0.43)	N/A
Heterosexual/straight	15 (100)	24 (96)		
Bisexual	0 (0)	1 (4)		
Less than secondary education (ref: secondary or above)	13 (87)	9 (36)	9.72 (<0.01)	0.09 [0.02–0.47]**
Married/common law (ref: Single, divorced, separated, widow)	12 (80)	20 (80)	0.00 (1.00)	1.00 [0.20–4.96]
Current financial situation bad to extremely bad (ref: extremely good to neutral)	5 (33)	15 (60)	2.67 (0.10)	3.00 [0.79–11.45]
Member of indigenous group	0 (0)	1 (4)	(1.00) ^b	N/A
Ever homeless, past 6 months	4 (27)	6 (24)	0.04 (0.85)	0.87 [0.20–3.77]
Ever arrested, less 6 months ago	2 (13)	2 (8)	(0.62) ^b	0.57 [0.07–4.50]
Migration history				
Migrated to current city alone	3 (20)	10 (42)	1.95 (0.16)	2.86 [0.64–12.84]
Currently lives in different country than civil partner	3 (30)	3 (25)	(1.00) ^b	0.78 [0.12–5.10]
Living in interview city less than 6 months (ref: more than 6 months)	9 (64)	13 (54)	0.37 (0.54)	0.66 [0.17–2.55]
International migrant, past 5 years	11 (73)	17 (71)	0.03 (0.87)	0.88 [0.21–3.74]
Regional migrant, past 5 years	10 (67)	11 (46)	1.61 (0.20)	0.42 [0.11–1.62]
Seasonal migrant, past year	11 (79)	12 (52)	2.58 (0.11)	0.30 [0.07–1.35]
Current undocumented migrant	7 (47)	9 (36)	0.44 (0.51)	0.64 [0.18–2.36]
Been to the United States, ever	2 (13)	0 (0)	(0.13) ^{b*}	N/A
Deported from non-US country, past 5 years	2 (13)	7 (28)	1.16 (0.28)	2.53 [0.45–14.20]
Substance use^c				
Audit C score \geq 3	15 (100)	24 (100)	–	N/A
Used illicit drugs, ever (n = 22)	11 (73)	11 (44)	3.26 (0.07)	0.29 [0.07–1.15]*
Start of drug use at the destination of travels (ref: started before first migration)	6 (55)	3 (30)	(0.39) ^b	0.36 [0.06–2.16]
Years used drugs	9 [2–12]	10 [4–17]	−1.16 (0.27)	1.07 [0.95–1.20]
Used any illicit drug, past 6 months	7 (47)	9 (36)	0.44 (0.51)	0.64 [0.17–2.36]
Crack or cocaine (no inj), past 6 months	3 (20)	6 (24)	0.09 (0.77)	1.26 [0.27–6.03]
Marijuana, past 6 months	6 (40)	7 (28)	0.62 (0.43)	0.58 [0.15–2.26]
Hard drug use any route, past 6 months	3 (20)	6 (24)	0.09 (0.77)	1.26 [0.27–6.03]
Injected drugs, ever	1 (9)	1 (9)	(1.00) ^b	1.00 [0.05–18.30]
Use drugs with sexual partner, past 6 months	3 (38)	2 (22)	(0.62) ^b	0.48 [0.06–3.99]
Drunk 2 h prior to sex with casual partner, past 6 months	9 (60)	19 (76)	1.14 (0.29)	2.11 [0.53–8.41]
High 2 h prior to sex with casual partner, past 6 months	3 (20)	6 (25)	0.13 (0.72)	1.33 [0.28–6.39]
Access to care				
Tested for HIV, ever	10 (67)	14 (56)	0.44 (0.51)	0.64 [0.17–2.41]
Needed to see a doctor but did not go, past year	6 (40)	4 (16)	2.88 (0.09)	0.29 [0.07–1.26]*
Always can get condoms for free (ref: never-often)	5 (33)	2 (8)	(0.08) ^b	0.17 [0.03–1.05]*
Median HIV knowledge (out of 17)	10 [9–12]	11 [9–13]	−0.37 (0.72)	1.05 [0.78–1.42]
Participant was carrying a condom	4 (27)	3 (12)	(0.39) ^b	0.38 [0.07–1.98]
Sexual partners and behaviors				
Median number of male partners, past 6 months [IQR]	7 [2–25]	3 [2–8]	−0.85 (0.41)	1.00 [0.99–1.01]
Had a steady partner, past 6 months	10 (67)	12 (48)	1.32 (0.25)	0.46 [0.12–1.75]

Table 2 continued

	Consistent condom use N = 15 N (%)	Inconsistent condom use N = 25 N (%)	Test statistic (p value) ^a	UOR [95% CI]
Inconsistent condom use steady partner, past 6 months (ref: always use condom)	9 (100)	12 (100)	N/A	N/A
Median number of casual sex partners, past 6 months [IQR]	5 [1–10]	2 [1–4]	−1.48 (0.16)	0.93 [0.84–1.02]
Exchanged sex, past 6 months	11 (73)	10 (40)	4.18 (0.04)	0.24 [0.06–0.98]**
Median number of clients, past 6 months [IQR]	15 [3–27]	13 [2–58]	−0.82 (0.41)	
Inconsistent condom use client, past 6 months (ref: always use condom) (n = 21)	1 (9)	4 (40)	(0.15) ^b	6.67 [0.60–74.51]
Start of sex work at the destination of travels (n = 20) (ref: started before first migration)	6 (60)	4 (40)	0.80 (0.37)	0.44 [0.07–2.66]
Ever forced to have sex, past year	3 (21)	2 (8)	(0.33) ^b	0.32 [0.05–2.19]

Bold values are significant at $p < 0.05$

IQR interquartile range, N/A statistic not available due to insufficient sample size

* $p < 0.1$; ** $p < 0.05$

^a p values are based on Chi square tests, non-parametric Wilcoxon rank sum tests or Fisher's Exact test

^b Fischer's exact

^c No women reported injecting drugs, smoking or snorting methamphetamines, using hallucinogens, or using inhalants in the past 6 months

^d Variables with more than 5 missing responses have the denominator in parentheses

documented among indigenous migrant workers in Mexico [31]. While the focus of many HIV prevention activities may be with persons who inject drugs, our finding lends further support to the potential role of non-injection drug use in increasing HIV/STI risk, specifically through decreased condom use [24, 41, 42].

In this alcohol and drug using population, 11% of men had ever injected an illicit drug, but recent injection drug use was low. In the univariate analyses for men, a past history of injection was associated with inconsistent condom use with casual partners. While not an independent predictor of inconsistent condom use in the final model, injection drug use nevertheless poses a greater risk for the introduction of blood-borne diseases into the population. Also of concern is the potential for overlap in the sexual networks between persons with injection drug use and with non-injection drug use [24].

Among men, inconsistent condom use with casual partners was negatively associated with access to free condoms—in other words, those who reported always having access to free condoms had a fourfold increase of consistently using condoms. We found that the majority of men bought their condoms from a pharmacy or store, rather than getting them from a free source. While cost was not directly cited as a major barrier to condom use, freely and easily accessible condoms for men may be a starting point for intervention.

Although it was not the main outcome of interest, the high rate of inconsistent condom use with clients (74%) among men who reported engaging in sex work was concerning. This may indicate that messages to commercial sex workers about condom use may be primarily geared towards women. Additionally, 53% of men who exchanged sex reported having a male client. Notably, while only 5% of migrant men reported identifying as gay or bisexual, 13% reported having sex with a man in the past 6 months. Other reports have found that about one-third of the MSM in Central America also report having sex with women [43]. This gap highlights the need to provide HIV prevention messaging to men more broadly, rather than just targeting men who identify as gay.

This study must be considered in light of some limitations. First, while the cross-sectional study design allowed us to interview migrants without the challenges of maintaining a highly mobile population in follow-up, it did not allow for any prediction of inconsistent condom use. Secondly, without a comparison group of either sending communities or the general population in the Mexico/Guatemala border region, we were unable to determine whether the prevalence of HIV and risk factors differ in non-migrants. Thirdly, behaviors may have been underreported due to social desirability bias. To minimize socially desirable responses, interviews were conducted in private settings with trained interviewers. Additionally, we only

Table 3 Variables associated with inconsistent condom use of recent male migrants with their casual partners, past 6 months (n = 175)

	Consistent condom use N = 52 N (%)	Inconsistent condom use N = 123 N (%)	Test statistic (p value) ^a	UOR [95% CI]
Sociodemographics^c				
Age [IQR]	27 [21–32]	29 [23–37]	−1.60 (0.11)	1.02 [0.99–1.06]
Youth (<25 years)	20 (39)	39 (32)	0.75 (0.39)	0.74 [0.38–1.46]
Sexual orientation				
Heterosexual/straight	3 (6)	6 (5)	0.54 (0.46)	
Homosexual/Gay/Lesbian	1 (2)	0 (0)	(0.30) ^b	
Bisexual	48 (92)	117 (95)	0.06 (0.81)	–
Less than secondary education (ref: secondary or above)	22 (42)	76 (62)	5.63 (0.02)	2.21 [1.14–4.26]**
Married/common law (ref: Single, divorced, separated, widow)	37 (71)	93 (76)	0.38 (0.54)	1.26 [0.61–2.60]
Current financial situation bad to extremely bad (ref: extremely good to neutral)	21 (40)	65 (53)	2.27 (0.13)	1.65 [0.86–3.19]
Member of indigenous group	4 (8)	15 (12)	0.69 (0.41)	1.63 [0.51–5.17]
Ever homeless, past 6 months	17 (33)	64 (52)	5.50 (0.02)	2.23 [1.13–4.40]**
Ever arrested, less 6 months ago	9 (17)	20 (16)	0.03 (0.87)	0.93 [0.39–2.20]
Migration history				
Migrated to current city alone	33 (65)	75 (62)	0.16 (0.69)	0.87 [0.44–1.72]
Currently lives in different country than civil partner	15 (56)	27 (44)	0.96 (0.33)	0.64 [0.25–1.58]
Living in interview city less than 6 months (ref: more than 6 months)	25 (57)	77 (67)	1.42 (0.23)	1.54 [0.76–3.14]
International migrant, past 5 years	43 (83)	87 (71)	2.73 (0.10)	0.51 [0.22–1.15]*
Regional migrant, past 5 years	27 (52)	73 (59)	0.82 (0.36)	1.35 [0.70–2.60]
Seasonal migrant, past year	29 (59)	81 (67)	0.92 (0.34)	1.40 [0.71–2.77]
Current undocumented migrant	30 (58)	68 (55)	0.09 (0.77)	0.91 [0.47–1.75]
Been to the United States, ever	16 (31)	39 (32)	0.02 (0.90)	1.05 [0.52–2.11]
Deported from US, past 5 years	9 (18)	26 (21)	0.27 (0.60)	1.25 [0.54–2.90]
Deported from non-US country, past 5 years	21 (41)	47 (38)	0.13 (0.71)	0.88 [0.45–1.72]
Substance use (ever or past 6 m)				
Audit C score ≥ 4	47 (90)	121 (98)	(0.03) ^b	6.44 [1.21–34.33]*
Used illicit drugs, ever (n = 157)	49 (94)	108 (88)	1.64 (0.20)	0.44 [0.12–1.59]
Start of drug use at the destination of travels (ref: started before first migration)	18 (40)	27 (30)	1.45 (0.23)	0.63 [0.30–1.34]
Years used drugs	9 [6–17]	11 [7–19]	−1.06 (0.29)	1.01 [0.97–1.05]
Used any illicit drug, past 6 months	35 (67)	90 (73)	0.62 (0.43)	1.33 [0.66–2.68]
Crack or cocaine (no inj), past 6 months	20 (39)	63 (51)	2.39 (0.12)	1.68 [0.87–3.25]
Smoked or snort meth, past 6 months	2 (4)	8 (7)	0.48 (0.49)	1.74 [0.36–8.48]
Hallucinogens, past 6 months	3 (6)	6 (5)	0.06 (0.81)	0.84 [0.20–3.48]
Inhalants, past 6 months	2 (4)	12 (10)	1.73 (0.19)	2.70 [0.58–12.53]
Marijuana, past 6 months	31 (60)	75 (61)	0.03 (0.87)	1.06 [0.55–2.05]
Hard drug use any route, past 6 months	20 (39)	62 (50)	2.09 (0.15)	1.63 [0.84–3.15]
Injected drugs, ever	2 (4)	18 (17)	4.8 (0.03)	4.70 [1.05–21.12]**
Injected drugs, past 6 months (n = 20)	0 (0)	2 (11)	(1.00) ^b	N/A
Use drugs with sexual partner	4 (11)	29 (30)	5.55 (0.02)	3.63 [1.18–11.15]**
Drunk 2 h prior to sex with casual partner, past 6 months	30 (58)	87 (71)	2.80 (0.09)	1.77 [0.90–3.48]*
High 2 h prior to sex with casual partner, past 6 months	19 (37)	65 (53)	3.89 (0.05)	1.95 [1.00–3.79]*
Access to care				
Tested for HIV, ever	30 (58)	49 (40)	4.71 (0.03)	0.49 [0.25–0.94]**
Needed to see a doctor but did not go, past year	10 (19)	29 (24)	0.40 (0.53)	1.30 [0.58–2.90]

Table 3 continued

	Consistent condom use N = 52 N (%)	Inconsistent condom use N = 123 N (%)	Test statistic (p value) ^a	UOR [95% CI]
Always can get condoms for free (ref: never-often)	13 (26)	11 (9)	7.77 (<0.01)	0.30 [0.12–0.72]***
Median HIV knowledge (out of 17)	11 [9–13]	10 [8–13]	−0.87 (0.38)	0.95 [0.87–1.04]
Participant was carrying a condom	7 (14)	12 (10)	0.52 (0.47)	0.70 [0.26–1.88]
Sexual partners				
Median number of partners, past 6 months [IQR]				
Women	3 [1–6]	3.5 [2–6]	−1.23 (0.22)	1.00 [0.98–1.03]
Men	0 [0–1]	1 [0–3]	−1.56 (0.12)	0.99 [0.95–1.03]
Trans	0 [0–2]	1 [0–2]	−0.84 (0.40)	1.3 [0.75–2.22]
Had sex with a man, past 6 months	6 (12)	25 (20)	1.94 (0.16)	1.96 [0.75–5.10]
Had a steady partner, past 6 months	27 (52)	61 (50)	0.03 (0.85)	0.94 [0.49–1.80]
Inconsistent condom use steady partner, past 6 months (ref: always use condom)	25 (93)	57 (98)	(0.24) ^b	4.56 [0.40–52.64]
Median number of casual sex partners, past 6 months [IQR]				
Bought sex, past 6 months	21 (40)	59 (48)	0.85 (0.36)	1.36 [0.71–2.63]
Had sex with a male commercial partner, past 6 months	1 (2)	1 (1)	(0.51) ^b	0.42 [0.03–6.81]
Had sex with a female commercial partner, past 6 months	20 (39)	59 (48)	1.33 (0.25)	1.48 [0.76–2.86]
Exchanged sex, past 6 months	11 (21)	33 (27)	0.63 (0.43)	1.37 [0.63–2.97]
Median number of clients, past 6 months [IQR]	2 [0–5]	1 [0–4]	−0.39 (0.70)	
Inconsistent condom use client, past 6 months (ref: always use condom)	3 (30)	28 (85)	11.48 (<0.01)	13.07 [2.50–68.29]***
Start of sex work at the destination of travels (ref: started before first migration)	7 (58)	23 (55)	0.05 (0.83)	0.87 [0.24–3.17]
Ever forced to have sex, past year	2 (4)	2 (2)	(0.58) ^b	0.41 [0.06–3.02]

Bold values are significant at $p < 0.05$

IQR interquartile range

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

^a p values are based on Chi square tests, non-parametric Wilcoxon rank sum tests or Fisher's Exact test

^b Fischer's exact

^c Variables with more than 5 missing responses have the denominator in parentheses

Table 4 Multivariate logistic regression of variables associated with male migrant's inconsistent condom use with casual partners in the past 6 months

	AOR ^a [95% CI], p value
Always have access to free condoms	0.26 [0.08–0.72], 0.01
Use drugs with sexual partners	3.38 [1.04–10.96], 0.04
Use drugs before sex	2.59 [1.14–5.91], 0.02

^a Variables are adjusted for the others listed in this table

had sufficient sample size to conduct multiple logistic regression analysis for men; our analysis for women was limited to descriptive univariate analyses. Finally, we used a non-probabilistic sampling strategy to gain greater access

into this hard-to-reach population and therefore, our conclusions are limited to recommendations among substance using migrants in this border region.

Conclusions

This study fills an important gap in our understanding of HIV risk factors at the southern Mexico border. Among problem drinking and substance using male and female recent migrants, we found high rates of inconsistent condom use with casual partners and very little condom use with spouses. Among male migrants, we found the potential for substance use to both indirectly (i.e., riskier sex) and directly (i.e., injection) affect transmission of HIV.

While associations with inconsistent condom use with casual partners differed by gender, both men and women reported having decision-making power in using condoms. For both genders, we recommend broader public health messaging on condom use that goes beyond targeting high-risk groups such as sex workers or MSM.

Funding Funding for this study was provided by the National Institutes of Drug Abuse (NIDA) R01DA029899 and Dr. Conners was supported by NIDA training grant T32DA023356. Dr. Brouwer was supported in part by the University of California, San Diego, Center for AIDS Research (CFAR), an NIH-funded program (P30 AI036214).

Compliance with Ethical Standards

Conflict of interest All authors declare that they have no conflict of interest.

Ethical approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

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