HIV among Young Latino Men in the San Diego-Tijuana Border Region

by

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Abstract

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The goal of this secondary analysis is to describe the sociodemographic, psychosocial, HIV testing, alcohol and drug use, and sexual risk behavior characteristics in a sample of young Latino men who have sex with men (YLMSM) living in the San Diego-Tijuana border region. In addition, this study will examine the predictors of three distinct outcomes, which include unprotected anal intercourse, HIV infection, and never testing for HIV, among the sampled YLMSM. This study represents a first effort to describe and analyze HIV seroprevalence and HIV risk behavior in YLMSM (of which the majority also reported having sex with women) residing in this border region, an understudied population with unique risks that are not well understood.

The venue-based study collected information, via standardized questionnaire, on eligible participants (N=372) who self-identified as Latino, reported a history of having sex with another man in their lifetimes, resided in the San Diego-Tijuana border region, and were between the ages of 17 and 30 years. A bivariate analysis was done separately for each of the three outcomes to examine the sociodemographic, psychosocial, HIV testing, alcohol and drug use, and sexual risk behavior characteristics among the combined sample. Three separate multivariate analyses (hierarchical logistic regression analysis) examined predictors of unprotected anal intercourse, HIV infection, and never testing for HIV.

Results from the study showed that for the combined sample of both San Diego and Tijuana YLMSM 25% tested positive for HIV, 42% reported having unprotected anal intercourse with a male, and 44% never tested for HIV. Compared to San Diego YLMSM, Tijuana YLMSM reported lower levels of socioeconomic status (e.g., low level of education), condom self-efficacy, HIV seroprevalence, HIV testing rates, and unprotected anal intercourse, but higher levels of alcohol and drug use and sex with both men and women. Findings from the multivariate analysis showed that being young, having an incarceration history, and self-reported likelihood of being infected were the strongest predictors of HIV infection, while San Diego residence and income from exchange sex were the strongest predictors of unprotected anal intercourse. Tijuana residence and no access to care were some of the strongest predictors of never testing for HIV.

The current study provides compelling evidence that the control of the HIV epidemic in the San Diego-Tijuana border region must include primary and secondary HIV prevention efforts directed at YLMSM. There is an urgent need for HIV interventions to address unprotected anal intercourse, high HIV seroprevalence rates, and low HIV testing rates in YLMSM in the US—
Mexico border region. These HIV interventions must be empirically-based, culturally and linguistically appropriate, and address the social context of HIV risk.
CHAPTER 1
INTRODUCTION

The extent of the epidemic of human immunodeficiency virus (HIV)/acquired immune deficiency syndrome (AIDS) among young Latino men who have sex with men (YLMSM) is not well known. Although epidemiologic surveillance studies confirm the presence of YLMSM residing along the California-Mexico border, specifically the San Diego-Tijuana border region (County of San Diego, 2008a; Martinez-Donate et al., 2005; Rangel et al., 2006), there are no studies that estimate the size of this population, and there is a paucity of literature on the subject of HIV infection among YLMSM.

Tijuana and San Diego, with a combined population of over 4 million, form the largest binational metropolitan region along the United States-Mexico border (Garza, Rodriguez-Lainz, & Ornelas, 2004). It is one of the busiest land port entries in the world, with approximately 152,000 daily legal border crossings (Bureau of Transportation Statistics, 2005). There is concern in Mexico and the United States that YLMSM are at increasing risk for HIV infection (Ferreira-Pinto, Ramos, & Shedlin, 1996) due to high mobility and high-risk behaviors. These factors have implications for increased HIV transmission for both YLMSM and their female sexual partners. In a study from 1998 to 2001, Viani, Calderon, Van Pratt, Lopez, and Spector (2003) found a three-fold increase in the prevalence of HIV among pregnant women living in Tijuana, Mexico, some of whom likely became infected through unprotected sex with their male partners. Studies have suggested that there might be a difference in HIV risk profile among YLMSM residing in opposite sides of the border due to socioeconomic differences, such as level of education and employment levels (Carillo, Fontdevila, Browne, & Gómez, 2008; Rangel et al., 2006).

There is a resurgence of HIV infection and risky sexual behavior among young MSM, particularly Latinos (Osmond, Pollack, Paul, & Catania, 2007; Wolitski, Valdiserri, Denning, & Levine, 2001), who are at high risk for HIV infection given their high rates of unprotected sex, increasing use of drugs, and low rates of HIV testing (Brouwer et al., 2006; County of San Diego, 2004b; Díaz, Ayala, Bein, Henne, & Marin, 2001; Valleroy et al., 2000). HIV studies encounter challenges in recruiting samples of YLMSM because they are considered a hidden population and a known sampling frame does not exist for them (Agronick et al., 2004; Díaz, Heckert, & Sanchez, 2005; Stueve, O'Donnell, Duran, San Doval, & Blome, 2001). Relatively small population size, residential dispersion, and experiences with stigma make these men difficult to reach with traditional probability sampling methods.

Testing for HIV is a low-cost method for lowering rates of unprotected anal intercourse and improves health outcomes for YLMSM who are diagnosed with HIV infection at an early stage of the disease (Schwarcz et al., 2006). Testing can be beneficial to the individual and society by lowering the amount of HIV in the population, thus reducing HIV transmission rates. YLMSM show some of the highest rates of HIV infection (Koblin et al., 2006), and continue to have very high rates of unprotected sex with both males and females yet have no awareness of their own HIV status or that of others. They do not test possibly because they may be fearful of learning of their HIV status while not having appropriate levels of health care access (Rhodes, Hergenrather, Wilkin, Alegría-Ortega, & Montaño, 2006).

This dissertation examines the social epidemiology of HIV infection and risk among a sample of YLMSM living in the San Diego-Tijuana border region. This study will explore the
sociodemographic, psychosocial, HIV testing, alcohol and drug use, and sexual risk behavior profile of YLMSM living in the San Diego-Tijuana border region. This is an important first step in increasing our understanding of this little-known, at-risk population. It also will provide useful insights into culturally and linguistically appropriate interventions to reduce the effects of the HIV epidemic in YLMSM living in the San Diego-Tijuana border region.

Objectives and Research Questions

The following are the overall objectives and associated research questions for this study of HIV risk among YLMSM living in the San Diego-Tijuana border region.

First objective

The current study has two main objectives. The first is to describe separately by city of residence (San Diego versus Tijuana) the sociodemographic (e.g., education, employment, access to health care), psychosocial (e.g., condom peer norms), HIV testing (e.g., testing history), alcohol and drug use, and sexual risk behavior (e.g., exchange sex) characteristics of the sampled YLMSM living in this border region. It is an area where YLMSM continue to engage in high-risk behavior and where they have among the highest rates of HIV infection. It is important to examine how the two samples of YLMSM by city of residence compare along these various characteristics in order to develop appropriate HIV interventions. In addition, considering that there are no known previous studies on YLMSM living in this area, the current study will provide a profile of these sampled YLMSM by these characteristics. Specifically, the research questions that the first objective will attempt to address are:

1. How do the two samples compare by individual/sociodemographic characteristics?
2. How do the two samples compare by psychosocial characteristics?
3. How do the two samples compare by HIV testing characteristics?
4. How do the two samples compare by alcohol and drug use?
5. How do the two samples compare by sexual risk behaviors?

Second objective

The second objective of this study is to examine the predictors of three distinct outcomes—unprotected anal intercourse, HIV infection, and never testing for HIV—among this sample population. In general, YLMSM report high rates of unprotected anal intercourse, HIV infection, and non-testing for HIV. An important contribution that this study will make to the HIV literature will be to provide a first glimpse of the rates and risk factors of unprotected anal intercourse, HIV infection, and non-testing for HIV among YLMSM living in this border region. It also will serve as a crucial and necessary first step in the implementation of culturally and linguistically tailored HIV prevention efforts. The research questions that the second objective will attempt to address are:

1. To what extent do psychosocial characteristics independent from individual/sociodemographic characteristics predict unprotected anal intercourse?
2. To what extent do HIV testing characteristics independent from psychosocial and individual/sociodemographic characteristics predict having a seropositive HIV test, indicating HIV infection?
3. To what extent do psychosocial characteristics independent from individual/sociodemographic characteristics predict HIV testing?
Background and Significance

Tijuana handles 37% of the total migrant flow between Mexico and the United States and 71% of that between Mexico and the United States in the western region of the U.S.-Mexico border (Secretaria del Trabajo y Prevision Social, 1999). Unprecedented economic expansion in the early 1990s along this border resulted in higher migration rates from Central American countries and the interior states of Mexico (Eldred, Cheever, & Parham-Hopson, 2006; International Community Foundation, 2004). The North American Free Trade Agreement of 1994 gave rise to many manufacturing plants or maquiladoras along the U.S.-Mexico border, which created many economic opportunities for workers (Villarruel, Gallegos, Cherry, & Refugio de Duran, 2003). Increased economic opportunities leads to increased migration and time spent at the border region. In turn, as migrants spend more time at the border region they will have an increased chance of engaging in unsafe sexual practices, drug use, incarceration and homeless. These and other factors will increase their HIV risk (Carillo, 2002; Carillo et al., 2008; Rangel et al., 2006).

The San Diego-Tijuana border, with its unique geographic, political, and social characteristics, creates a context for the transmission of HIV. A unique HIV-related factor found in this border region is drug use. The San Diego-Tijuana border region is a major route for drug trafficking and, as a result, YLMSM engage in higher rates of drug use (Rachlis et al., 2007). Currently, increasing levels of drug use by YLMSM living in this border region is a major public health concern. The present study attempts to examine the rates of alcohol and drug use in YLMSM and the impact on HIV infection and risk.

The migratory experience of YLMSM in the border region places them at a higher risk for HIV infection through increased rates of unprotected anal intercourse and, as a result of low rates of health insurance, reduced access to HIV testing (Magis-Rodríguez et al., 2004; Organista, Carrillo, & Ayala, 2004; Rachlis et al., 2007). The migratory experience can be stressful, affecting the physical, mental, and emotional health of young Latino migrants (Sanchez et al., 2004) and can contribute to the risk for HIV through its association with loneliness, isolation, homelessness, and poverty; in turn, these factors can result in alcohol and drug use, risky sexual practices, exchange sex, and inadequate access to health care services (Hirsch, Higgins, Bentley, & Nathanson, 2002). Often times migrating Latinos come alone without their families and are employed in jobs that do not offer health insurance. They often experience discrimination, racism, and extreme poverty. Some migrants report binge drinking, drug use, and risky sex in order to cope with their harsh living environments and with their emotional suffering (Diaz, 1998; Ramirez-Valles, Garcia, Campbell, Diaz, & Heckathorn, 2008).

Some of the Latino men who migrate come from the most vulnerable sectors of the population, given their high rates of undocumented status and illiteracy and very low socioeconomic status (Organista et al., 2004; Rangel et al., 2006). Reasons cited by Latino MSM for migrating to the border region include increased sexual freedom, decreased homophobia, decreased possibility of bringing shame to their families, and decreased violent assaults due to homophobia (e.g., gay-bashing) (Bronfman & Moreno, 1996; Carillo et al., 2008; Diaz & Ayala, 2001). The border region can be a place where some of these young men start to have a lot more sex with other men from both sides of the border. In addition, some of these sexual encounters that occur at the border region come with a high level of HIV risk, such as unprotected intercourse, sex under the influence of drugs, and exchange sex. Based on epidemiologic reports, the Latino MSM population in the San Diego-Tijuana border region is
increasing (Bronfman & Moreno, 1996; County of San Diego, 2004b; County of San Diego, 2006).

The U.S.-Mexico border region has experienced increasing rates of HIV and sexually transmitted diseases (STDs) since the late 1990s (Consejo Nacional para la Prevención del VIH/SIDA (CONASIDA), 2007; County of San Diego, 2008a). Cases of AIDS have tripled from 1990 to 1996 in the four U.S. border states of New Mexico, Texas, Arizona, and California, and have increased six-fold in the six Mexican northern states of Baja California (Martinez, Licea Serrato, Jimenez, & Grimes, 1998). Additional resources and public health workers are needed to curb the effect of HIV on YLMSM living in this area.
References


CHAPTER 2
LITERATURE REVIEW

Overview

The following section provides pertinent HIV epidemiologic trends in the San Diego-Tijuana border region. It will also review the various risk factors, including sociodemographic and psychosocial factors, HIV testing, alcohol and drug use, and sexual risk behaviors of HIV in MSM populations. This section includes literature relevant to the first objective of this study, which is to compare the San Diego and Tijuana samples by these characteristics. In addition, risk factors for unprotected anal intercourse, HIV infection, and HIV testing will be discussed to address the second objective of this study, which is to examine the predictors of these three outcomes in the combined sample of YLMSM.

HIV Epidemiologic Trends

San Diego surveillance data

San Diego County HIV data for Latinos and Latino men reveal trends that cause concern. San Diego’s Epidemiology Unit reports that although Latinos comprise 29% (3,098,269) of the population in the San Diego County in 2007, they disproportionately represent 42% of the total AIDScases reported in 2007 (County of San Diego, 2008a). This disparity is less pronounced in the state of California (Office of AIDS, 2005). California state data show that Latinos comprised 35.2% of the total population in 2004, but they disproportionately accounted for 38.8% of all new AIDS cases reported in 2004.

Latino MSM AIDS cases as a proportion of all MSM AIDS cases have increased significantly (i.e., from 9.3% in 1981-1986 to 32.8% in 2002-2006) in San Diego County (County of San Diego, 2007b). Among male AIDS cases reported by San Diego in 2007, Latino men have the second highest case rate at 23 per 100,000 (County of San Diego, 2008a).2

Latino MSM represent over 80% of all adult and adolescent male HIV cases reported in San Diego County by race/ethnicity as of 2008 (County of San Diego, 2008b). San Diego does not report an HIV prevalence rate for Latino MSM because they do not have data that estimate the size of this population. HIV is disproportionately affecting young Latino males. The County of San Diego (2008a) reports that Latinos have a significantly greater proportion of AIDS cases among people aged 20 to 29 years than do either white or black people, reflecting Latinos’ overall younger age when diagnosed with HIV infection.

Mexican surveillance data

As of July 2005, the Mexican National Center for HIV/AIDS Prevention and Control reported 112,512 cumulative adult3 cases of AIDS, with “homosexual” and “bisexual” men representing 27.6% and 19.8%, respectively, of all accumulated AIDS cases in Mexico (Consejo Nacional para la Prevención del VIH/SIDA (CONASIDA), 2007). AIDS is one of the leading

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1 AIDS is a later stage in the HIV disease spectrum. Usually AIDS is diagnosed when an HIV patient has a CD4 cell count of 200 or below or when the HIV patient is diagnosed with an opportunistic infection.
2 Black males have the highest rate of reported AIDS cases at 43/100,000 in San Diego in 2007.
3 CENSIDA defines an adult AIDS case as those who are 15 to 49 years old.
causes of death for both men and young adults between the ages of 25 and 44 years. According to the Centro Nacional para la Prevención y Control del VIH/SIDA (CENSIDA), MSM have the highest HIV prevalence rate (CONASIDA, 2005a; Minichiello, Magis, Uribe, Anaya, & Bertozzi, 2002). The state of Baja California, in which Tijuana is located, has the sixth greatest number of accumulated AIDS cases among all states in Mexico (CONASIDA, 2008). Among the six border states of northern Mexico, Baja California has the highest accumulated incidence rate of AIDS cases, and it has the fourth highest number of accumulated reported cases of HIV from 1995 to 2007 among all Mexican states.

There is less HIV than AIDS surveillance data available for Mexico. As of June 2007, Mexico reported approximately 39,470 accumulated cases of HIV (CONASIDA, 2007). It also estimates that HIV prevalence among MSM is about 12.6% and that there are approximately 186,000 persons aged 15 to 49 years living with HIV in Mexico (CONASIDA, 2006, 2007).

**HIV prevalence studies**

There are no HIV prevalence studies of YLMSM living in the San Diego-Tijuana border region or in Mexico. The present study will contribute substantially to the HIV literature by providing serologic-based HIV prevalence estimates for YLMSM living in this area. Despite the paucity of data, there are a few HIV prevalence studies done with MSM samples from the United States, California, and Tijuana. These studies show estimates of HIV infection ranging from 17% to 34% (Díaz, Ayala, & Bein, 2004; Osmond, Pollack, Paul, & Catania, 2007; Xia et al., 2006a).

Xia et al. (2006a) conducted a cross-sectional study of HIV-related risky sexual behavior among a population-based sample of MSM living in California. Using the 2001 California Health Interview Survey to obtain a sample of 298 men who self-reported their HIV status, the authors found an HIV prevalence rate of 23.3% among Latino MSM. In addition, a study by Brouwer et al. (2006) used statistical modeling to estimate the current HIV prevalence in Tijuana residents aged 15 to 49 years. Among the 1,803 to 5,472 residents infected with HIV, the authors estimated that approximately 1,446 to 3,300 are MSM and that the epidemic in Tijuana was dynamic and mainly driven by the MSM population. An important limitation of this study is that these estimates were based on other data (e.g., Mexican census data), and bold assumptions were made about the size of the high-risk groups, including MSM, which is a hidden population.

Current research studies clearly have shown that HIV is significantly increasing among Latino MSM in the United States. Osmond et al. (2007) conducted a telephone-based, probability study, called the Urban Men’s Health Study, in 1997 and 2002 showing that self-reported HIV prevalence rates significantly increased from 10.6% (number of Latino MSM subgroup is not reported) in 1997 to 34.0% in 2002 among Latino MSM. The authors of this study suggest that the increase in HIV cases could be attributed to HIV medications that effectively decreased rates of HIV mortality. The highly effective antiretroviral medications introduced in 1997 prolonged the lives of individuals with HIV. As a result, death rates among HIV-infected people began to decrease.

**Risk Factors**

**Sociodemographic characteristics**

The sociodemographic risk factor profile for Latino men varies by age, place of residence, employment, education, housing status, and health-seeking behaviors. Age is the
most cited risk factor for HIV in the literature and the results have been somewhat mixed. Evidence shows that younger MSM are at greater risk for HIV infection and unprotected anal intercourse compared with older MSM (Diaz, Morales, Bein, Dilan, & Rodriguez, 1999; Jarama, Kennamer, Poppen, Hendricks, & Bradford, 2005; MacKellar et al., 2006; Xia et al., 2006a). Other studies have found the opposite: older age was a risk factor for HIV infection and unprotected anal intercourse (Harawa et al., 2004; Ramirez, Suarez, de la Rosa, Castro, & Zimmerman, 1994; Sifakis et al., 2007). A problem contributing to the mixed findings arises when studies use different age ranges for their sample population. One study may use the 23 to 29 year age range (MacKellar et al., 2006), for example, and another may use a much larger age range, such as 18 to 64 years (Xia et al., 2006a).

In terms of HIV testing, the literature overwhelmingly shows that MSM who are younger and have lower levels of socioeconomic status (SES) are at greater risk for never testing for HIV compared with older MSM and MSM with higher levels of SES, respectively (Fernandez, Perrino, Royal, Ghany, & Bowen, 2002; Harawa et al., 2004; Kellerman et al., 2002; Krentz, Auld, & Gill, 2004; MacKellar et al., 2006; Schvarcz et al., 2006; Sifakis et al., 2007; Varas-Díaz, Serrano-García, & Toro-Alfonso, 2005). A study by Fernández, Perrino, Bowen, Royal, and Varga (2003) indicated that repeat testers were more likely to be older, more educated, and to have a regular source of health care compared with non-repeat testers. This study is significant in that it is one of only a handful of studies examining HIV testing behaviors among a sample of Latino MSM.

Studies show that young age and lower SES indicators (e.g., lower levels of education, not being in school, homelessness, unemployment, exchange sex income, incarceration, and inadequate health care) are risk factors for unprotected anal intercourse and HIV infection among MSM populations (Akin, Fernandez, Bowen, & Warren, 2008; Denner, Organista, Dupree, & Thrush, 2005; Essien et al., 2004; Garza, Rodriguez-Lainz, & Ornelas, 2004; Harawa et al., 2004; Jarama et al., 2005; Ruiz, Facer, & Sun, 1998; Sifakis et al., 2007). In addition, poverty has been found to be a risk factor for unprotected anal intercourse and HIV infection among young Latino MSM (Diaz, Ayala, Bein, Henne, & Marin, 2001; Marks et al., 2008; Organista, Carrillo, & Ayala, 2004; Valleroy et al., 2000).

There are very few research studies that show how lower SES leads to HIV infection and unprotected anal intercourse (Essien et al., 2004; Poundstone, Strathdee, & Celentano, 2004). In the only known study that demonstrates this connection among Latino MSM, Diaz, Ayala, & Bein (2004), working with a probability sample of 912 Latino gay men, show that poverty was a significant predictor of unprotected anal intercourse when adjusting for racism and homophobia but not when adjusting for difficult sexual situations (e.g., sex in public sex environments and sex under the influence of drugs or alcohol). It is precisely because of the social, cultural, and structural frameworks that Diaz’ study could elucidate this convincing pathway between poverty and unprotected anal intercourse among Latino MSM; poverty indirectly predicts unprotected anal intercourse when Latino MSM encounter difficult sexual situations. This dissertation will utilize similar multivariate methods that will control for other potential confounders.

Psychosocial characteristics

This study will focus on the following psychosocial characteristics: self-efficacy, peer norms, perceived threat, and alcohol attitudes. Two main research questions in this dissertation involve the extent to which psychosocial characteristics predict two different outcomes: unprotected anal intercourse and HIV testing.
**Self-efficacy**

Self-efficacy is defined as the level of confidence an individual has in her ability to perform a specific behavior under specified levels of difficulty (Bandura, 1997). According to the literature, a low level of self-efficacy is a predictor of unprotected anal intercourse and HIV infection among various MSM populations (Denner et al., 2005; Diaz et al., 1999; Ekstrand, Stall, Paul, Osmond, & Coates, 1999; Knipper et al., 2007; Norman, 2003; Organista, Organista, Bola, de Alba, & Moran, 2000). In a study of HIV predictors among Latino MSM, having lower levels of self-efficacy was a significant predictor of unprotected anal intercourse in multivariate models (Díaz et al., 1999). This study measured self-efficacy by asking participants if they were able to avoid behaviors that may have put them at risk for infection. In addition, the San Francisco Young Men’s Study, a longitudinal study of HIV risk, found a significant association between low self-efficacy and HIV infection among a population-based sample of 510 gay men (Ekstrand et al., 1999).

**Peer norms**

Peer norms can be defined as subjective judgments and beliefs concerning the perceived pressure to perform or not to perform the behavior (Terry, Gallois, & McCamish, 1993). Numerous studies have identified negative peer norms as a significant risk factor for unprotected anal intercourse among various MSM populations (Díaz & Ayala, 1999; Díaz et al., 1999; Lemp et al., 1994; Molitor, Facer, & Ruiz, 1999; Morin et al., 2003; Organista, Organista, de Alba, Moran, & Carrillo, 1996; Williams, Wyatt, Resell, Peterson, & Asuan-O'Brien, 2004). A study examining predictors of sexual risk among Latino MSM found that negative peer norms were a significant predictor of unprotected anal intercourse after adjusting for other covariates (Díaz et al., 1999).

Negative peer norms regarding safe sex will cause a collective acceptability and perpetuation of unprotected anal intercourse. Díaz and Ayala (1999) state,

…carrying condoms, or having them available, could signal promiscuity, that the carrier is only thinking about or interested in sex…it is no surprise that, within relationships, condom use was described as extremely difficult…wanting to use condoms within a relationship conveys an accusation or admission of infidelity. (p. 286-287)

If YLMSM believe that they are being judged as promiscuous and untrustworthy when they discuss condoms before sexual relations, it is likely that they will not use condoms and likely that they will engage in unprotected anal intercourse. This belief explains, in part, how negative peer norms about condoms contribute to high rates of unprotected anal intercourse and HIV infection among YLMSM.

In a qualitative study that examined factors associated with increased unprotected anal intercourse and HIV infection among MSM in California, focus group participants identified peer norms of unsafe sex as explanatory factors for the recent increases in HIV infections among MSM (Morin et al., 2003). The authors of the study describe how unsafe sex is the new peer norm in some internet-based MSM communities. They state, “Unsafe sex has become a viable and acceptable option in the community and safer sex is no longer the only norm” (Morin et al., 2003, p. 357). The Latino MSM in this study particularly highlighted that cultural taboos against using condoms exist in their respective communities.
Perceived threat

Perceived threat of HIV is defined as an individual’s belief about the chances of acquiring HIV infection and beliefs about the seriousness and consequences of HIV infection (Rosenstock, Strecher, & Becker, 1988a). Perceived threat of HIV has been reported as a risk factor for unprotected anal intercourse in MSM samples (Halkitis, Zade, Shrem, & Marmor, 2004; Morin et al., 2003; Remafedi, 1994). Results from a convenience-based study by Kalichman, Picciano, and Roffman (2008) showed that MSM who engaged in unprotected anal intercourse compared with those who did not had significantly higher levels of perceived risk of acquiring HIV in a multivariate model. In another study, young MSM who reported greater levels of perceived threat of HIV in their lifetime were more likely to report unprotected anal intercourse and alcohol and drug use compared with those who had lower levels of perceived threat of HIV (MacKellar et al., 2007).

Low levels in perceived threat of HIV in the MSM population has been attributed to treatment optimism (Morin et al., 2003). Treatment optimism refers to how the introduction of highly active antiretroviral therapy in the late 1990s directly contributed to decreased perception of threat of HIV and increased high HIV risk sexual behavior among MSM. There are MSM who consider HIV infection to be a manageable rather than a fatal disease, precisely because of this treatment optimism. Young MSM who hold inflated treatment optimism and believe that an HIV cure will be a reality in the near future continue to engage in high levels of unprotected anal intercourse.

According to the HIV literature, perceived threat of HIV also is a factor in HIV testing among MSM populations (Ehrlich, Organista, & Oman, 2007; MacKellar et al., 2007; Spielberg et al., 2003). Latino MSM who report being repeat testers are more likely to have higher levels of perceived threat of HIV infection compared with non-repeat testers (Fernandez et al., 2003). In a cross-sectional study of 290 migrant Latino day-laborers over the age of 18 years, men who perceived themselves to be at risk for HIV infection, compared with men who did not, had greater odds of being tested in (Ehrlich et al., 2007).

Alcohol attitudes

For the purposes of this dissertation, the term, alcohol attitudes, is defined as the perception and views towards alcohol use, specifically within the context of sexual interactions. Studies suggest that negative alcohol attitudes predict unprotected anal intercourse and HIV infection among MSM populations (Apostolopoulos et al., 2006; Carillo, Fontdevila, Browne, & Gómez, 2008; Diaz, 1998). As an example of a negative alcohol attitude, a YLMSM may feel the need to drink heavily to relax and lower his inhibitions before engaging in a sexual encounter with another man, which increases his chances of engaging in unprotected anal intercourse through reducing his ability to regulate and negotiate safe sex (Carillo et al., 2008; Diaz, 1998).

HIV testing characteristics

According to the literature, related terms used for HIV testing include repeat, regular, and late HIV testers (Fernandez et al., 2003; MacKellar et al., 2006). Repeat and regular testers are individuals who get tested with some frequency at their regular medical visits or at testing sites. Late testers for HIV are defined as those who have received their HIV diagnosis within 12 months or less of their AIDS diagnosis (Schwarcz et al., 2006). The present study seeks to
examine how YLMSM in the San Diego and Tijuana border area compare along various HIV testing characteristics, such as never testing for HIV infection and HIV status.

To examine the pertinent findings related to HIV testing, however, this literature review will include studies that examined any form of HIV testing characteristics, including late testers, repeat testers, or regular testers. HIV testing is one of three main outcomes and is part of a couple research questions. One main research question involves examining the extent to which HIV testing characteristics independent from other covariates predict testing positive for HIV infection. Yet another main research question examines the extent to which psychosocial characteristics independent from other covariates predict never testing for HIV.

The majority of studies in the literature found low rather than high rates of HIV testing among MSM populations (Ruiz et al., 1998; Xia et al., 2006a). The HIV seroprevalence study by Xia et al. (2006a) found that of the 131 MSM who were considered to be at high risk, 51% had never tested for HIV (49% tested) in the past 12 months. Fewer studies have shown high rates of HIV testing among MSM populations. Fernández et al. (2003) conducted a venue-based study of HIV testing among a probability sample of 538 Latino MSM from Miami and found an 89% rate of testing for HIV. These high rates of HIV testing may be due to the relatively high SES status reported by the sampled participants. Latino MSM who report higher SES levels are more likely to have health insurance and access to health care (i.e., HIV testing) through their full-time employment.

Although MSM who have higher levels of HIV risk are more likely to get tested, younger and minority MSM who are also at high risk for HIV are less likely to be tested for HIV (MacKellar et al., 2005; Sifakis et al., 2007). Sifakis et al. (2007) reported a 78.9% HIV testing rate among young MSM and, in multivariate regression, showed that older MSM compared to younger MSM who had greater levels of HIV risk were more likely to have been tested. Studies suggest that Latino MSM who never test for HIV do so because of low perceptions of risk, exclusive safe sex practices, and fear of learning results (Fernandez et al., 2002; MacKellar et al., 2005), while reporting that they get tested because of perceived threat of HIV and wanting to learn their HIV status (Fernandez et al., 2003).

HIV testing has been found to be associated with higher levels of unprotected anal intercourse among Latino MSM (Fernandez et al., 2003; Marks et al., 2008; Ruiz et al., 1998). Results from a respondent-driven sampling study of unrecognized HIV infection among MSM in three U.S. cities showed that Latino MSM who were unaware of their HIV infection were significantly more likely to engage in unprotected anal intercourse than those who were aware of their HIV infection (Marks et al., 2008). The authors think that their results, such as the extraordinarily high HIV-positive rate of 56% among Latino MSM from Los Angeles, may be overestimates because of recruitment issues at several sites. At one of these sites, some participants mistakenly understood that the study was for HIV-positive Latino MSM and concentrated on recruiting participants who they thought were infected with HIV.

**Alcohol and drug use**

One of the most important social and behavioral issues affecting YLMSM is alcohol and drug use (Celentano et al., 2006; National Institute on Drug Abuse, 2004) because of the numerous associated psychological (e.g., paranoia, decreased self-esteem), social (social isolation and physical/emotional violence), and mental health (depression and memory difficulties) comorbidities (AIDS Project of Los Angeles, n.d.; Garofalo, Mustanski, McKirnan, Herrick, & Donenberg, 2007; Klitzman, Pope, & Hudson, 2000; Stall et al., 2001; Varas-Díaz et
In particular, methamphetamine (meth) use is on the rise among young Latino men living along the San Diego-Tijuana border (National Institute on Drug Abuse, 2004), a major drug-trafficking route. Recently there has been greater research interest in the connection between use of “club drugs” and unprotected anal intercourse among various MSM subgroups (Fernandez et al., 2005a; Halkitis, Parsons, & Stirratt, 2001; Ramirez-Valles, Garcia, Campbell, Diaz, & Heckathorn, 2008), as these behaviors directly contribute to rising rates of HIV infection among these groups (Golden, Brewer, Kurth, Holmes, & Handsfield, 2004). Other terms used for club drugs include “party drugs” and stimulants (Halkitis et al., 2004; Valleroy et al., 2000). Club drugs include methamphetamine, cocaine, methylenedioxy-methamphetamine (ecstasy), amyl nitrites (poppers), and gamma-hydroxybutyrate (GHB).

Club drugs have become part of the gay culture in venues such as bathhouses, circuit parties, and sex clubs (Mansergh et al., 2001; Reback, Larkins, & Shoptaw, 2003). The MSM who report frequently attending circuit parties, which are typically professionally produced parties that operate from the late evenings into the early hours of the next day, are typically young men of color (Xia et al., 2006b). The majority of attendees at these venues are gay-identified MSM, however a small percentage of non-gay-identified MSM attend as well.

There are alarmingly high rates of club-drug use among samples of MSM (Celentano et al., 2006; Golden et al., 2004). In particular, club drug use is increasing in popularity among YL MSM (Díaz, Heckert, & Sanchez, 2005). A study, using respondent-driven sampling examined substance use among a sample of Latino MSM from Chicago and San Francisco reported rates of alcohol and drug use during sex in the past 12 months of 41.7% and 18.6%, respectively (Ramirez-Valles et al., 2008).

Studies have established that alcohol and drug use (including injection drug use) are risk factors for unprotected anal intercourse and HIV infection among MSM populations (Akin et al., 2008; Denner et al., 2005; Fernandez et al., 2005b; Marks et al., 2008; Ramirez-Valles et al., 2008; Xia et al., 2006a). An internet-based probability study of 171 Latino MSM by Fernandez et al. (2005b) found that club-drug use was a significant risk factor for recent unprotected anal intercourse and that it was positively associated with recent unprotected anal intercourse and HIV infection.

According to some studies, MSM engage in alcohol and drug use because of physical, emotional, and socialization needs (Díaz et al., 2005; Halkitis, Fischgrund, & Parsons, 2005). A study by Díaz, Heckert, and Sánchez (2005) found that some of the reasons Latino MSM use stimulants included increased energy, sexual enhancement, social connection, coping with stress, and focused productivity. In addition, Latino MSM commonly report that they use alcohol and drugs as a way of coping with their internalized homophobia (e.g., guilt and shame), especially when engaging in male sex (Díaz & Ayala, 2001; Díaz et al., 2004; Williams et al., 2004).

**Sexual risk behaviors**

An objective of this dissertation is to assess how YL MSM in the San Diego-Tijuana border region compare by sexual risk behaviors. Unprotected anal intercourse is an outcome and part of a research question in this study: to what extent do psychosocial characteristics independent from individual/sociodemographic characteristics predict unprotected anal intercourse?
Unprotected Anal Intercourse

Unprotected anal intercourse has increased in various MSM populations (Ekstrand et al., 1999; Osmond et al., 2007; Parsons & Bimbi, 2007; Wolitski, Valdiserri, Denning, & Levine, 2001). The Urban Men’s Health Study, a telephone-based probability study conducted in 1997 and 2002, reported that unprotected anal intercourse significantly increased among Latino MSM (number in Latino MSM subgroup is not reported), from 18.9% in 1997 to 26.8% in 2002 (Osmond et al., 2007).

According to the literature, unprotected anal intercourse is a primary risk factor for HIV infection among MSM populations (Harawa et al., 2004; Koblin et al., 2006). A large longitudinal study of 4,295 MSM by Koblin et al. (2006) found that unprotected anal intercourse is a risk factor for HIV infection. Studies show high rates of unprotected anal intercourse among YLMSM (Agronick et al., 2004; MacKellar et al., 2005; O'Donnell et al., 2002). In a venue-based study of sexual risk behaviors among YLMSM, 31% reported unprotected anal intercourse in the past three months (O'Donnell et al., 2002). Moreover, YLMSM have the highest rates of unprotected anal intercourse when compared with groups of MSM by race and ethnicity (Remien, Wagner, Dolezal, & Carballo-Dieguez, 2001; Ruíz et al., 1998; Xia et al., 2006a).

A worrisome trend that is becoming more prevalent in the MSM community is planned unprotected anal intercourse irrespective of the partner’s HIV status, which is termed “barebacking” by the MSM community (Groß et al., 2007; Xia et al., 2006a). Planned unprotected anal intercourse presents a challenge to ongoing prevention efforts. Unprotected anal intercourse is the most risky form of HIV sexual behavior. Some MSM are not aware of their HIV-positive status, thus they can potentially infect their partner unknowingly through unprotected anal intercourse.

Factors associated with elevated rates of unprotected anal intercourse among MSM populations include sensation-seeking behavior and dislike of condoms (Dolezal, Carballo-Diéez, Nieves-Rosa, & Díaz, 2000; Halkitis et al., 2001; Suarez & Miller, 2001; Xia et al., 2006a). Condoms have been associated among Latino MSM with intimacy disruption, interpersonal disconnection, promiscuity, untrustworthiness, inconvenience, embarrassment, and impracticality (Díaz & Ayala, 1999; Rhodes et al., 2006).

Sexually transmitted diseases

The risk of HIV infection among YLMSM dramatically increases with the presence of sexually transmitted diseases (STDs), which can cause skin ulcerations facilitating HIV transmission. The presence of STDs in MSM populations provides a good indicator of HIV risk because both STDs and HIV share similar sociodemographic, social, and behavioral risk factors for disease transmission (Apostolopoulos et al., 2006; Fox et al., 2001). Some of the risk factors for both HIV and STDs among MSM populations include low SES, low access to health care, low knowledge of safe sex, negative peer norms, high alcohol and drug use, and the high stress of the migratory experience.

High rates of STDs exist among MSM populations (Agronick et al., 2004; MacKellar et al., 2006). Studies have found that a history of STDs significantly increases the risk for unprotected anal intercourse (Dolezal et al., 2000; Golden et al., 2004), HIV infection (Elifson, Boles, & Sweat, 1993; Golden et al., 2004; MacKellar et al., 2005; Ruíz et al., 1998; Sifakis et al., 2007), and HIV testing (MacKellar et al., 2006) among MSM populations.

Rates of hepatitis B, as reported in The Young Men’s Survey, were 10.7% and 13.2% in the Los Angeles (n=509) and San Francisco (n=702) sites, respectively (Valleroy et al., 2000).
Rates of syphilis in this same study were 0.6% for men in both sites. The same study also found that young MSM who reported a past STD compared with those who did not were 2.5 times more likely to report HIV infection in multivariate models. Furthermore, Ruiz et al. (1998) found that 17% of young MSM sampled in their study had a history of STDs, and that young MSM with a history of STDs were 3.5 times more likely to report HIV infection compared with those without a history of STDs.

**Exchange sex**

The YLMSM who engage in exchange sex do so mainly for economic reasons (Scott et al., 2005). To some young MSM who live on the streets and in extreme poverty, exchange sex is a viable way to obtain food, shelter, other necessities, and drugs. Young MSM who are homeless have a greater likelihood of engaging in exchange sex than those who are not (Newman, Rhodes, & Weiss, 2004), and similarly, young MSM who are substance users are more likely than those who are not to engage in exchange sex to support their drug using behavior (Newman et al., 2004).

Studies have found exchange sex to be associated with other HIV-related risk factors, such as low SES indicators, unprotected anal intercourse, young age, drug use, alcohol intoxication, STD history, and incarceration among MSM populations (Bacon et al., 2006; Carillo, 2002; Newman et al., 2004; Scott et al., 2005) and is reported to exist among MSM at a relatively high rate (Levy et al., 2005; MacKellar et al., 2005; Molitor et al., 1999; Rietmeijer, Wolitski, Fishbein, Corby, & Cohn, 1998). The study by Agronick et al. (2004) showed that 19.5% of a probability-based sample of YLMSM reported engaging in exchange sex. According to a few studies exchange sex is a risk factor for unprotected anal intercourse and HIV infection among MSM (Harawa et al., 2004; Molitor et al., 1999; Ruiz et al., 1998). Harawa et al. (2004) identified exchange sex in the past 6 months as a significant risk factor for HIV infection in an adjusted model among a venue-based sample of 2,929 young MSM.

**Men who have sex with men and women**

Men who have sex with men and women (MSMW) is another HIV-related risk behavior reported by MSM populations (Agronick et al., 2004; Izazola-Licea, Gortmaker, de Gruttola, Tolbert, & Mann, 2003; Izazola-Licea et al., 1991; MacKellar et al., 2006). Results from an HIV risk behavior study of YLMSM by O’Donnell et al. (2002) showed a 23% rate of men who have sex with men and women. Compared to MSM, MSMW have greater risks for unprotected anal intercourse, HIV infection, and never testing for HIV (Agronick et al., 2004; Catania et al., 2001; Jarama et al., 2005; Wolitski, Jones, Wasserman, & Smith, 2006).

According to the Young Men’s Survey by Valleroy et al. (2000), 61.4% of the venue-based sample of young MSM (N=3,492) reported having both male and female sexual partners. The authors of this study also indicated that MSMW have a higher risk for HIV infection compared to MSM in an unadjusted model. Moreover, Agronick et al. (2004) examined unprotected anal intercourse by sexual identification in a multivariate model and found that YLMSM who also reported having female sex partners were almost 3.5 times more likely to report insertive unprotected anal intercourse with a male partner compared to gay-identified YLMSM. Finally, Wolitski et al. (2006) found that MSM who do not self-identify as gay have a greater probability of never testing compared to gay-identified MSM.

There is empirical evidence to suggest that unprotected anal intercourse is increasing in greater magnitude among MSMW compared with MSM (Prabhu, Owen, Folger, & McFarland,
In the past 5 years, sexual risk behavior among MSMW has increased in parallel with other MSM. Clearly, elements of a ‘bisexual bridge’ are present. However, past dire predictions of the widespread transmission to the heterosexual population in San Francisco have failed to come true. (Prabhu et al., 2004, pp. 1605-1606)

In the past, there were concerns that MSMW would transmit HIV to their female sexual partners and trigger an epidemic within the general population. For some regions, such as San Francisco Bay Area, these concerns have not been validated; however, for other regions, like the San Diego-Tijuana border region, the question remains to be answered (Viani, Calderon, Van Pratt, Lopez, & Spector, 2003).

**Summary of Literature Review**

There is paucity in the literature in regards to HIV/AIDS among YLMSM living in the San Diego-Tijuana border region. Epidemiologic data from San Diego County and or Mexico shows that Latino MSM are disproportionately impacted by HIV, have alarmingly high prevalence rates of HIV, and are becoming infected with HIV at a very early age. Studies on HIV prevalence report rates as high as 34% among Latino MSM in California, while the Mexican National Center for the Prevention and Control of HIV/AIDS indicate that there is an approximate 12.6% HIV prevalence rate among the MSM population.

The sociodemographic risk profile of YLMSM who are at risk for HIV infection, unprotected anal intercourse, and low rates of HIV testing include low levels of socioeconomic status, such as homelessness, low levels of education, and unemployment. There are mixed results concerning age; most studies report that younger MSM have a higher risk of HIV infection and unprotected anal intercourse, while less studies report the opposite.

The literature is consistent in showing how low self-efficacy, negative peer norms, increased perceived threat of HIV infection, and negative alcohol and sex attitudes are predictors of higher rates of HIV infection, unprotected anal intercourse, and HIV testing (perceived threat only applies to HIV testing).

The majority of the literature reports that Latino MSM have very low rates of HIV testing. Young Latino MSM are particularly at greater risk of never testing for HIV compared with other race and ethnic young MSM groups. HIV testing has been identified as a risk factor for HIV infection and unprotected anal intercourse among MSM populations. In addition, there are high rates of alcohol and drug use, including non-injection drug use, club drug use, and injection drug use among various MSM populations. Alcohol and drug use has also been identified as a risk factor for unprotected anal intercourse, HIV infection, and low HIV testing rates among MSM populations.

Sexual risk behaviors in the form of unprotected anal intercourse, exchange sex, and past STDs and being an MSMW all are risk factors for HIV among MSM. Studies show that MSM continue to engage in high rates of unprotected anal intercourse despite knowing the risk factors of HIV. One of the issues of most concern is that a large proportion of YLMSM unknowingly infect their male and female sexual partners.
References


CHAPTER 3
CONCEPTUAL OVERVIEW

Overview

The three theoretical frameworks of HIV in the literature will be reviewed to provide an overall conceptual understanding of HIV risk. A discussion of relevant theories and measures used in this study will be included in each of the theoretical frameworks.

Theoretical Frameworks

The majority of the literature on HIV prevention can be classified into three levels of theory: individual or intrapersonal, interpersonal, and structural (Emmons, 2000; National Cancer Institute, 2005; Poundstone, Strathdee, & Celentano, 2004). Risk factors at the intrapersonal, interpersonal, and structural levels play important roles in the acquisition and transmission of HIV infection in YLMSM.

Intrapersonal Framework

The intrapersonal framework of HIV examines the role of biologic, individual, and behavioral factors in HIV infection. The intrapersonal framework is the most dominant perspective in the HIV literature (Díaz & Ayala, 1999; Poundstone et al., 2004) and mainly addresses individual-level factors, such as skills, beliefs, knowledge, and attitudes. The Health Belief Model (Rosenstock, Strecher, & Becker, 1988a; Rosenstock, Stretcher, & Becker, 1988b), Transtheoretical Model (Prochaska, Redding, Harlow, Rossi, & Velicer, 1994), and the Theory of Planned Behavior (Azjen, 1991) are theories that primarily use this framework. These theories originated in the field of social psychology.

A criticism of the intrapersonal framework is that it does not fully explain the disproportionate impact of HIV among YLMSM. The intrapersonal framework narrowly conceptualizes HIV causality by focusing on intrapersonal factors and overlooks the role of broader contextual risk factors, such as cultural, social, and community factors, related to HIV infection (Tesh, 1988).

Intrapersonal Factors

Examples of factors that fit within the intrapersonal framework include self-efficacy and perceived threat, both of which are part of this study as measures. Self-efficacy is defined as the level of confidence an individual has in her ability to perform a specific behavior under specified levels of difficulty (Bandura, 1997). The two theories most commonly associated with self-efficacy are the Health Belief Model and Social Cognitive Theory. The Health Belief Model was one of the first theories of health behavior and is one of the most recognized in public health (National Cancer Institute, 2005). It is often is used in HIV studies because it can be used to address high-risk sexual behavior, and it is useful for both short-term and long-term behavior strategies.

Applying this model to HIV, a young Latino man will take the necessary steps to protect his health from HIV under certain conditions (Rosenstock et al., 1988a; Rosenstock et al., 1988b). First, he must believe that his health is susceptible to HIV and that HIV has serious
health consequences. Second, he must know that his actions can protect him from contracting HIV and that the benefit is sufficient enough to overcome any barriers (i.e., fear of knowing his HIV status via HIV testing) to taking this action. Third, he must know the necessary skills (i.e., how to bring up the topic of condom use with a partner he is about to have sex with) to prevent HIV risk and have the confidence to implement these skills in an effective manner.

Social Cognitive Theory also considers self-efficacy to be a critical factor to behavioral change (Bandura, 1986). This theory focuses on the deterministic relationship between environment, internal processes, and behavior. Self-efficacy, goals, and outcome expectancies are the three main factors that influence behavioral change in the Social Cognitive Theory (National Cancer Institute, 2005). If a YLMSM recognizes he has self-efficacy, then he can enact behavioral change (i.e., always requesting to use a condom with all of his exchange sex clients) even if he is faced with barriers (i.e., extreme poverty or living in the streets).

Perceived threat, as a theoretical construct, is similar in concept with two other terms used in the literature: perceived susceptibility and perceived severity (National Cancer Institute, 2005; Rosenstock et al., 1988a; Rosenstock et al., 1988b). Perceived susceptibility involves an individual’s belief about the chances of acquiring HIV infection. Perceived severity is defined as an individual’s belief about the seriousness of HIV and its consequences. Therefore, perceived threat will be the preferred term in this discussion. According to the Health Belief Model, perceived threat of HIV is an important first step that leads to safer sex practices among YLMSM (Rosenstock et al., 1988a).

A cultural factor that is directly connected with perceived threat among Latino gay men is invulnerability or fatalism (Carillo, 2002; Diaz, 1998; Talashek, Peragallo, Norr, & Dancy, 2004). Fatalism or fatalismo refers to the idea that LMSM consider it inevitable that they will get HIV (Diaz, 1998). Diaz (1998) explains, “...HIV fatalism among Latino gay men is not merely an exaggerated or culturally distorted perception of risk, but rather a perception of personal and collective vulnerability fueled by experiences of poverty and racism” (pp. 115). YLMSM who experience violence, discrimination, and homophobia in their daily lives may feel as if this is part of their destiny; this perceived lack of control over their destiny then contribute to their perception of vulnerability to HIV given that some YLMSM may consider HIV as part of their fate. Fatalism can be described, then, as a cognitive theoretical construct that stems partly from the social experiences of YLMSM.

Interpersonal Framework

An interpersonal framework of HIV examines the role of community, neighborhood, and social network factors in HIV infection. Interventions based on this framework aim to change community or family norms, beliefs, and attitudes. Theories that primarily use an this framework include the Diffusion of Innovations Theory (Rogers, 1995), Opinion Leaders Theory (Somerville, Diaz, Davis, Coleman, & Taveras, 2006), Psychocultural Theory of Sexual Self-regulation (Diaz, 1998), and Empowerment Theory (Zimmerman, 2000; Zimmerman, Ramirez-Valles, Suarez, de la Rosa, & Castro, 1997).

The interpersonal framework, in comparison to the intrapersonal framework, borrows important concepts from a broader set of disciplines, including sociology, psychology, education, and anthropology. The criticism for this framework is similar to the individual-level framework in that other factors, such as political factors, are neglected, despite their prominent role in HIV infection (Minkler, Wallace, & McDonald, 1995; Zierler & Krieger, 1997).
Interpersonal Factors

Examples of factors that fit within the interpersonal framework are peer norms and men who have sex with men and women. Both of these factors are part of this study as measures. Peer norms can be defined as subjective judgments and beliefs concerning the perceived pressure to perform or not to perform a behavior (Terry, Gallois, & McCamish, 1993). An example of an HIV peer norm is the following statement, “My friends think that having sex without a condom is much better than with a condom.” Other terms in the literature that are conceptually similar to peer norms are subjective, social, and community norms (Azjen, 1991).

According to the Diffusion of Innovations Theory (Rogers, 1995), Theory of Reasoned Action (Fishbein & Ajzen, 1975), and Theory of Planned Behavior (Azjen, 1985, 1991), peer norms for engaging or not engaging in certain behaviors are central to behavioral change. The Diffusion of Innovations Theory addresses how individuals in a social group begin to model a behavior and how this new behavior is expected to alter what is considered the norm within the group (Rogers, 1995). This theory has been used in HIV studies to achieve condom use and HIV testing among study participants (National Cancer Institute, 2005).

The Theory of Reasoned Action and Theory of Planned Behavior are similar in that they consider subjective norms and attitudes as determinants of behavioral intentions, which, in turn, are the most important determinants of health behavior (Bandura, 1986; Kippax & Crawford, 1993; Terry et al., 1993). According to Terry, Gallois, and McCamish (1993), the Theory of Reasoned Action and Theory of Planned Behavior are useful theories to use for HIV prevention studies, as they acknowledge,

…the role of normative influence on behavioral choice, an influence that is likely to be important in the context of safer sex, given the cooperative nature of the behavior. For [this] reason the [Theory of Reasoned Action / Theory of Planned Behavior] may form an appropriate theoretical basis for research into the determinants of safer sex… (p. 7)

As an example, if a community leader from the Latino gay community convinces his other Latino gay friends to talk about condom use before the initiation of sex, then the hope is that this safer sex practice will become the norm. In addition, his positive rather than negative attitude towards condom awareness and use will hopefully positively impact his Latino gay friends within his community. As new individuals begin to adopt this safer sex norm and attitude, community members, regardless if they were in contact with the community leader who initiated the safer sex practice, will adopt it as this safer sex practice diffuses throughout this Latino gay community.

In terms of the men who have sex with men and women factor, some reasons given by non-gay-identifying Latino MSM for this behavior are directly related to several important theoretical constructs, such as cultural expectations, gender roles, sexual norms, and masculinity. These theoretical constructs are from Diaz’ Theory of Sexual Self-Regulation (Diaz, 1998). Latino MSM, particularly non-gay identified Latino MSM, can have female sex partners because cultural and societal expectations (e.g., masculinity and male gender roles) make it easier for them to do so than to have male partners (Diaz, 1998; J. K. Williams, Wyatt, Resell, Peterson, & Asuan-O’Brien, 2004). Also, according to cultural and religious expectations, including Catholic beliefs, Latino males must marry a woman and have children (Diaz, 1998), an expectation conformed by many Latino MSM who do not self-identify as gay.
Structural Framework

A structural framework examines the role of economic, legal, and political factors, sometimes referred to as “upstream” or “distal” factors, in HIV infection. This framework is the least common in the HIV literature, yet the most comprehensive and relevant to marginalized groups (Krieger, 2001; Loue, 2006; Organista, 2007).

Theories that can be categorized under this framework include Political Economy of Health (Minkler et al., 1995), Theory of Gender and Power (Wingood & DiClemente, 2000), The Lifecourse Model (Blane, 1999), and The Ecological Model (Poundstone et al., 2004). Compared to the other frameworks, the structural framework borrows from the most diverse set of disciplines, including economics, political science, and ecology. A common critique of theories based on a structural framework is that they present methodological challenges (e.g., level of measurement and analysis) requiring complex analytical and innovative statistical methods (Krieger, 2000).

The perspectives of earlier studies suggested that HIV risk was the result of intrapersonal deficits in individuals (Díaz & Ayala, 1999; Tesh, 1988). Recent studies regarding causality of HIV infection in minority and marginalized groups criticize the intrapersonal framework by describing how it has failed to capture the role of structural factors in HIV disparities among marginalized populations.

Despite this dissertation’s focus on intrapersonal and interpersonal frameworks of HIV, it is important to understand the broader structural framework of HIV. This dissertation is not applying a structural framework to HIV risk. The intention is to discuss how a structural framework can be applied to the study of HIV risk among YLMSM living in the border region. The most important reason for discussing the structural framework is that the other two frameworks alone fail to fully explain HIV risk among YLMSM. In addition, a structural framework together with the intrapersonal and interpersonal frameworks informs the development of an ecological model. This dissertation is mainly based on this theoretical perspective, which is why there is a discussion of various factors that fit within the three framework levels.

Below is a diagram of an ecological model of HIV risk factors applicable to YLMSM and any other disproportionately HIV-affected population. The ecological framework provides a much broader concept of HIV risk by including factors that fall into the intrapersonal, interpersonal, and structural framework.

Structural factors

Exchange sex as a risk factor of HIV infection has commonly been discussed within an intrapersonal framework. However, the context in which exchange sex occurs for YLMSM living in the San Diego-Tijuana border region requires a structural framework context. The Theory of Political Economy of Health is an appropriate theory to conceptualize and understand the connection between exchange sex and HIV infection (Minkler et al., 1995; Wingood & DiClemente, 2000).
This theory provides an interdisciplinary approach that examines how structural factors, such as politics, power, and economics, all directly contribute to health disparities among marginalized groups. Studies have associated exchange sex with indicators of low SES, such as homelessness, unemployment, substance abuse, and incarceration (Deren et al., 1997; Marino, Minichiello, & Disogra, 2003; M. L. Williams, Atkinson, Klovdahl, Ross, & Timpson, 2005).

In addition, there are political factors that contribute to YL MSM’s invisibility and powerlessness in our society today that directly contributes to their high levels of HIV risk. Young Latino MSM, particularly for those who live on the streets, who engage in exchange sex...
encounter discrimination, criminalization, persecution, and violence from the authorities (Minichiello et al., 1999). Sex work as type of employment for males is considered illegal by both San Diego and Tijuana. Those who are undocumented immigrants and who do not speak English are at increased risk for HIV infection since they represent the most marginalized and hidden sectors of our society. Undocumented YLMSM will not feel empowered to approach institutions that represent government authority, especially if they have experienced physical and or sexual abuse, and emotional trauma (Marino et al., 2003; Scott et al., 2005).

Summary

The HIV literature focusing on Latino MSM can be classified into three main theoretical frameworks: intrapersonal, interpersonal, and structural. Intrapersonal and interpersonal theories overlook the role of structural factors in HIV infection. The structural framework is relevant to marginalized groups in that it addresses the much broader social, economic, and political context of HIV. The intrapersonal, interpersonal, and the structural frameworks together are the basis for the ecological model; the most appropriate theoretical perspective that aids in conceptualizing the multiple HIV risk factors affecting YLMSM living in the San Diego-Tijuana border region.
References


CHAPTER 4

Methods

This secondary data analysis uses data from a previous study, which intended to estimate HIV prevalence, HIV genetic subtype, and sexual risk behavior among young Latino men who have sex with men (YLMSM) residing along the San Diego-Tijuana border region. The original cross-sectional study was conducted by the California Department of Public Health, Office of AIDS, in collaboration with the departments of Public Health from Baja California and San Diego County, from 1999 to 2001. Eligible participants (N=372) self-identified as Latino, reported a history of having sex with another man in their lifetimes, resided in the San Diego-Tijuana border region, and were between the ages of 17 and 30 years. The study used a standardized questionnaire and used participants’ blood samples for the assessment of HIV infection status.

Venue-based sampling took place in San Diego and Tijuana. (See appendix for more information on other study procedures.) Study target sites included any gay-identified venues (i.e., dance clubs and bars) or “cruising”/public areas (i.e., parks) where YLMSM congregate for social events or to “cruise” to find sexual partners. Appropriately, a convenience-based study design was used since some aspects of YLMSM are, to a large extent, reflective of a hidden population (Atkinson & Flint, 2001; National Institute of Drug Abuse, 1990). Eligible men were invited to participate and were given the option of immediately enrolling in the study or to set up an appointment to enroll in the study at a later time.4 Participants were given the option of completing the survey at a neutral location and were also given a $15 stipend for their participation. The study protocol for the present study, which is a secondary analysis, was reviewed and approved (for exempt status) by the University of California, Berkeley’s Office for the Protection of Human Subjects.

All surveys were done anonymously, either in English or Spanish (depending on the participant’s preference), contained unique identifiers instead of personal identifying information, and took 30 to 40 minutes to complete. Agency site coordinators submitted completed questionnaires and HIV serologic-based test results to the Office of AIDS, where the data was entered into a secure database without any of the participant’s personal identifying information.

As for the content of the survey, there were questions about individual/sociodemographic, psychosocial, HIV testing, alcohol and drug use, and sexual risk behavior characteristics. Specifically, individual/sociodemographic questions included date of birth, current place of residence (San Diego or Tijuana region), highest level of education obtained (less than high school, high school graduate or equivalency, some college, graduate school, and graduate degree) and current attendance in school (yes/no). Participants were also asked about their past year employment status (full-time, part-time, occasional, and unemployed), and their source of income (job, public assistance, student loans/scholarships, other public benefits [social security, disability, and unemployment], spouse/family/friends, exchange sex, and stealing/selling drugs/begging). The questionnaire also assessed history of homelessness (yes/no), incarceration (yes/no), living in the border region (< 1 month, 1 month to 1 year, 1 to 5 years, and > 5 years), and regular source of health care (public health department, community-based, community health center, private practice, and hospital).
hospital clinic, health maintenance organization, private doctor, don’t have a regular source of healthcare).

The survey contained a list of psychosocial-related questions with a 5-point likert scale. Response options 1, 2, 3, 4, and 5 were labeled as “do not agree at all,” “do not agree,” “neutral,” “agree,” and “strongly agree,” respectively. Examples of psychosocial questions included “Most of my friends think that you should always use a condom when having anal sex,” “If someone I’m having sex with does not want to use a condom, there is little I can do about it,” and “After a few drinks I am more sexually responsive.”

Participants were also asked about their HIV testing characteristics. The “likelihood of being HIV positive” variable is based on participants’ responses to the following question, “How likely do you think it is that you are HIV-positive?” The categorical, mutually exclusive responses were “very likely,” “likely”, “unlikely”, and “not possible. Self-reported data was collected on participants’ drug and alcohol use. Respondents were asked about their past substance use. Some of the substances included alcohol, poppers, ecstasy, and cocaine. To assess for a history of injection drug use, participants were asked if they have ever in their lifetime injected drugs (excluding prescription drugs) into their veins or under their skin with a needle.

Participants were asked about their sexual risk behaviors in the past four months and in their lifetime. Exchange sex was assessed by asking participants if they had recently given or received things, such food, shelter, drugs, or money, in exchange for sex with another male in the past four months. They were asked about having unprotected sex with males, and sex with both males and females. Lastly, the participants were asked about any past STD, such as gonorrhea, syphilis, Chlamydia, herpes, or warts, diagnosed by a provider.

**Measures**

The following section describes how measures were recoded and/or how composite measures were created based on questionnaire items.

**Individual/sociodemographic measures**

Age as a continuous variable with years as the units was first computed from the numerical date of birth variable and then recoded into 3 age categories (17-20, 21-25, and 26-30 years). The age grouping was done this way because of 21 year old legal drinking age in the U.S. and to have similar number of participants in each group. The categorical form of age was used in the analyses to compare various characteristics (i.e., sociodemographic, psychosocial, HIV testing, drug use characteristics, and sexual risk behaviors) for YLMSM in the two study samples, San Diego and Tijuana. The categorical form of age was also used to examine bivariate associations between various characteristics (i.e., sociodemographic, psychosocial, HIV testing, drug use characteristics, and sexual risk behaviors) and the unprotected anal intercourse and the never tested for HIV outcomes. For the bivariate associations in the HIV infection outcome, the three age categories were collapsed into two age categories (17-25 and 26-30 years) due to small cell sizes. The main rationale for this grouping was to obtain approximately equal distribution of participants in both of these age groups.
For the regression modeling of never tested for HIV, age was used as a continuous variable since it was linearly associated with this outcome. A goodness of fit test \(^5\) was used to determine how well the variation in the risk was explained by a linear pattern of increase or decrease (Jewell, 2004). If a categorical variable is linearly associated with an outcome, then the continuous form of the variable can be used rather than the categorical form. The categorical form of the age was not linearly associated with the unprotected anal intercourse and the HIV infection outcomes. Therefore, the categorical form for age was used for unprotected anal intercourse and HIV infection. One benefit in using the continuous rather than the categorical form of a numerical variable in a regression analysis is that the models require fewer independent variables and degrees of freedom resulting in a more robust model.

Responses to the level of education measure (less than high school, high school graduate or equivalency, some college, graduate school, and graduate degree) were recoded into three categories: less than high school, high school graduate, and at least some college. The responses to employment status were recoded into either full-time employment, part-time employment (part-time/sometimes employment), and unemployed. The employment status measure contained non-mutually exclusive responses (e.g., participants were asked to check all that applied). These recoded educational and employment categories are simple, clear, and capture all of the original categories. In addition, these are most commonly used for this population (Fernandez et al., 2005a; Fernandez et al., 2005b).

The source of income measure was recoded as follows: employment (a job), public benefits (welfare, public assistance, food stamps, social security, disability, and unemployment), school (student loans, grants, and scholarships), family/friends (spouse, family, and friends), exchange sex, and other (stealing, selling drugs, and begging). The time living in the border region measure was left as is since it had even distribution of participants in each category. Responses to the source of income variable were non-mutually exclusive, unlike the mutually exclusive response options for the time living in the border region measure.

The categories for the regular source of health care were recoded as follows: “clinics (public health department, community-based, college, hospital clinic),” “health maintenance organization (like Kaiser),” “doctor (private doctor),” and none (“no regular source of healthcare”). The few written responses for the regular source of health care measure were coded into one of the four categories. For the second objective, I am interested if participants had a regular source of health care rather than the type of health care. Therefore, the four categories for regular source of healthcare were recoded into a dichotomous (yes/no) measure. Clinics, health maintenance organization, and doctor were categorized as “yes” responses, while “don’t have a regular source” and “do not seek care” were categorized as “no” responses.

**Psychosocial measures**

The psychosocial questions originated from a standardized survey instrument adopted from the Center for AIDS Prevention Studies, University of California, San Francisco (Hays, Kegeles, & Coates, 1990). Given the focus of my research objectives, the four psychosocial constructs of interest that were created for this present study were condom peer norms, condom self-efficacy, perceived threat of HIV infection, and alcohol attitudes. The original study only listed these questions and did not include psychosocial constructs.

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\(^5\) \(\chi^2\) goodness of fit test = overall \(\chi^2\) - trend \(\chi^2\). The test statistic approximately follows a \(\chi^2\) sampling distribution with K-2 degrees of freedom.
The theoretical discussion presented in the literature review and these two studies mentioned above were used as a guide for the groupings of questions in each of my psychosocial measures. The study by Molitor et al. (1990) also used these questions with slightly different psychosocial constructs. The study by Molitor et al. (1990) used general types of peer norms and self-efficacy, while I focused on condom peer norms and condom self-efficacy. I used fewer questions for each of my psychosocial constructs.

The four psychosocial measures are composite measures: the scores for each of the questions in the composite measure were summed and averaged for analysis. The psychosocial composite measures were the only continuous independent variables (the other independent variables were categorical). Scales for some of the questions were reversed so that a higher score consistently reflected a higher level of HIV risk and a lower score a lower level of HIV risk. For example, the scale was reversed (referred to as “reversed-coded”) for “Most of my friends think that you should always use a condom when having anal sex” and “There is little chance I could become infected with HIV or infect others, from what I do sexually” in order to appropriately reflect a higher level of risk.

Examples of questions for condom peer norms (total of five questions with possible scores ranging from 5 to 25 points) were “Most of my friends think that you should always use a condom when having anal sex” (reverse-coded) and “Most of my friends think you should avoid anal sex without condoms” (reverse-coded). Examples of questions for condom self-efficacy (total of four questions with possible scores ranging from 4 to 20 points) included “I can get a man I’m having sex with to use condoms if I want him to” (reverse-coded) and “If someone I’m having sex with does not want to use a condom, there is little I can do about it.”

Perceived threat had a total of three questions (with possible scores ranging from 3 to 15 points) some of which were “My sexual behavior is risky in terms of HIV” and “There is little chance I could become infected with HIV or infect others, from what I do sexually” (reverse-coded). Lastly, alcohol attitudes had four questions (with possible score ranging from 4 to 20 points), such as “I often feel more sexual after I’ve had a few drinks,” “A drink or two makes me more comfortable sexually,” and “After a few drinks I am more sexually responsive.” For alcohol attitudes, HIV risk behavior may not be as easily captured by a higher score compared to the other psychosocial constructs. Any indication of there being more sexual activity as a result of drinking alcohol is considered high risk. The literature clearly shows that alcohol directly contributes to riskier sexual practices in relation to HIV infection.

**HIV testing measures**

The “likelihood of being HIV positive” variable (based on participant’s perception) contained the following responses, “very likely,” “likely”, “unlikely”, and “not possible. The “don’t know” and “refused” categories were recoded into the “not possible” category. This recoding approach for these types of relatively uninformative responses (e.g., “don’t know” and “refused”) was applied on a question-by-question-basis. Ultimately, it allowed for the recoding of less informative responses in a manner that consistently reflects lower levels of HIV risk.

This variable underwent further recoding in the bivariate associations with the HIV infection outcome. The “very likely”/”likely” categories were recoded into the “likely” variable and the “unlikely”/”not possible” categories were recoded into the “unlikely” variable. This recoding was done due to low numbers of participants in the original categories when stratified by the HIV infection outcome.
Alcohol and drug use measures

As previously discussed in the literature review, club drugs include various stimulant drugs. Therefore, the newly created independent variable “club drug use during sex” measure included any “yes” responses to the use of poppers, ecstasy, methamphetamine, or cocaine during sex. The variable “alcohol during sex” captured those respondents who indicated using alcohol during sex in the past.

The decision to use the “during sex” time period versus the other time periods (lifetime, last 4 months, etc.) involved several reasons. First, there are many research studies that utilize the variable alcohol and or drug use during sex (Celentano et al., 2006; Fernandez et al., 2005a; Molitor, Facer, & Ruiz, 1999; Poppen, Reisen, Zea, Bianchi, & Echeverry, 2004). Second, it is possible that alcohol and drug use while having sex is an event that is easier to recall for some YLMSM versus alcohol and drug use in their lifetime or alcohol and drug use more than three times. However, this is an unsubstantiated reason since there are no studies to support its rationale. Finally, the other time periods compared to the “during sex’ time period for alcohol and drug use had too many missing responses. Using the other time periods for alcohol and drug use would have substantially reduced the overall already small sample size of 364 YLMSM.

The injection drug use history question had two missing responses that were recoded as “no” responses. According to the literature, not engaging in injection drug use is associated with lower levels of HIV risk and, therefore, consistent with my recoding approach to the recoding of less informative responses. The new measure created for injection drug use history is “IDU history.”

Sexual risk behavior measures

The “unprotected intercourse with a female” dichotomous measure (“female UI”) was created by combing “yes” responses to questions regarding vaginal and anal unprotected intercourse with a female in the past 4 months. A participant’s response that indicated exchange sex as a source of income in the last four months was coded as having engaged in recent exchange sex. As a result, a couple of responses were changed to “yes” for the “exchange sex” measure.

The young men in this study were asked if they have had sex with both males and females, which is captured by the “MSMW” measure. This measure was created by grouping all young men who reported having sex with men with those who reported sex with a female. The MSMW variable had two missing responses. According to the literature and to my recoding approach, they were recoded as “no” responses. As mentioned previously, MSMW have been shown to have a higher level of HIV risk compared to MSM. The “STD history” measure captures participants who have had a STD diagnosis.

Outcome measures

The three dichotomous (“yes”/”no”) outcome measures of interest were unprotected anal intercourse in the past 4 months, HIV infection, and never testing for HIV. The unprotected anal intercourse measure was created by including “yes” responses to questions about insertive or receptive anal intercourse with another male in the past 4 months. Despite the fact that receptive unprotected intercourse is riskier in terms of HIV infection compared to insertive unprotected intercourse, combining them into unprotected anal intercourse is based on the fact that both types of unprotected intercourse carry a similar level of risk for HIV infection.
The “HIV infection” measure is the second outcome of interest. HIV serologic-based results for all 372 YLMSM were either positive or negative. The third outcome is never tested for HIV, which is labeled as “never tested. This outcome measure had a few participants (n=8) that did not know if they ever tested for HIV. These responses were recoded into the never tested category corresponding with the lower level of HIV risk. According to the literature, YLMSM who never get tested for HIV have lower levels of HIV risk compared to those who get tested for HIV. Often times, YLMSM seek HIV testing because of a potential exposure to HIV, such as unprotected anal intercourse.

Analysis

All analyses were performed using Stata/IC version 10.0 for Windows (StataCorp, 2007).

Univariate analysis

Univariate statistics were performed to understand the distribution of all independent and outcome measures and to assess for outliers and missing values. If any of the measures had missing values, then all attempts were made to recode them into the categories that reflected a low level HIV risk. This recoding approach for handling missing values was consistently followed. Most importantly, the literature was primarily relied on in determining what was considered low risk for HIV. Fortunately, missing values were not a major problem in the measures included in this study. Variables with a significant amount of missing values were not used since it would reduce the already small sample size of 372.

In a few instances, logical checks were performed in the data and corrective action was taken. For instance, a couple of participants reported no exchange sex with another male in a later question that was part of the sexual risk behavior section. However, they reported exchange sex as a source of income in an earlier individual/sociodemographic question that asked about their sources of income in the past 4 months. Therefore, these participants’ responses for exchange sex in the past 4 months were changed from “no” to “yes.”

Bivariate analysis

For the first research objective, participants’ characteristics are compared by place of residence (e.g., San Diego vs. Tijuana) in a bivariate analysis. Similarly, for the second objective (prior to regression modeling) participants’ characteristics were compared by each of the three outcomes (unprotected anal intercourse, HIV infection, and never tested for HIV) in a bivariate analysis.

Categorical or dichotomous measures are compared using the chi-squared ($\chi^2$) statistic, while continuous measures are compared using the $t$-test statistic. The $\chi^2$ statistic with K-1 degrees of freedom, where K is the number of categories in the independent variable, is used to test for associations between two categorical variables. The $t$-test statistic compares the means of a continuous variable by a dichotomous outcome measure. These two test statistics produced an associated p-value and significance levels are set to p-values of .05 or less. A $\chi^2$ test with a p-value less than .05 means that the null hypothesis of independence is rejected and one can interpret that the two variables are significantly associated. A $t$-test (two-tailed) with a p-value less than .05 also means that the null hypothesis (means are not any different) can be rejected and one can conclude that the means of the continuous measure are significantly different.

Before addressing regression modeling, a correlation matrix of all variables was performed to assess for multicollinearity. (Correlation matrix results are not shown due to the
large amounts of data output.) According to Katz, “Multicollinearity occurs when two or more variables are so closely related to one another that the model may not be able to assess the independent contribution of each variable” (2006, p. 68). A bivariate statistic that is commonly used to assess collinearity is called the Pearson correlation coefficient or $r$. It assumes a linear relationship between the two variables and it has a range of -1 to 1. A value of 1 means that the variables change together in the same exact direction, while a value of -1 means that the variables change together in the exact opposite directions. A correlation coefficient with a zero value means that the two variables are not associated at all. Typically, correlation coefficient values indicating any potential collinearity issues are greater than 0.8 (Jewell, 2004; Katz, 2006).

Fortunately, the Pearson correlation coefficients in the correlation matrix performed for this dissertation were all below a value of 0.8. The largest correlation coefficient value was 0.62.

**Multivariate analysis**

Since all three outcomes measures are dichotomous, logistic regression is the appropriate multivariate analysis tool. Logistic regression was used to answer the three research questions in the second overall objective. Some categorical measures, such as age, level of education, and likelihood of being HIV positive (+) were recoded into dichotomous variables depending on the outcome. Most other dichotomous variables with “yes/no” responses were changed to dummy variables where the high risk responses were coded as “1” and the low risk responses were coded as “0.” For instance, “yes” responses to the ever homeless variable were coded as “1,” while the ‘no” responses were coded as “0.” According to the literature and my coding scheme, YLMSM who reported a history of being homeless have a higher level of HIV risk compared to those who reported no history of ever being homeless. Attempts were made to consistently apply this coding scheme when needed, as it would assist with the interpretation of results.

Second, hierarchical regression analysis was done in a stepwise manner. Regression modeling for each outcome will be individual/socio-demographic, psychosocial, HIV testing (testing), alcohol and drug use, and sexual risk behaviors, which are referred to as sets of independent measures. Third, only the significant variables from the bivariate analysis by each outcome will be retained in the regression analysis. Therefore, not all variables under each set of independent measures will be used. Fourth, only the significant predictors in a model are retained to serve as control or adjustment variables in subsequent models. For example, the initial individual/sociodemographic set of independent measures in the first model of unprotected anal intercourse are age, residence, income source, homeless, incarceration, and regular source of health care. Education, employment, and time living in the border region are not included since they were not significant in the bivariate analysis. Only residence and income source were significant in the initial regression model of unprotected anal intercourse, so they were retained in the next regression model of unprotected anal intercourse where the psychosocial independent measures are entered. The only exception to the rule was for the age variable since it was not a significant predictor for the unprotected anal intercourse outcome. The decision to include age in each of the regression models for unprotected anal intercourse is based on the literature.

In essence, this modeling strategy allows for the examination of the predictive strength of a set of independent variables adjusting for previous sets of independent variables. The logic behind the model sequencing order, which is adapted from other studies (Denner, Organista, Dupree, & Thrush, 2005; Norman, 2003; Victora, Hutty, Fuchs, & Olinto, 1997), in the present study allows for the adjustment of potential confounders. For instance, the first individual/sociodemographic model allows for the examination of significant
Then in later models, particularly those related to my research questions, adjustment for potential confounders takes place while assessing a particular set of significant risk factors. For example, the model for the first research question attempts to answer the extent to which psychosocial characteristics predict unprotected anal intercourse after adjusting for potential individual/sociodemographic confounders.

Lastly, the regression models contain odds ratios and their associated 95 percent confidence intervals (95% CI). For logistic regression the odds ratio is a statistical measure of “how much the likelihood of the outcome changes with a one-unit change in the independent variable” (Katz, 2006, p. 126). The odds ratio is also the antilogarithm of the regression coefficient. A value of “1” means that there is no change in the outcome with changes in the independent variable; values greater than one and less than one indicate an increase and a decrease, respectively, in risk of the outcome. The confidence interval represents a range of plausible odds ratio values. A large confidence interval is indicative of a large degree of variability and or a small sample size (Katz, 2003). Significant odds ratios will have an associated 95% CI that exclude 1, while non-significant odds ratios will contain “1” in the 95% CI.

The other statistical measure that is important in assessing overall model properties is the likelihood ratio test. The likelihood ratio test assists with examining how well the model accounts for the outcome compared to chance (Katz, 2006). The test compares the model with all of the respective independent variables and the model with the constant term (has no independent measures). This test produces a $\chi^2$ statistic (with K-1 degrees of freedom, where K is the number of independent variables) and its associated p-value. A p-value less than .05 means that the model (with all of the independent variables of interest) describes the outcome better than chance (model with the constant term and no independent variables). The values for the likelihood ratio test are not reported in the regression tables. After careful consideration of the likelihood ratio tests in each model, all p-values were less than .05 meaning that the models accounted for the outcome significantly better than chance.
APPENDIX

Counseling and Referral Services

Risk assessment counseling was conducted immediately after the study interview but
before the collection of a blood specimen. Participants were counseled on the disclosure of test
results two weeks later at a venue designated by the survey worker. Study results were often
returned at the offices of local community-based organizations. If necessary, referrals for HIV
care and services were also made during this disclosure counseling. Study interviewers provided
referrals for medical follow-up to the participants who tested positive for HIV infection.

Laboratory Methods

Participants’ HIV infection status was determined using the standardized Food and Drug
Administration (FDA) approved Enzyme Immune Assay (EIA) for the presence of HIV-1 and/or
HIV-2 antibodies. All EIA positive tests were confirmed by FDA-approved Western blot. The
San Diego Public Health Laboratory conducted laboratory work.

Human Subjects

There is no risk of accidental HIV disclosure during the proposed dissertation analyses,
since the researcher does not have access to any data containing participants’ names or
identifying information. In a letter dated October 10, 2006, University of California, Berkeley
Office for the Protection of Human Subjects approved the application for exempt status from
References


StataCorp. (2007). Stata Statistical Software: Release 10., College Station, TX.

CHAPTER 5

Results

This chapter has three sections. The first section addresses the study’s first objective, which is to compare the two subgroups’ characteristics by place of residence. The second section reports bivariate associations of each of these characteristics with the three outcomes, which include unprotected anal intercourse, HIV infection, and HIV testing, respectively. Characteristics that are significantly associated with an outcome are retained for multivariate analyses. The third section examines the risk factors of each outcome using multivariate analyses.

Bivariate Analysis of Characteristics by City of Residence

This first section reports the distribution of participants’ characteristics by city of residence.

Individual/sociodemographic characteristics

The individual/sociodemographic characteristics of the sample of young Latino men who have sex with men (YLMSM) by city of residence are presented in Table 1. In general, there are low levels of education and high levels of homelessness within the combined sample of YLMSM. The majority of the combined sample of YLMSM, for instance, reported having less than a college education (56.2%), not being in school at the time of the study (86.3%), and having a history of homelessness (53.5%). The majority of the total sample, however, reported full-time employment (52.2%), full-time employment as their source of income in the past 4 months (52.2%), and having a regular source of health care (73.4%).

There were significant differences when examining individual/sociodemographic characteristics by city of residence, which addresses one of the study’s research questions. In general, Tijuana men have lower levels of education and higher levels of homelessness compared to San Diego men. Tijuana YLMSM who reported less than a high school education outnumbered San Diego YLMSM by approximately seven times. The only exception to these lower socioeconomic status levels among Tijuana men compared to San Diego men was their reported higher rate of having a health care (77.5% vs. 65%, respectively). Other significant differences between the two subgroups included Tijuana men reported much higher rates of unemployment, homelessness, income from exchange sex6, and incarceration history7 than San Diego men.

HIV testing characteristics

The HIV testing characteristics of the sample of YLMSM by city of residence in Table 1 show a very high rate (25.3%) for those testing positive for HIV in the combined sample.

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6 This individual/sociodemographic variable, “income from exchange sex,” is not to be confused with the sexual risk behavior, “exchange sex,” in table 5.

7 The “incarceration history” variable is included as part of the individual/sociodemographic characteristics based on a subjective decision. This variable did not quite fit under the other types of characteristics, and so it was determined that incarceration history is more appropriately an individual/sociodemographic characteristics.
TABLE 1. Characteristics of the sample of YLMSM by city of residence

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>San Diego (n=123)</th>
<th>Tijuana (n=249)</th>
<th>Total (N=372)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Individual/sociodemographic characteristics</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age (years)***</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17-20</td>
<td>6.5</td>
<td>23.3</td>
<td>17.7</td>
</tr>
<tr>
<td>21-25</td>
<td>29.3</td>
<td>34.5</td>
<td>32.8</td>
</tr>
<tr>
<td>26-30</td>
<td>64.2</td>
<td>42.2</td>
<td>49.5</td>
</tr>
<tr>
<td>Education***</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; High school</td>
<td>4.9</td>
<td>33.7</td>
<td>24.2</td>
</tr>
<tr>
<td>High school graduate</td>
<td>24.4</td>
<td>35.7</td>
<td>32.0</td>
</tr>
<tr>
<td>At least some college</td>
<td>70.7</td>
<td>30.5</td>
<td>43.8</td>
</tr>
<tr>
<td>Currently in school***</td>
<td>24.4</td>
<td>8.4</td>
<td>13.7</td>
</tr>
<tr>
<td>Living situation***</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Homeless history</td>
<td>22.8</td>
<td>68.8</td>
<td>53.5</td>
</tr>
<tr>
<td>Employment, past year</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Full-time***</td>
<td>65.9</td>
<td>45.4</td>
<td>52.2</td>
</tr>
<tr>
<td>Part-time</td>
<td>29.3</td>
<td>31.3</td>
<td>30.7</td>
</tr>
<tr>
<td>Unemployed***</td>
<td>9.8</td>
<td>23.7</td>
<td>19.1</td>
</tr>
<tr>
<td>Source of income, past 4 months</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employment***</td>
<td>87.0</td>
<td>70.3</td>
<td>75.8</td>
</tr>
<tr>
<td>Public benefits</td>
<td>4.9</td>
<td>3.2</td>
<td>3.8</td>
</tr>
<tr>
<td>School funding</td>
<td>3.3</td>
<td>1.2</td>
<td>1.9</td>
</tr>
<tr>
<td>Family/friends***</td>
<td>8.9</td>
<td>27.3</td>
<td>21.2</td>
</tr>
<tr>
<td>Exchange sex***</td>
<td>2.4</td>
<td>18.9</td>
<td>13.4</td>
</tr>
<tr>
<td>Other***</td>
<td>2.4</td>
<td>10.4</td>
<td>7.8</td>
</tr>
<tr>
<td>Time living in border region*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 1 month</td>
<td>1.6</td>
<td>2.8</td>
<td>2.4</td>
</tr>
<tr>
<td>1 month-1 year</td>
<td>13.0</td>
<td>22.1</td>
<td>19.1</td>
</tr>
<tr>
<td>1-5 years</td>
<td>25.2</td>
<td>29.3</td>
<td>28.0</td>
</tr>
<tr>
<td>&gt; 5 years</td>
<td>60.2</td>
<td>45.8</td>
<td>50.5</td>
</tr>
<tr>
<td>Incarceration history***</td>
<td>8.2</td>
<td>51.4</td>
<td>37.1</td>
</tr>
<tr>
<td>Regular source of healthcare***</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clinic</td>
<td>33.3</td>
<td>60.2</td>
<td>51.3</td>
</tr>
<tr>
<td>HMO</td>
<td>19.5</td>
<td>1.2</td>
<td>7.3</td>
</tr>
<tr>
<td>Doctor</td>
<td>12.2</td>
<td>16.1</td>
<td>14.8</td>
</tr>
<tr>
<td>None</td>
<td>35.0</td>
<td>22.5</td>
<td>26.6</td>
</tr>
<tr>
<td>HIV testing characteristics</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never tested***</td>
<td>22.8</td>
<td>53.8</td>
<td>43.6</td>
</tr>
<tr>
<td>Likelihood of being HIV+*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Very likely</td>
<td>19.5</td>
<td>18.5</td>
<td>18.8</td>
</tr>
<tr>
<td>Likely</td>
<td>21.1</td>
<td>37.0</td>
<td>31.7</td>
</tr>
<tr>
<td>Unlikely</td>
<td>33.3</td>
<td>26.9</td>
<td>29.0</td>
</tr>
<tr>
<td>Not possible</td>
<td>26.0</td>
<td>17.7</td>
<td>20.4</td>
</tr>
<tr>
<td>HIV+ test**</td>
<td>35.8</td>
<td>20.1</td>
<td>25.3</td>
</tr>
</tbody>
</table>
A higher percentage of men in San Diego (35.8%) tested positive than did Tijuana men (20.1%). There were very high rates (43.6%) of never testing for HIV testing in the combined sample with Tijuana men outnumbering San Diego men by a factor of almost two and a half. In addition, more Tijuana men had a higher likelihood of being HIV infected, as indicated by self-report, than San Diego men (for very likely/likely: 55.5% vs. 40.6%, respectively). These results address the study’s research question regarding the comparison of HIV testing characteristics in YLMSM by city of residence.

**Alcohol and drug use characteristics**

The overall alcohol and drug use characteristics of the sample of YLMSM by city of residence show alarmingly high rates of alcohol and drug use in the combined sample with the highest being 66.9% for alcohol during sex and the lowest being 30.1% for injection drug use history. To address the study’s research question regarding the comparison of alcohol and drug use in the sampled YLMSM by city of residence, Tijuana men have higher rates of alcohol and drug use than San Diego men. More than half of all Tijuana men and slightly under a third of all San Diego men (53.0 vs. 30.1%, respectively) reported club drug use during sex. In addition, there are 5.5 times more Tijuana men who reported injection drug use history than San Diego men (41.4% vs. 7.3%, respectively).

**Sexual risk characteristics**

The sexual risk characteristics of the sample of YLMSM by city of residence are presented in Table 1. Overall, YLMSM reported high rates of sexual risk characteristic in the combined sample; the highest was for men who have sex with men and women (74.7%) and the
lowest was for exchange sex\(^8\) in the past four months (27.8%). There were high rates for both male and female unprotected intercourse (42.2% and 35.5%, respectively).

Results show that Tijuana YLMSM reported higher rates of sexual risk behaviors, with the exception of male unprotected intercourse, than San Diego YLMSM. The greatest disparity for these two subgroups is seen in female unprotected intercourse and exchange sex rates, specifically the rates for Tijuana men are roughly 3.6 times greater than the rates for San Diego men for these two sexual risk characteristics.

**Psychosocial characteristics**

The psychosocial characteristics of the sample of YLMSM by city of residence are presented in Table 2. In general, higher mean scores for psychosocial characteristics indicated a higher level of HIV risk compared to lower mean scores. Overall, the total sample of YLMSM had mean scores of 12.2 (SD = 4.48; possible scale of 5-25 points) for condom norms; 9.6 (SD = 3.45; possible scale of 4-20 points) for condom self-efficacy; and 11.1 (SD = 5.57; possible scale of 4-20 point) for alcohol attitudes. These mean scores indicate medium levels of HIV risk considering their respective possible scales. To address one of the study’s research question regarding how the two subgroups compare along psychosocial characteristics, Tijuana men reported higher levels of HIV risk as reflected in their higher mean scores for condom norms, condom self-efficacy, and alcohol attitudes than their San Diego counterparts.

**TABLE 2. Psychosocial characteristics of the sample of YLMSM by city of residence**

<table>
<thead>
<tr>
<th>Psychosocial characteristic</th>
<th>San Diego (n=123)</th>
<th>Tijuana (n=249)</th>
<th>Total (N=372)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Condom norms (5-25 pts.)***</td>
<td>10.7 4.11</td>
<td>12.9 4.47</td>
<td>12.2 4.48</td>
</tr>
<tr>
<td>Condom self-efficacy (4-20 pts.)***</td>
<td>8.3 3.11</td>
<td>10.3 3.44</td>
<td>9.6 3.45</td>
</tr>
<tr>
<td>Perceived threat (3-15 pts.)</td>
<td>9.5 2.49</td>
<td>9.7 2.89</td>
<td>9.6 2.76</td>
</tr>
<tr>
<td>Alcohol attitudes (4-20 pts.)*</td>
<td>10.1 4.99</td>
<td>11.6 5.79</td>
<td>11.1 5.57</td>
</tr>
</tbody>
</table>

*p<.05, ***p<.001. A t-test was used to compare each characteristic by city of residence. Each composite variable is on a 5-point Likert-scale with response options 1 through 5 as “do not agree at all,” “do not agree,” “neutral,” “agree,” and “strongly agree,” respectively. SD = standard deviation.

**Bivariate Analysis of Characteristics by Each Outcome**

This second section reports the bivariate analysis of participants’ characteristics by each outcome. Select characteristics that were significantly associated with an outcome are briefly discussed. The purpose of this bivariate analysis was to identify significant correlates of each outcome in unadjusted models and enter them into their corresponding multivariate model.

---

\(^8\) The “exchange sex” variable is not to be confused with “exchange sex income” presented in table 1.
Unprotected anal intercourse

The bivariate associations between unprotected anal intercourse in the past four months and individual/sociodemographic, HIV testing, alcohol and drug use, and sexual risk characteristics for the sampled YLMSM are presented in Table 3. Of those reporting no unprotected anal intercourse, Tijuana YLMSM outnumbered San Diego men by a factor of four. There were much higher rates of exchange sex among YLMSM who engaged in unprotected anal intercourse than those who did not. The present study found that lower rates of homelessness and incarceration history were associated with unprotected anal intercourse. In addition, not having a regular source of health care was associated with unprotected anal intercourse among the sample YLMSM.

TABLE 3. Characteristics of the sample of YLMSM by unprotected anal intercourse

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>UAI (n=157)</th>
<th>No UAI (n=215)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Individual/sociodemographic characteristics</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age (years)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17-20</td>
<td>18.5%</td>
<td>17.2%</td>
</tr>
<tr>
<td>21-25</td>
<td>27.4%</td>
<td>36.7%</td>
</tr>
<tr>
<td>26-30</td>
<td>54.1%</td>
<td>46.1%</td>
</tr>
<tr>
<td>Residence***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>San Diego</td>
<td>51.0%</td>
<td>20.0%</td>
</tr>
<tr>
<td>Tijuana</td>
<td>49.0%</td>
<td>80.0%</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; High school</td>
<td>23.6%</td>
<td>24.7%</td>
</tr>
<tr>
<td>High school graduate</td>
<td>27.4%</td>
<td>35.4%</td>
</tr>
<tr>
<td>At least some college</td>
<td>49.0%</td>
<td>40.0%</td>
</tr>
<tr>
<td>Currently in school</td>
<td>14.0%</td>
<td>13.5%</td>
</tr>
<tr>
<td>Employment, past year</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Full-time</td>
<td>53.5%</td>
<td>51.2%</td>
</tr>
<tr>
<td>Part-time</td>
<td>30.6%</td>
<td>30.7%</td>
</tr>
<tr>
<td>Unemployed</td>
<td>21.0%</td>
<td>17.7%</td>
</tr>
<tr>
<td>Source of income, past 4 months</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employment</td>
<td>79.0%</td>
<td>73.5%</td>
</tr>
<tr>
<td>Public benefits</td>
<td>3.2%</td>
<td>4.2%</td>
</tr>
<tr>
<td>School funding</td>
<td>2.6%</td>
<td>1.4%</td>
</tr>
<tr>
<td>Family/friends</td>
<td>20.4%</td>
<td>21.9%</td>
</tr>
<tr>
<td>Exchange sex*</td>
<td>18.5%</td>
<td>9.8%</td>
</tr>
<tr>
<td>Other</td>
<td>5.7%</td>
<td>9.3%</td>
</tr>
<tr>
<td>Living situation**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Homeless history</td>
<td>44.9%</td>
<td>59.8%</td>
</tr>
<tr>
<td>Time living in border region</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Characteristic</td>
<td>UAI (n=157)</td>
<td>No UAI (n=215)</td>
</tr>
<tr>
<td>--------------------------------------</td>
<td>-------------</td>
<td>----------------</td>
</tr>
<tr>
<td></td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td>&lt; 1 month</td>
<td>1.3</td>
<td>3.3</td>
</tr>
<tr>
<td>1 month-1 year</td>
<td>17.2</td>
<td>20.5</td>
</tr>
<tr>
<td>1-5 years</td>
<td>28.0</td>
<td>27.9</td>
</tr>
<tr>
<td>&gt; 5 years</td>
<td>53.5</td>
<td>48.4</td>
</tr>
<tr>
<td>Incarceration history**</td>
<td>27.6</td>
<td>44.1</td>
</tr>
<tr>
<td>No regular source of health care*</td>
<td>32.5</td>
<td>22.3</td>
</tr>
</tbody>
</table>

**HIV testing characteristics**

- Never tested* 37.6 47.9
- Likelihood of being HIV+
  - Very likely 21.0 17.2
  - Likely 27.4 34.9
  - Unlikely 29.9 28.4
  - Not possible 21.7 19.5

**HIV+ test** 28.7 22.8

**Alcohol and drug use characteristics**

- Club drugs during sex 45.2 45.6
- Alcohol during sex 70.7 64.2
- IDU history* 23.6 34.9

**Sexual risk characteristics**

- Female UI, past 4 months 30.6 39.1
- MSMW history** 66.9 80.5
- Exchange sex, past 4 months** 36.5 21.5
- STD history* 35.0 23.7

* p<.05, ** p<.01, *** p<.001. A χ²-test was used to compare each characteristic by UAI status. UAI = unprotected anal intercourse with male in past four months; HIV+ = HIV positive; IDU = injection drug use; UI = unprotected intercourse; MSMW = men who have sex with men and women; STD = sexually transmitted disease.

In the bivariate associations of HIV testing characteristics by unprotected anal intercourse, only never tested for HIV was significantly associated with unprotected anal intercourse (see table 3). The proportion of YL MSM who reported never testing for HIV was about 1.3 times greater for those who reported no unprotected anal intercourse than for those who reported unprotected anal intercourse (47.9% vs. 37.6%, respectively).
In the bivariate associations of alcohol and drug use characteristics by unprotected anal intercourse (see table 3), injection drug use history was significantly associated with unprotected anal intercourse. The rate of injection drug use history was greater for YLMSM who reported no unprotected anal intercourse than for those who reported unprotected anal intercourse (34.9% vs. 23.6%, respectively).

In the bivariate associations of sexual risk characteristics by unprotected anal intercourse (see table 3), men who have sex with men and women, exchange sex, and STD history were significantly associated with unprotected anal intercourse. The rates for exchange sex and STD history were much higher, while the rates for men who have sex with men and women were much lower, among YLMSM who engaged in unprotected anal intercourse compared to those who did not engage in unprotected anal intercourse.

In the bivariate associations of psychosocial characteristics by unprotected anal intercourse for the sampled YLMSM are shown in Table 4. Only condom self-efficacy and perceived threat were significantly associated with unprotected anal intercourse. Young LMSM who reported unprotected anal intercourse compared with those who reported no unprotected anal intercourse had higher mean scores for perceived threat and lower mean scores for condom self-efficacy.

**TABLE 4. Psychosocial variables of the sample of YLMSM by unprotected anal intercourse**

<table>
<thead>
<tr>
<th>Psychosocial characteristic</th>
<th>UAI (n=157)</th>
<th>No UAI (n=215)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Condom norms (5-25 pts.)</td>
<td>12.1 4.75</td>
<td>12.2 4.28</td>
</tr>
<tr>
<td>Condom self-efficacy (4-20 pts.)*</td>
<td>9.2 3.33</td>
<td>9.9 3.52</td>
</tr>
<tr>
<td>Perceived threat (3-15 pts.)*</td>
<td>10.0 2.40</td>
<td>9.3 2.96</td>
</tr>
<tr>
<td>Alcohol attitudes (4-20 pts.)</td>
<td>11.3 5.30</td>
<td>11.0 5.77</td>
</tr>
</tbody>
</table>

* p<.05. A t-test was used to compare each characteristic by UAI status. Each composite variable is on a 5-point Likert-scale with response options 1 through 5 as “do not agree at all,” “do not agree,” “neutral,” “agree,” and “strongly agree,” respectively. SD = standard deviation; UAI = unprotected anal intercourse with male in past four months.

**HIV infection**

The bivariate associations between HIV infection (based on serologic HIV testing) and individual/sociodemographic, HIV testing, alcohol and drug use, and sexual risk characteristics for the sampled YLMSM are presented in Table 5. Older age, Tijuana residence, and incarceration history were significantly associated with HIV infection. The proportion of older men aged 26 to 30 years who tested positive for HIV infection was approximately 2.4 times greater than their younger counterparts aged 17 to 25 years. The rate of HIV infection among Tijuana men was greater than their San Diego counterparts (53.2% vs. 46.8%, respectively). In addition, there was a higher incarceration rate among men who tested negative for HIV infection compared with those who tested positive.
TABLE 5. Characteristics of the sample of YLMSM by HIV infection

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>HIV+ (n=94)</th>
<th>HIV- (n=278)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual/sociodemographic characteristics</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Age (years)</strong>*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17-25</td>
<td>29.8</td>
<td>57.6</td>
</tr>
<tr>
<td>26-30</td>
<td>70.2</td>
<td>42.5</td>
</tr>
<tr>
<td><strong>Residence</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>San Diego</td>
<td>46.8</td>
<td>28.4</td>
</tr>
<tr>
<td>Tijuana</td>
<td>53.2</td>
<td>71.6</td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; High school</td>
<td>19.2</td>
<td>25.9</td>
</tr>
<tr>
<td>High school graduate</td>
<td>31.9</td>
<td>32.0</td>
</tr>
<tr>
<td>At least some college</td>
<td>48.9</td>
<td>42.1</td>
</tr>
<tr>
<td><strong>Currently in school</strong></td>
<td>12.8</td>
<td>14.0</td>
</tr>
<tr>
<td><strong>Employment, past year</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Full-time</td>
<td>52.1</td>
<td>52.2</td>
</tr>
<tr>
<td>Part-time</td>
<td>33.0</td>
<td>29.9</td>
</tr>
<tr>
<td>Unemployed</td>
<td>23.4</td>
<td>17.6</td>
</tr>
<tr>
<td><strong>Source of income, past 4 months</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employment</td>
<td>78.7</td>
<td>74.8</td>
</tr>
<tr>
<td>Public benefits</td>
<td>5.3</td>
<td>3.2</td>
</tr>
<tr>
<td>School funding</td>
<td>1.1</td>
<td>2.2</td>
</tr>
<tr>
<td>Family/friends</td>
<td>18.1</td>
<td>22.3</td>
</tr>
<tr>
<td>Exchange sex</td>
<td>9.6</td>
<td>14.8</td>
</tr>
<tr>
<td>Other</td>
<td>6.4</td>
<td>8.3</td>
</tr>
<tr>
<td><strong>Living Situation</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ever homeless</td>
<td>48.9</td>
<td>55.1</td>
</tr>
<tr>
<td><strong>Time living in border region</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 1 month</td>
<td>2.1</td>
<td>2.5</td>
</tr>
<tr>
<td>1 month-1 year</td>
<td>14.9</td>
<td>20.5</td>
</tr>
<tr>
<td>1-5 years</td>
<td>35.1</td>
<td>25.5</td>
</tr>
<tr>
<td>&gt; 5 years</td>
<td>47.9</td>
<td>51.4</td>
</tr>
<tr>
<td><strong>Incarceration history</strong></td>
<td>22.6</td>
<td>42.0</td>
</tr>
<tr>
<td><strong>No regular source of healthcare</strong></td>
<td>21.3</td>
<td>28.4</td>
</tr>
<tr>
<td><strong>HIV testing characteristics</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never tested</td>
<td>28.7</td>
<td>48.6</td>
</tr>
<tr>
<td><strong>Likelihood of being HIV</strong>*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Likely</td>
<td>77.7</td>
<td>41.4</td>
</tr>
<tr>
<td>Unlikely</td>
<td>22.3</td>
<td>58.6</td>
</tr>
<tr>
<td><strong>Alcohol and drug use characteristics</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Club drugs during sex</td>
<td>39.4</td>
<td>47.5</td>
</tr>
<tr>
<td>Alcohol during sex</td>
<td>68.1</td>
<td>66.6</td>
</tr>
</tbody>
</table>
In the bivariate associations of HIV testing characteristics by HIV infection, both never testing for HIV and likelihood of being HIV infected were significant correlates of HIV infection (see Table 5). There were greater rates of never testing for HIV among men who tested HIV negative than among men who tested positive (48.6% vs. 28.7%, respectively). A greater proportion of men who tested HIV positive thought it was likely that they were HIV positive than men who tested HIV negative (77.7% vs. 41.4%, respectively).

History of injection drug use was the only significant correlate of HIV infection in the bivariate associations of alcohol and drug use characteristics by HIV infection (see Table 5). Young LMSM who had an injection drug use history had lower rates of HIV infection than YLMSM who did not have an injection drug use history (19.2% vs. 33.8%, respectively).

In the bivariate associations of sexual risk characteristics by HIV infection (see Table 5), significant correlates of HIV infection included female unprotected intercourse, men who have sex with men and women, exchange sex, and STD history. There was 3.4 times less female unprotected intercourse, 1.3 times less men who have sex with men and women, and 1.6 times less exchange sex among YLMSM who tested HIV positive than among YLMSM who tested HIV negative. Young LMSM who tested HIV positive reported higher rates of a past STD compared to those who tested negative.

The bivariate associations of psychosocial characteristics by HIV infection (Table 5) show that there are two significant correlates of HIV infection: perceived threat and alcohol attitudes. Young LMSM who tested positive had higher mean scores for perceived threat compared to those who tested negative, yet also reported on average less negative alcohol attitudes, as reflected by their lower mean scores.

---

9 Based on the literature, it would seem that YLMSM who tested HIV positive would have higher rates of these sexual risk characteristics, but this data showed the opposite.
HIV testing

The bivariate associations between never testing for HIV and individual/sociodemographic, HIV testing, alcohol and drug use, and sexual risk characteristics and are presented in Table 6 below.

**TABLE 6. Characteristics of the sample of YLMSM by never tested for HIV**

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Never tested (n=162) %</th>
<th>Tested (n=210) %</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Individual/sociodemographic characteristics</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age (years)***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17-20</td>
<td>26.5</td>
<td>11.0</td>
</tr>
<tr>
<td>21-25</td>
<td>26.5</td>
<td>37.6</td>
</tr>
<tr>
<td>26-30</td>
<td>46.9</td>
<td>51.4</td>
</tr>
<tr>
<td>Residence***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>San Diego</td>
<td>17.3</td>
<td>45.2</td>
</tr>
<tr>
<td>Tijuana</td>
<td>82.7</td>
<td>54.8</td>
</tr>
<tr>
<td>Education***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; High school</td>
<td>35.8</td>
<td>15.2</td>
</tr>
<tr>
<td>High school graduate</td>
<td>32.7</td>
<td>31.4</td>
</tr>
<tr>
<td>At least some college</td>
<td>31.5</td>
<td>53.3</td>
</tr>
<tr>
<td>Currently in school**</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>8.0</td>
<td>18.1</td>
</tr>
<tr>
<td>Employment, past year</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Full-time**</td>
<td>44.4</td>
<td>58.1</td>
</tr>
<tr>
<td>Part-time</td>
<td>31.5</td>
<td>30.0</td>
</tr>
<tr>
<td>Unemployed</td>
<td>21.0</td>
<td>17.6</td>
</tr>
<tr>
<td>Source of income, past 4 months</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employment</td>
<td>72.2</td>
<td>78.6</td>
</tr>
<tr>
<td>Public benefits*</td>
<td>1.2</td>
<td>5.7</td>
</tr>
<tr>
<td>School funding</td>
<td>0.0</td>
<td>3.3</td>
</tr>
<tr>
<td>Family/friends</td>
<td>19.8</td>
<td>22.4</td>
</tr>
<tr>
<td>Exchange sex**</td>
<td>21.0</td>
<td>7.6</td>
</tr>
<tr>
<td>Other</td>
<td>10.5</td>
<td>5.7</td>
</tr>
<tr>
<td>Living Situation***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ever homeless</td>
<td>67.7</td>
<td>42.6</td>
</tr>
<tr>
<td>Time living in border region</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 1 month</td>
<td>1.9</td>
<td>2.9</td>
</tr>
<tr>
<td>1 month-1 year</td>
<td>19.8</td>
<td>18.6</td>
</tr>
<tr>
<td>1-5 years</td>
<td>29.0</td>
<td>27.1</td>
</tr>
<tr>
<td>&gt; 5 years</td>
<td>40.4</td>
<td>51.4</td>
</tr>
<tr>
<td>Ever incarceration***</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>48.1</td>
<td>28.7</td>
</tr>
<tr>
<td>No regular source of healthcare*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HIV testing characteristics</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Likelihood of being HIV+**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Very likely</td>
<td>11.7</td>
<td>24.3</td>
</tr>
</tbody>
</table>
In the bivariate associations between sexual risk characteristics and never testing for HIV (Table 6), female unprotected intercourse, men who have sex with men and women, exchange sex, and unprotected anal intercourse were significantly associated with never testing. There were higher rates of the following sexual risk characteristics in YLMSM who never tested compared to those who tested: female unprotected intercourse, men who have sex with men and women, and exchange sex. Young LMSM who never tested, however, had lower rates of male unprotected intercourse compared with those who had tested.

TABLE 7. Psychosocial variables of the sample of YLMSM by never tested for HIV

<table>
<thead>
<tr>
<th>Psychosocial characteristics</th>
<th>Never tested (n=162)</th>
<th>Tested (n=210)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Condom norms (5-25 pts.)</td>
<td>2.3 1.64</td>
<td>11.6 4.37</td>
</tr>
<tr>
<td>Condom self-efficacy (4-20 pts.)**</td>
<td>10.2 3.45</td>
<td>9.2 3.40</td>
</tr>
<tr>
<td>Perceived threat (3-15 pts.)</td>
<td>9.5 2.61</td>
<td>9.7 2.87</td>
</tr>
<tr>
<td>Alcohol attitudes (4-20 pts.)**</td>
<td>12.1 5.59</td>
<td>10.4 5.45</td>
</tr>
</tbody>
</table>

* p<.05, ** p<.01, *** p<.001. A χ²-test was used to compare each characteristic by HIV testing status. HIV+ = HIV positive; IDU = injection drug use; UI = unprotected intercourse; MSMW = men who have sex with men and women; STD = sexually transmitted disease.
In the bivariate associations between psychosocial characteristics and never for HIV testing, condom self-efficacy and alcohol attitudes were the only two significant correlates of never testing for HIV (see Table 7 above). Young LMSM who never tested compared with those who had tested had higher mean scores for condom self-efficacy and alcohol attitudes, both reflecting higher risk for HIV.

**Multivariate Analysis for Each Outcome**

This third section reports multivariate analyses of the characteristics that were significant (p<.05) covariates of an outcome in unadjusted models. Each of these characteristics is entered in their respective regression model. As examples, residence, exchange sex income, homelessness, and incarceration were entered in the individual/sociodemographic model\(^{10}\) for the unprotected anal intercourse outcome; condom self-efficacy and perceived threat were entered in the psychosocial model\(^{11}\) of the unprotected anal intercourse outcome.

Select characteristics that are significant predictors within their set of characteristics (e.g., individual/sociodemographic, psychosocial, HIV testing, alcohol and drug use, and sexual risk behavior) will be discussed; for example, only the *HIV testing characteristics* that were significant predictors in the *HIV testing model*\(^{12}\) of the outcome of interest will be discussed. Lastly, there will be no discussion of ‘final models,’ since the focus is on examining the relationship between key independent variables and the outcome of interest after adjusting for certain characteristics.

**Unprotected anal intercourse**

The results of the regression analysis for unprotected anal intercourse\(^{13}\) are shown in Table 8. In the individual/sociodemographic model, residence and income from exchange sex\(^{14}\) were the only two significant predictors of unprotected anal intercourse. For YLMSM living in Mexico the odds of engaging in unprotected anal intercourse were 77% (OR=0.23; 95% CI=0.13, 0.40) lower than the odds for YLMSM living in San Diego, after adjusting for other covariates. The odds of unprotected anal sex for YLMSM who reported income from exchange sex were 306% (OR=4.06; 95% CI=2.05, 8.06) greater than YLMSM who did not report this type of income, after adjusting for other covariates.

The psychosocial model was used to attempt to answer the first of three research questions: “To what extent do psychosocial characteristics independent from individual/sociodemographic characteristics predict unprotected anal intercourse?” In the psychosocial model, perceived threat was a significant predictor of unprotected anal intercourse after adjusting for other covariates. For every point increase in mean score for perceived threat, the odds of unprotected anal intercourse increased 14% (OR=1.14; 95% CI=1.04, 1.24) for YLMSM after adjusting for other covariates.

---

10 “Individual/sociodemographic model” refers to the model where individual/sociodemographic independent measures are entered.
11 “Psychosocial model” refers to the model where psychosocial characteristics are entered.
12 “HIV testing model” refers to the model where HIV testing characteristics are entered.
13 Unprotected anal intercourse in the past 4 months.
14 Income from exchange sex as an individual/sociodemographic characteristic is not to be confused with exchange sex as a sexual risk behavior.
In the HIV testing model, which is adjusted for psychosocial and individual/sociodemographic characteristics, never testing for HIV did not predict unprotected anal intercourse for YLMSM. Similarly, the alcohol and drug use model contained no alcohol and drug use variables that were significant predictors. In the following sexual risk behavior model, exchange sex\textsuperscript{15} and STD history were significant predictors of unprotected anal intercourse after adjusting for other covariates.

\textbf{TABLE 8. Regression analysis of unprotected anal intercourse}

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Individual/ Sociodemographic</th>
<th>Psychosocial Testing</th>
<th>Alcohol and drug use</th>
<th>Sexual risk behavior</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OR (95% CI)</td>
<td>OR (95% CI)</td>
<td>OR (95% CI)</td>
<td>OR (95% CI)</td>
</tr>
<tr>
<td>Aged 17-20 years\textsuperscript{a}</td>
<td>1.26 (0.66, 2.38)</td>
<td>1.42 (0.75, 2.69)</td>
<td>1.47 (0.77, 2.81)</td>
<td>1.37 (0.71, 2.64)</td>
</tr>
<tr>
<td>Aged 21-25 years\textsuperscript{a}</td>
<td>0.71 (0.42, 1.20)</td>
<td>0.75 (0.45, 1.27)</td>
<td>0.74 (0.44, 1.25)</td>
<td>0.74 (0.44, 1.25)</td>
</tr>
<tr>
<td>Tijuana residence</td>
<td>0.23* (0.13, 0.40)</td>
<td>0.16* (0.10, 0.28)</td>
<td>0.17* (0.10, 0.29)</td>
<td>0.17* (0.10, 0.30)</td>
</tr>
<tr>
<td>Income from exchange sex</td>
<td>4.06* (2.05, 8.06)</td>
<td>3.82* (1.96, 7.43)</td>
<td>3.96* (2.03, 7.73)</td>
<td>3.86* (1.98, 7.53)</td>
</tr>
<tr>
<td>Homeless history</td>
<td>1.08 (0.62, 1.89)</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Incarceration history</td>
<td>1.55 (0.86, 2.79)</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>No regular source of health care</td>
<td>1.30 (0.78, 2.19)</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Condom self-efficacy\textsuperscript{b}</td>
<td>-</td>
<td>1.00 (0.93, 1.07)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Perceived threat\textsuperscript{b}</td>
<td>-</td>
<td>1.14* (1.04, 1.24)</td>
<td>1.13* (1.04, 1.24)</td>
<td>1.14* (1.04, 1.24)</td>
</tr>
<tr>
<td>HIV testing</td>
<td>Never tested</td>
<td>-</td>
<td>0.80 (0.49, 1.31)</td>
<td>-</td>
</tr>
</tbody>
</table>

\textsuperscript{15} Exchange sex as a sexual risk behavior is different than exchange sex income as an individual/sociodemographic characteristic.
HIV infection

The results of the multivariate regression analysis for HIV infection\(^{16}\) are presented in Table 9. The significant individual/sociodemographic predictors of HIV infection included age and incarceration. Young LMSM who had a history of incarceration, compared with those who did not, had 159% (OR=2.59; 95% CI=1.39, 4.82) greater odds of having HIV infection, after adjusting for other covariates. Perceived threat was the only psychosocial characteristic that was a significant predictor of HIV infection after adjusting for individual/sociodemographic characteristics.

The following model with HIV testing characteristics addresses the second research question; “To what extent do HIV testing characteristics independently from psychosocial and individual/sociodemographic characteristics predict HIV infection?” The model suggests that HIV characteristics, specifically likelihood of being HIV infected\(^{17}\), predict HIV infection after adjusting for individual/sociodemographic and psychosocial characteristics. Specifically, YLMSM who thought it was likely that they were HIV positive had 403% (OR=5.03; 95% CI=2.80, 9.06) greater odds of having HIV infection compared with YLMSM who thought it was unlikely that they were HIV positive, after adjusting for other variables.

In the next alcohol and drug use model, YLMSM with an injection drug use history had 60% (OR=0.40; 95% CI=0.19, 0.84) lower odds of having HIV infection than those without an injection drug use history, after controlling for other covariates. Lastly, the sexual risk behavior model shows that female unprotected intercourse and STD history were significant predictors of HIV infection, after adjusting for other covariates. Likelihood of being HIV positive and age

\(^{16}\) HIV infection refers to an HIV serologic positive test, which was done as part of the original study.

\(^{17}\) Participants’ were asked to gauge how likely it is that they are HIV positive.
were the only other non-sexual risk behavior characteristics that remained as significant predictors of HIV infection. Young LMSM who reported an STD history had 113% (OR=2.13; 95% CI=1.16, 3.92) greater odds of having HIV infection compared to those who reported no STD history, after adjusting for other variables.

### TABLE 9. Regression analysis of HIV infection

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Models</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Individual/Socio-demographic</td>
</tr>
<tr>
<td></td>
<td>OR (95% CI)</td>
</tr>
<tr>
<td>Individual/Socio-demographic</td>
<td></td>
</tr>
<tr>
<td>Aged 17-25 yearsa</td>
<td>0.30* (0.16, 0.51)</td>
</tr>
<tr>
<td>Tijuana residence</td>
<td>0.86 (0.49, 1.51)</td>
</tr>
<tr>
<td>Incarceration history</td>
<td>2.59* (1.39, 4.82)</td>
</tr>
<tr>
<td>Psychosocial</td>
<td></td>
</tr>
<tr>
<td>Condom normsb</td>
<td>–</td>
</tr>
<tr>
<td>Perceived threatb</td>
<td>–</td>
</tr>
<tr>
<td>Alcohol attitudesb</td>
<td>–</td>
</tr>
<tr>
<td>HIV testing</td>
<td></td>
</tr>
<tr>
<td>Never tested</td>
<td>–</td>
</tr>
<tr>
<td>Likelihood HIV positive</td>
<td>–</td>
</tr>
<tr>
<td>Alcohol and drug use</td>
<td></td>
</tr>
<tr>
<td>IDU history</td>
<td>–</td>
</tr>
<tr>
<td>Sexual risk behavior</td>
<td></td>
</tr>
<tr>
<td>Female UI, past 4 mos.</td>
<td>–</td>
</tr>
<tr>
<td>MSMW history</td>
<td>–</td>
</tr>
<tr>
<td>Exchange sex, past 4 months</td>
<td>–</td>
</tr>
</tbody>
</table>
HIV testing

The results of the multivariate regression analysis for never testing for HIV are presented in Table 10. The individual/sociodemographic characteristics\(^{18}\) that were significant predictors of never testing for HIV included Tijuana residence, education, and no regular source of health care. The odds of never testing for HIV for Tijuana YLMSM were 137% (OR=2.37; 95% CI=1.28, 4.40) greater compared to San Diego YLMSM, after adjusting for other covariates.

**TABLE 10. Regression analysis of never testing for HIV**

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Individual/ Socio-demographic</th>
<th>Psychosocial Testing</th>
<th>Alcohol and drug use</th>
<th>Sexual risk behavior</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OR (95% CI)</td>
<td>OR (95% CI)</td>
<td>OR (95% CI)</td>
<td>OR (95% CI)</td>
</tr>
<tr>
<td>STD history</td>
<td>―</td>
<td>―</td>
<td>―</td>
<td>―</td>
</tr>
<tr>
<td></td>
<td>2.13* (1.16, 3.92)</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

\(^{18}\) As previously discussed, the continuous form of the age variable was used, since it was linearly associated with this outcome. The literature contains sufficient empirical evidence to keep age in all the models of never testing for HIV, despite its lack of statistical significance in its association with never testing for HIV.
<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Individual/Socio-demographic</th>
<th>Psychosocial</th>
<th>Testing</th>
<th>Alcohol and drug use</th>
<th>Sexual risk behavior</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OR (95% CI)</td>
<td>OR (95% CI)</td>
<td>OR (95% CI)</td>
<td>OR (95% CI)</td>
<td>OR (95% CI)</td>
</tr>
<tr>
<td>Income from public benefits</td>
<td>0.26 (0.05, 1.27)</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Income from exchange sex</td>
<td>1.55 (0.77, 3.13)</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Homeless history</td>
<td>0.66 (0.37, 1.17)</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Incarceration history</td>
<td>0.97 (0.55, 1.73)</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>No regular source of health care</td>
<td>1.82* (1.07, 3.14)</td>
<td>1.99* (1.18, 3.34)</td>
<td>1.87* (1.10, 3.18)</td>
<td>1.74* (1.01, 2.99)</td>
<td>1.83* (1.07, 3.14)</td>
</tr>
<tr>
<td><strong>Psychosocial</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Condom self-efficacy(^a)</td>
<td>–</td>
<td>1.01</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Alcohol attitudes(^a)</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td></td>
<td>(0.94, 1.08)</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>1.04</td>
<td></td>
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<td></td>
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<td></td>
</tr>
<tr>
<td><strong>HIV testing</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Likelihood HIV positive(^b)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Very likely</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>0.21* (0.09, 0.46)</td>
<td>0.17* (0.08, 0.38)</td>
</tr>
<tr>
<td>Likely</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>0.40* (0.21, 0.78)</td>
<td>0.37* (0.19, 0.72)</td>
</tr>
<tr>
<td>Unlikely</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>0.37* (0.19, 0.73)</td>
<td>0.38* (0.20, 0.74)</td>
</tr>
<tr>
<td>HIV infection</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>0.66</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(0.36, 1.20)</td>
<td></td>
</tr>
<tr>
<td><strong>Alcohol and drug</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IDU history</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>1.63 (0.95, 2.81)</td>
</tr>
<tr>
<td><strong>Sexual risk</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female UI, past 4 months</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>MSMW history</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Exchange sex, past 4 months</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>STD history</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>UAI, past 4 months</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
</tbody>
</table>
Models

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Individual/Socio-demographic</th>
<th>Psychosocial</th>
<th>Testing</th>
<th>Alcohol and drug use</th>
<th>Sexual risk behavior</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OR (95% CI)</td>
<td>OR (95% CI)</td>
<td>OR (95% CI)</td>
<td>OR (95% CI)</td>
<td>OR (95% CI)</td>
</tr>
</tbody>
</table>

95% CI = 95% confidence interval; IDU = injection drug use; MSMW = men who have sex with men and women; OR = odds ratio; STD = sexually transmitted disease; UAI = unprotected anal intercourse; UI = unprotected intercourse. * Continuous variable, *Reference category is “not possible,” * Bold values for OR indicate p<.05.

The psychosocial model attempted to answer the last of the three research questions: “To what extent do psychosocial characteristics independent from individual/sociodemographic characteristics predict never testing for HIV?” There were no significant predictors of never tested for HIV after controlling for other covariates in this model.

In the following HIV testing model, all three indicator variables for the likelihood of being HIV positive measure (“not possible” was the reference category) were significant predictors of never being tested for HIV, after adjusting for psychosocial and injection drug use variables. In general, YLMSM who thought that there was no likelihood of being HIV positive were more likely to have never tested compared to those who thought it was unlikely, likely, or very likely of being HIV positive.

The subsequent alcohol and drug use, and sexual risk behavior models had no alcohol and drug use and sexual risk behavior variables, respectively, that were significant predictors of never testing for HIV.
CHAPTER 6

DISCUSSION

This secondary analysis of data had two primary research objectives. First was investigating patterns of sociodemographic, psychosocial, HIV testing, alcohol and drug use, and sexual risk behavior characteristics among young Latino men who have sex with men (many whom have sex with women) living in the San Diego-Tijuana border region. Second, was assessing how well the above characteristics predicted unprotected anal intercourse, HIV infection, and HIV testing among the study sample. This study represents a first effort to describe and analyze HIV seroprevalence and HIV risk behavior among YLMSM residing in the U.S.-Mexico border region, an understudied population with unique risks that are not well understood. The other unique aspect of this study is that about three-fourths of the sampled YLMSM reported having sex with both men and women unlike most other studies of Latino MSM (Fernandez, Perrino, Bowen, Royal, & Varga, 2003; Harawa et al., 2004). HIV risk becomes a concern for both these young men and their female partners.

Study Findings

The study showed a high rate of HIV infection and unprotected anal intercourse among YLMSM. For instance, 25% tested positive for HIV and more than 40% reported having unprotected anal intercourse with a male. Of those who reported having sex with men and women, more than half reported engaging in unprotected intercourse. These rates of HIV infection and male unprotected anal intercourse are high relative to other studies of MSM (MacKellar et al., 2007; Newman, Rhodes, & Weiss, 2004), but are comparable to a few Latino MSM studies (Díaz, Ayala, & Bein, 2004; Ramirez-Valles, Garcia, Campbell, Diaz, & Heckathorn, 2008). Findings from the multivariate analysis showed that being young, having an incarceration history, and self-reported likelihood of being infected were the strongest predictors of HIV infection, while San Diego residence and income from exchange sex were the strongest predictors of unprotected anal intercourse.

There were also some important HIV risk profile differences by city of residence. Some characteristics that distinguish Tijuana from San Diego YLMSM were low socioeconomic status (e.g., low level of education), higher rates of incarceration, injection drug use, and sex with men and women. Almost 90% of the Tijuana sample reported sex with men and women as compared to 50% of the San Diego sample. Other Latino MSM HIV studies have not reported such high rates of sex with men and women as seen in this study. Perhaps there are cultural and gender factors in Tijuana that pressures these YLMSM to continue to engage in sex with females, while allowing San Diego men to have relationships with men exclusively (Diaz, 1998). Despite the lower socioeconomic status of Tijuana YLMSM, they reported significantly higher levels of access to a regular source of healthcare than San Diego YLMSM. The latter could be attributed to the different health care system in Mexico compared to the United States. All citizens of Mexico, even the most indigent, can access health services through the public clinic system administered by the Ministry of Health (Magis-Rodríguez et al., 2004).

While one would expect to see higher rates of HIV infection among Tijuana YLMSM based on their higher HIV risk profile, San Diego YLMSM had a 15% higher infection rate. This difference is likely due to higher rates of male unprotected anal intercourse reported by San Diego YLMSM. San Diego residence was one of the strongest predictors of unprotected anal
intercourse. According to the literature, unprotected anal intercourse is one of the strongest risk factors for HIV infection among MSM (Harawa et al., 2004; Koblin et al., 2006).

In addition, this difference in HIV infection and unprotected anal intercourse by residence could be attributed to there being a stronger and more visible gay community in San Diego than Tijuana has (Carillo, Fontdevila, Browne, & Gómez, 2008). San Diego has more gay organizations (including the San Diego Lesbian, Gay, Bisexual, and Transgender Center and Bienestar) and venues (bars, nightclubs, and bathhouses) than in Tijuana. Therefore, there are more opportunities for YLMSM to engage in sexual relationships, including unprotected anal intercourse, with other men.

Another finding that stands out from this study is the high rates of never testing for HIV. Over 40% of the total sample had never tested prior to the study, which is of great concern considering that HIV testing is a critical step in raising awareness of one’s HIV status. Young Latino MSM who are unaware of their HIV infection continue to engage in unprotected sex, and place themselves and their partners at risk for HIV infection (MacKellar et al., 2005). The current HIV epidemic among Latino MSM is in large part due to low rates of HIV testing (Marks et al., 2008).

In the multivariate analysis, Tijuana residence and no access to care were some of the strongest predictors of never testing for HIV. Among Tijuana men, however, the study findings show low testing rates in spite of reporting greater access to care. This finding is contrary to previous findings that show access to care as a predictor of greater levels of testing (Apostolopoulos et al., 2006; Fernandez et al., 2003). It is possible that the health system in Mexico, which is made available to all citizens, does not include access to adequate testing. This remains an empirical question deserving of further attention.

Limitations

Like all secondary analysis, the scope of the present study was limited in part by the original study and data available. One limitation was the small sample size, especially for the San Diego sample (n=123). This limitation provided comparatively little statistical power, and generated wide confidence intervals around odds ratios, precluding detection of potentially meaningful relationships. Additionally, the venue-based sampling strategy used in the original study may have lead to selection bias. Non-gay identified YLMSM are less likely to attend gay venues leading to overestimates of actual risky sexual and drug using behaviors. Studies indicate that HIV prevalence and risk behaviors among MSM who do not frequent gay venues are lower than MSM who do (Goldbaum et al., 1998; Xia et al., 2006b).

Selection bias may also explain some of the differences seen between Tijuana and San Diego YLMSM. The effects of location could have played a role in the results of the study. For example, the majority of Tijuana participants were primarily recruited from “street-based” areas (e.g., cruising sites) where exchange sex may be more common as compared to “venue-based” areas (e.g., gay bars and clubs), where most of the recruitment took place for San Diego participants. Location could also have played a role in some of the unexpected findings.

Location or place of residence could make associations appear significant when in fact they are nonsignificant, commonly referred to as confounding (Katz, 2006). For instance, the present study found that in an unadjusted model lower rates of incarceration history were associated with higher rates of unprotected anal intercourse. This finding was reversed in the multivariate model that adjusted for place of residence indicating that that place of residence does matter. Lower
rates of incarceration now predicted higher lower rates of unprotected anal intercourse after adjusting for place of residence.

The method in which less informative responses (e.g., “missing” responses) were handled may have contributed to inaccurate measurement of certain characteristics for the sampled YLMSM. Every attempt was made to recode less informative responses into response categories that reflected the lowest level of HIV risk. However, this coding scheme may have led to misclassification. For example, maybe the two participants with missing responses to the question about past injection drug use really did in fact engage in injection drug use. Misclassification would occur since the responses to these two participants were recoded as “no” responses. Utilizing this recoding scheme consistently, citing past studies as empirical support, and applying the recoding scheme to survey items with a few missing responses were all deliberate steps taken to strengthen the study’s research methodology.

The issue is whether or not it was appropriate to recode missing responses to “no” responses. It difficult to know for sure what these respondents answers would have truly been if they had actually provided a response. Comparing the analysis of the data with the missing responses versus the “no” responses could of been a way to determine if there would be any significant changes in the results of the study. Finally, another way of handling missing values is imputation. Imputation is essentially a way of assigning a value to a missing value before conducting an analysis (Jewell, 2004).

The psychosocial construct measures were created based on groupings of related survey questions. However, this study did not provide validation for these psychosocial construct measures.

Future Studies

Future studies with more representative multisite sampling methods, especially on opposite sides of a border region, should pay careful attention that uniform sampling strategies are employed in order to minimize selection bias. Future studies will also benefit from obtaining larger samples that will allow for an examination of YLMSM by city of residence.

Future studies with larger samples should consider multivariate models that adjust for place of residence in multivariate models. Adjusting for place of residence might provide insight into the associations between certain variables of interest. For example, one might come to a certain conclusion from an unadjusted model of a particular outcome, but after adjusting for a third key variable the association may change. With a sufficiently large sample size, uniform sampling strategies, and adjustment for certain key variables, researchers will gain addition knowledge regarding how different types of risk factors, predictors, and overall disease dynamics differ by city of residence.

Based on the ecological framework of HIV infection and previous HIV studies of YMSM populations, HIV risk among YLMSM is the result of individual, cultural, community, societal, and policy-level risk factors (Díaz, 1998; Harawa et al., 2004; Organista, 2007; Poundstone, Strathdee, & Celentano, 2004; Suarez & Miller, 2001). The study by Carillo, Fontdevila, Brown, and Gómez (2008) is an example of a study that attempts to incorporate an ecological framework by exploring the sexual contexts of HIV risk among LMSM living in the San Diego-Tijuana border region. The authors of this qualitative study have identified complex factors, such as the migratory experience, acculturation, and economic and immigration policies, that directly contribute to YLMSM risk for HIV. The current study corroborated Carillo et al. (2008) by finding high rates of unprotected anal intercourse, HIV infection, men who have sex with men
and women, and low rates of HIV testing among YLMSM living in the San Diego-Tijuana border region.

Future studies should explore YLMSM HIV risk using the ecological framework. This study provides a critical first step for an ecological framework by providing an epidemiologic profile for a population (YLMSM living in the San Diego-Tijuana border region) that has never been studied before. Along the lines of an ecological framework, future studies may want to look at how policies (such as migration and health care) on both sides of the border affect HIV risk among YLMSM.

Implications for Public Health Practice

The biggest question that the present study raises for public health practitioners is, how can prevention campaigns reduce unprotected anal intercourse and increase HIV testing rates among YLMSM living in the border region? It is disconcerting that such a large proportion of YLMSM participants in this study had never tested for HIV given their high rates of risk behaviors, HIV infection, and high rates of sex with men and women. Regular HIV testing has been shown to reduce HIV risk behaviors among YMSM populations (Fernandez et al., 2003; Grov et al., 2007; MacKellar et al., 2006; Mikolajczak, Hospers, & Kok, 2006; Weinhardt, Carey, Johnson, & Bickham, 1999). In addition, regular testing offers the opportunity for providers to facilitate awareness of risky sexual behavior, safe sexual practices, proper condom use, and to discuss strategies for risk reduction with YLMSM.

Related to the critical issue of raising awareness among YLMSM, another question is how are public health practitioners are going to tailor the HIV prevention messages for these young men who have unusually high rates of sex with both men and women? A significant challenge facing public health practitioners is that young men who have sex with both men and women are much harder to reach than the gay community, which is particularly true for the Tijuana men.

HIV prevention campaigns should double their efforts to deliver culturally, linguistically, gender and sexual lifestyle appropriate messages that reach a hidden population. YLMSM need to know that HIV is a threat to their health if they continue to engage in unprotected anal intercourse and other HIV risk behaviors. The challenge is delivering consistent HIV prevention messages to a population that is, to a large degree, mobile, young, engages in survival exchange sex, is street-based and reports sex with both men and women from the opposite sides of the border. Street-based YLMSM in this border region, often encounter violence, homophobia, drugs, and homelessness. Some of these men engage in alcohol and drug use to cope with the high demands (e.g., emotional and physical) and increased stress levels from extreme living conditions.

In this day of ever decreasing budgets for health prevention, it is necessary and important that public health practitioners work collaboratively, share resources, and continue to raise awareness of HIV’s devastating effect on the health of young men on both sides of the border region.

Conclusion

This HIV seroprevalence and risk behavior study provides compelling evidence that the control of the HIV epidemic in the San Diego-Tijuana border region must include primary and secondary HIV prevention efforts directed at YLMSM. Collaborative interventions must include increased access to HIV testing coupled with effective linkages to care and treatment services for
those receiving an HIV positive test result. Early diagnosis through HIV testing has beneficial effects for both the individual and society. Not only does HIV testing improve clinical outcomes for individuals with HIV infection, but it also decreases the viral loads of those individuals with HIV infection.

There is an urgent need for HIV interventions to address unprotected anal intercourse, low HIV testing rates and high HIV seroprevalence rates among YLMSM in US—Mexico border region. These HIV interventions must be empirically-based, culturally and linguistically appropriate, and address the social context of HIV risk (Harawa, Bingham, Cochran, Greenland, & Cunningham, 2002). Lastly, HIV interventions should include assessment of sociodemographic factors, psychosocial factors, and alcohol and drug use in order to effectively address HIV and associated factors that directly contribute to HIV risk. YLMSM continue to engage in high rates of unprotected anal intercourse putting themselves at risk for HIV infection.
References


