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Using the Social Ecological Model to understand the contextual factors associated with HIV risk in commercial sex workers at high risk for contracting HIV

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by

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2008

DEDICATION

For my family…old and new

"The effect of mass migration has been the
creation of radically new types of human beings;
people who root themselves in ideas rather than places,
in memories as much as material things;
people who have been obliged to define themselves…by their otherness;
people in whose deepest selves strange fusions occur,
unprecedented unions between what they are and where they find themselves.
Migrant[s] suspect reality: having experienced several ways of being,
[they understand] their illusionary nature"

-- Salmon Rushdie

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ABSTRACT OF THE DISSERTATION

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Doctor of Philosophy in Clinical Psychology

University of California, San Diego, 2008

San Diego State University, 2008

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Sexually transmitted infections (STIs) and HIV infection are increasing at an alarming rate in Mexico (United Nations Program on AIDS [UNAIDS], 2006). Female sex workers (FSWs) are one of the groups affected by the increase in HIV prevalence in Mexico. Early surveillance of FSWs found seroprevalence rates of 4.8% in Tijuana and 4.9% in Ciudad Juarez, Mexico (Patterson et al., 2006b), while the most recent study of FSWs from these two cities found a seroprevalence rate of 6% (Strathdee et al, in press). Prevention efforts that are culturally sensitive and

appropriately tailored are needed to stem the rise of HIV in this high-risk population.

The current study examined the applicability of the Social Ecological model for HIV prevention in a sample of female sex workers (FSWs) (N=472) participating in a safe sex counseling intervention in Tijuana, Mexico. Within the framework of the Social Ecological Model we explored differential predictors of condom use by comparing women who work in bar settings to those who work on the street hypothesizing that there would be differences across venue (bar vs street) with higher condom use in bar workers. Baseline models were established using path analysis in bar (N=233); (CFI= .890, RMSEA =.062) and street workers (N=203); (CFI =.928, RMSEA = .040). For bar workers individual level factors, (self-efficacy, condom use beliefs, alcohol use before sex) and institutional level factors (condom access) were directly and indirectly related to condom use, while in street workers interpersonal level factors (social support, previous abuse, client power) and drug use were the most important factors associated with condom use. Multiple group partial structural invariance was then performed comparing street workers (N=79) to bar workers (N=103) on the 5 paths that their baseline models shared, showing that these paths were invariant across groups ($\Delta\chi^2(5) = 6.30$). Multiple group comparisons found similarities between the bar and street workers, including the relationship between self-efficacy and condom use. Baseline model comparisons found differences including the type of substance used before sex, and the relationship between monetary incentives for unprotected sex and condom use self-efficacy, supporting the need for the tailoring of interventions for women based on location of their sex work.

CHAPTER 1

INTRODUCTION

In 2005 an estimated 38.6 million people worldwide were living with HIV, an estimated 4.1 million became newly infected with HIV and an estimated 2.8 million lost their lives to AIDS (UNAIDS, 2006). The AIDS epidemic is not abating. Although antiretroviral medications have stabilized the growth of the epidemic in certain parts of the world, residents of developing countries are still at an increased risk of HIV/AIDS.

Commercial sex workers represent an important potential source of HIV infection. Female Sex Workers (FSWs) in various parts of the world have been found to have high rates of sexually transmitted infections and HIV. A recent report by the Joint United Nations Program on AIDS (UNAIDS) noted that sex workers were one of four "at risk and neglected" populations (2006). These at risk populations, which include sex workers, men who have sex with men, injecting drug users, and prisoners, tend to have a higher prevalence of HIV infection when compared to that of the general population because they engage in behaviors that put them at higher risk of becoming infected including sharing injection equipment and having unprotected sex (Beltrami, Shouse, & Blake, 2005; Simooya, Sanjobo, & Sichilima, 1995). Marginalization and discrimination are also important factors that play a role in the increased risk of HIV found in these neglected populations (Agha & Nchima, 2004). Despite the need, there is a dearth of resources devoted to HIV prevention, treatment and care are in these high risk groups (UNAIDS, 2006).

Sex Workers' Rates of HIV Infection

It is difficult to measure the prevalence of HIV among sex workers and clients, partly because it is almost impossible to identify how many people in any one country sell or buy sex and how many of these have HIV (Vandepitte, et al., 2006). Commercial sex is frequently clandestine, sex workers and clients are often mobile, and many people sell sex only occasionally and away from recognizable commercial sex settings (Carael, Slaymaker, Lyerla, & Sarkar, 2006). In general, research suggests high rates of sexually transmitted infections among sex workers around the world. In Asia, a high proportion of new HIV infections are attributed to paid sex (in Thailand approximately 18%), and a relatively high HIV prevalence has been found among sex workers in Asia and Latin America, (10% prevalence of HIV in brothel- based female sex workers in India, as high as 6.3% in Latin America); (Gouws, White, Stover, & Brown, 2006; Sarkar, Bal, Mukherjee, Niyogi, & Bhattacharya, 2005; UNAIDS Latin America Regional Profile, 2006). In major urban areas of sub-Saharan Africa, HIV prevalence among female sex workers has been reported at levels as high as 73% in Ethiopia, 68% in Zambia, 50% in Ghana and South Africa, 40% in Benin, 31% in Cote d'Ivoire, 27% in Djibouti and Kenya, and 23% in Mali (UNAIDS, 2006). Around the world, HIV prevalence has been high in the FSW population, highlighting the need for appropriate prevention programs targeting FSWs and their clients.

Women who are involved in sex work may have several risk factors for acquiring HIV including unprotected sex with clients, unprotected sex with partners, and injection drug use. Substance abuse has been highly associated with sex work (Plant, 1990) and research examining sex workers and substance use in the United

States found that sex workers report more injection drug use and higher rates of needle sharing (Paone, Cooper, Alperren, Shi, & Des Jalais, 1999). Social factors, including stigma and discrimination, are also important in defining the increased risk of HIV found in this population. Oppressive situations, where women feel incapable of asserting power over their environment, can reduce the likelihood of condom use while the stigma associated with being a "sex worker" can also contribute to their increased risk. If women do not have the ability to initiate safer sexual behaviors or access primary healthcare because of worry associated with their profession, they will be at an increased risk for contracting HIV (Newman, 2003).

HIV/AIDS in Mexico

Sexually transmitted infections (STIs) and HIV infection are increasing at an alarming rate in Mexico. The number of reported AIDS cases in Mexico has almost quadrupled in the past ten years, increasing from 25,746 reported cases in 1995 to 180,000 cases through 2005 (UNAIDS, 2006). Almost 60% of all recently diagnosed cases were a result of heterosexual transmission. It is important to understand the role prostitution can play in this trend. Qualitative studies exploring condom use among female sex workers in Mexico found the women to have overall negative attitudes towards condoms and a combination of monetary reinforcement and personal barriers to condom use with clients (Bucardo, Semple, Fraga-Vallejo, Davila, & Patterson, 2004). High prevalence of STIs, including HIV, have been reported among female sex workers in Mexico. A recent study in Tijuana found that HIV rates among female sex workers have been found to range between 5-8%, while the lifetime prevalence of syphilis was found as high as 31% (Patterson, et al., 2006a). Unprotected sex with

FSWs may increase an individual's risk for acquiring HIV or other STIs. Understanding how culture interacts with sexual behavior is important to help inform the development of appropriate interventions to prevent the further transmission of HIV and other STIs in Mexico.

Patronizing of FSW's is high among Hispanics and tolerated within the community (Bronfman, Leyva, Negroni, & Rueda, 2002). A recent study among Hispanic immigrants in North Carolina found that 28% of respondents reported using the services of a female sex worker during the previous year (Parrado, Flippen, & McQuiston, 2004). In Mexico City, studies have found approximately 6% of men aged 15–24 years reported having their first sexual intercourse with a FSW (Hernandez-Giron, Cruz-Valdez, Quiterio-Trenado, Peruga, & Hernandez-Avila, 1999) but the proportion of men who have been clients of FSW during their lifetime is undoubtedly higher (Del Rio, & Sepulveda, 2002). A recent study exploring HIV risk factors in Mexican migrants and immigrants traveling through Tijuana found high rates of unprotected sex with FSW's among those returning to Mexico voluntarily from the US, with an estimated 22.2% of the subjects who had vaginal sex with prostitutes (n=145) reporting unprotected sex (Rangel et al., 2006). Condom use with regular and non-regular partners was explored in different geographic contexts, including the sending communities in Mexico, the receiving communities in the United States (US), and the Mexican North border region. The proportion of unprotected vaginal sex with regular partners ranged from 75.4% to 85.5% with substantially higher rates of vaginal sex with multiple sexual partners

among Mexican migrants and immigrants in the Mexican border region and in the US. Among them, the percentage that had unprotected sex with both types of partners ranged from 33.3% and 47.3% in the US to 91.9% in the Mexican border region (Rangel et al., 2006). Clients of sex workers in Tijuana may be more likely to have unprotected sex with multiple partners including FSWs, increasing the risk for HIV/STI for them and their partners.

In border regions of Mexico, patronization of prostitutes is not limited to the dominant population. A study of female sex workers in Tijuana found that while 100% reported having Mexican clients in the previous two months a majority of the sample (76%) also reported having foreign clients, of which 84% were American (Bucardo et al., 2004). Borders cannot stop HIV. Americans crossing into Mexico to have unprotected sex with prostitutes are at risk for contracting HIV and returning back to the United States making the prevention of HIV in Mexican prostitutes a border health issue and a priority for both the United States and Mexican health authorities. FSW's are also vulnerable to infection from unprotected sex with clients traveling from the United States where the HIV prevalence is higher among the general population (UNAIDS, 2006). Increasing condom use among FSW's in Mexico can help slow the spread of HIV in Mexico and in the United States.

Tijuana

With a population of over 1.4 million, Tijuana is the sixth largest city in Mexico. It is located in the northwest corner of Baja California, Mexico, and shares a 12-mile border with San Diego, California where the busiest border crossing in the world connects these two cities. A recent epidemiological study estimates that up to

one in every 125 persons aged 15–49 years in Tijuana is HIV infected (Brouwer et al, 2006). Examining how migration, drug use, and sexually permissive attitudes may have contributed to this rate of HIV infection will inform the future development of interventions and will facilitate future prevention efforts.

Migration. Recent data from the California–Mexico AIDS Initiative show rising rates of HIV infection among Mexican migrants within Mexico and in California. The California-Mexico AIDS Initiative found that 0.6 percent of Mexican migrants tested in California and 1.1 percent of adult rural migrants surveyed in Mexico were infected with HIV, with the latter figure more than three times higher than the infection rate reported for the general Mexican population ages 15 to 49 (University Wide AIDS Research Project, 2006). Tijuana is a major connector between Mexico and the US and many migrants stopover in Tijuana before crossing the border. Studies exploring the frequenting of FSWs by Mexican migrant workers who have already made it into the United States found 46% of the single men and 40% of the married men living apart from their wives patronized prostitutes (Parrado, Flippen, & McQuiston, 2004). Because the use of FSWs among migrants is high and/or because Tijuana is a city where migrants from all throughout Mexico spend time before crossing over to the United States it is important to acknowledge the possibility of an increased use of prostitutes in this city from this group.

Drug Use. Substance use puts people at risk for contracting HIV. The risk of contracting HIV and AIDS through injection drug use has been well established (Centers for Disease Control and Prevention [CDC], 2002). In addition, the use of recreational drugs, due to their relaxing or disinhibiting effects, may increase the

prospect of high-risk sexual activity. The Tijuana/San Diego border area is situated on a major drug trafficking route whereby heroin, cocaine, marijuana and methamphetamine are smuggled to the U.S. (Drug Enforcement Agency, 2006). Shipments must be stockpiled on the Mexican side of the border before exportation, thereby increasing access for residents. This increased access is a risk factor for the consumption of illegal drugs. Data from the 1998 Mexican national drug addiction epidemiologic surveillance system found Tijuana to have the highest percentage of residents to have ever used illegal drugs (14.7%), which was almost three times that of Mexico's national average (5.3%) (Medina-Mora, Cravioto, Ortiz, Curi, & Villatoro, 2003). The type of drug consumed is also influenced by the city's location on the border. In recent years, there has been a decrease in the number of methamphetamine labs seized in California and an increase in the number of labs just south of the border in Mexico where drug enforcement is more lax (Drug Enforcement Agency, 2006; Brouwer et al., 2006). This has been affecting drug consumption in Tijuana as evidenced by recent trends in the number of treatment admissions for methamphetamines in this city. Baja California was found to have the largest percent of admissions (44%) when compared to other regions along the United State Mexico border (Maxwell et al., 2006). Recent trends in drug use among female sex workers in Tijuana have found methamphetamine use is increasing among this population (Patterson et al., 2006b; Brouwer et al., 2006). This is of specific interest because methamphetamine use has been related to increased, unprotected sexual activity thereby increasing the risk of contracting and/or transmitting sexually transmitted infections, including HIV (Molitor, Truax, Ruiz, & Sun, 1998). Using drugs before

sex with a client may increase the likelihood of unprotected sex in FSWs. The current study compared the proportion of bar and street FSWs using drugs before sex, to explore if drug use is a salient risk factor for acquiring HIV in both groups of women.

Sexual Attitudes. Baja California is among the Mexican states that regulate sex work; therefore, it is considered quasi-legal and treated with a tolerant attitude. This sexually permissive environment attracts large numbers of "sexual tourists" from the United States and other foreign countries contributing to the documented increase in HIV/STIs in Tijuana and other Mexican cities along the U.S. border (Bucardo et al., 2004). Under the current regulations, sex workers are limited to work in certain areas of the city, are required to be licensed, and are legally mandated to have periodic health exams including HIV testing. Despite governmental regulation there appears to be a large proportion of sex workers who are not registered with the City and therefore are at a greater risk for acquiring and transmitting HIV(Larios et al, 2006).

Working Environment

The environments in which sex workers work can have certain protective factors that aid in maintaining safe sex practices and decrease risk of STIs and HIV transmission. In the United States several protective factors are found for the women who work in legal "brothels", in the 10 counties in Nevada where sex work is legal and heavily regulated. Brothel sex workers are legally mandated to undergo weekly medical examinations to test for sexually transmitted infections, (including syphilis, gonorrhea, and herpes) and are tested for HIV monthly. A mandatory condom use policy was established in 1988 to supplement the existing licensing requirements. The high level of regulation and structure has positive effects on condom use within this

group of sex workers. In a study of 41 Nevada brothel sex workers, researchers found that all women reported using a condom for every act of vaginal intercourse in the past year (Albert, Warner, Hatcher, Trussell, & Bennett, 1995). Similar results were found in Thailand when a national program was implemented mandating 100% rate of condom use among the sex workers and their clients at brothel establishments. There are clear indications that these efforts have had an impact on HIV transmission at the national level. Studies found a tenfold reduction in STI incidence and a fivefold reduction in HIV incidence among young Thai men between 1991 and 1993 (Celentano et al., 1998). HIV prevalence among female sex workers working in brothels in Chaing Mai steadily declined during this period from 44% in 1991 to 30.4% in 1993 (Siraprapasiri et al., 1991; Chaisiri, Danutra, & Limanonda 1993). Ten years later HIV prevalence rates in FSWs have continued to decline and were found to be 20% lower (10.87%) in 2003 (Epidemiology Division, Ministry of Public Health, Thailand, 2004). All indications are that the 100% Condom Program has been an important contributor to large-scale reduction of HIV transmission throughout the country but has only targeted sex workers who work out of brothel establishments. A recent study in India examined the rate of condom use among brothel and non-brothel (street-based) sex workers, and found that non-brothel based FSWs were at a significantly higher risk of HIV infection compared to brothel-based FSWs (Dandona et al., 2005).

Risk factors for HIV transmission vary depending on the type of work environment the FSW inhabits (Dandona et al., 2005; Larios et al., 2006). To date, research has yet to explore how different work environments impact HIV risk

behaviors in FSW living in Mexico and while previous research has concentrated on understanding condom use in FSWs who work in brothels (Kerrigan et al., 2006; Ford et al., 1996) women who sell sex in bars have been to a large extent understudied (Chiao, Morisky, Rosenberg, Ksobiech, & Malow, 2006). Understanding how contextual factors influence condom use in establishment based (bar) and non-establishment (street) based FSWs is vital to inform the development of future prevention efforts. Using the social-ecological model as a guiding framework through which to understand how working environment may influence condom use behaviors the current study compared bar workers to street workers hypothesizing differential effects of each level of the social ecological model on condom use for each group. It was hypothesized that for the women who work in bars structural/institutional and community level factors would be more important in predicting condom use behaviors. In contrast, for the women who work on the street it was hypothesized that interpersonal level factors would be more salient predictors of condom use.

Social-Ecological Model

The Institute of Medicine's Report on AIDS and Behavior (Auerbach, Wypijewska, & Brodie, 1994) concluded that:

> Despite their conceptual contributions, current theoretical models are limited in their ability to predict risk behavior for two main reasons. First, with respect to sexual behavior, the models are based on the assumption that sexual encounters are regulated by self-formulated plans of action, and that individuals are acting in an intentional and volitional manner when engaging in sexual activity. Second, the dominant theoretical models of behavior do not easily accommodate contextual, personal and socio-cultural variables such as gender and racial/ethnic culture (p. 87).

Using the Social Ecological Model (McLeroy, Bibeau, Steckler & Glanz, 1988) as the framework to explain condom use behavior in FSWs offers an important advantage over other psychosocial models. Many models that have been developed to explain human behavior concentrate on individual level factors as sole predictors of behavior (e.g. Health Belief Model (Rosenstock, 1966; Glanz, Lewis, & Rimmer, 2002), Transtheoretical Model (TTM; Prochaska, DiClemente, & Norcross, 1992). The Social Ecological Model incorporates various levels of influence reflecting the accumulated wisdom of many domains of health behavior and integrates individual, interpersonal, and structural determinants of behavior to better explain the dynamic nature of sexual behavior.

The Ecological Framework states that health is influenced by multiple factors of the physical and socio-cultural environment, that these multiple factors and the environment interact, and that prevention is most effective when coordinated across levels (individual level, interpersonal level, institutional level, community level, and policy); (McQuiston, Choi-Hevel, & Clawson, 2001). As described by McLeroy and colleagues, (1988) central to the ecological perspective is the idea of the interaction between the individual with his or her social and physical environment. Ecological models divide the social environment into analytic levels that can then be used to focus attention on different levels and types of social influence. The Social Ecological Model proposes a framework incorporating individual (e.g., knowledge, attitudes, and behaviors), interpersonal (e.g., peers, social networks), institutional (e.g., workplace environment, access to services), community (e.g., social capital, relationships

between organizations), and policy factors (local, state, and national laws and policies) to explain and help understand influences on human behavior.

Most research on health behaviors has concentrated on exploring how individual level factors influence behavior. Individual factors include biological (age, gender) and psychological (knowledge, outcome expectancies) variables. Studies have shown that individual level factors affect health behaviors, including tobacco and alcohol use (Spruijt-Metz, 2005; Watkins, 2006). The Social Ecological Model incorporates individual level factors but acknowledges the importance and impact of broader socio-cultural factors in order to better explain human behavior. This model proposes that interpersonal relationships are important sources of influence in health related behaviors. Social relationships have been found to affect stress and coping (DeLongis & Hoffman, 2005), tobacco use (Hoffman, Sussman, Unger, & Valente, 2006), risky behavior and decision making (Gardner, & Steinberg, 2005) and risky sexual behaviors in men (Locke, Newcomb, & Goodyear, 2005). Unfortunately, research on women's HIV risk behaviors has ignored the implications of relationship dynamics in establishing HIV risk.

The framework suggested by the Social Ecological Model includes structural level factors that describe the physical and social environment in which behavior takes place. Cohen and colleagues (2000) described four categories of structural factors that can explain and influence health behaviors, including; (1) availability of protective or harmful consumer products (2) social structures and policies (3) physical structures and (4) and media and cultural messages. These factors have been found to relate to obesity and physical activity (French, Story, & Jeffery, 2001; Sallis et al., 2003).

The Social Ecological Model has operationalized community in three distinct ways. First, community can refer to mediating structures, or face-to-face primary groups, to which an individual belongs. This view of community includes families, friendship networks, or fellow sex workers. Second, community has been described as the relationship between organizations (e.g. local schools, community centers) and groups within an area. Third, community can be a geographic and politically defined area, where the members of the community are under the jurisdiction of a power structure like a county or city government (McLeroy et al., 1988). In the present study, the FSWs community was defined as their face-to-face primary group, i.e. other FSWs.

The broadest category included in the Social Ecological Model incorporates the policies and laws that influence behavior. Regulatory policies have been used extensively in the field of public health to protect the health of the community. Examples include tobacco laws that restrict smoking in public places, restrictions on alcohol sales and consumption, increased taxes on tobacco and alcohol products, and policies that target sanitation, housing and food quality all impact the health of the community. For the current study policy level factors will not be explored since the policy regarding sex workers has been in flux in Tijuana and a majority of the FSWs are not registered with Municipal Health Services (Larios et al., 2006).

The Social Ecological framework has been used to examine the impact of macro-level contextual influences on contraception/condom use in women (Bull, & Shlay, 2005), intimate partner violence (Burke, O'Campo, & Peak, 2006), physical activity (Fleury & Lee, 2006), STI risk behaviors in adolescents (Voisin, DiClemente,

Salazar, Crosby, & Yarber, 2006), and adherence to treatment in pediatric HIV/AIDS (Naar-King et al., 2006). In the field of HIV prevention, recent interventions have been developed that consider both the situational and dispositional determinants of behavior (Kerrigan et al., 2006), but no formal model that incorporates multiple level determinants of behavior has been tested in FSWs. The present study contributes to the literature in this area by being the first to examine how the Social Ecological framework can be used to understand condom use in FSWs. In particular, we explored the relationship between interpersonal factors, structural factors, community factors, and condom use hypothesizing that individual level factors (self-efficacy, substance use before sex, and condom use beliefs) would explain the relationship between interpersonal factors, (social support, client variables) community factors (social norms) and condom use. Direct effects between structural factors (working conditions, condom availability) were also examined (See Figure 1). We then used this framework to identify differences that may exist between bar and street workers, improving our ability to develop effective interventions to increase condom use that are tailored to the needs of each group.

Using the Social Ecological Model to Explain Condom Use Behaviors

Figure 2 has been included as a conceptual model of how the different levels of the Social Ecological Model are hypothesized to influence condom use in the FSW population. Each path will be discussed in detail, please refer to the figure throughout this section for clarification.

Individual factors

The majority of research on condom use behaviors has concentrated on examining the influence of individual factors while ignoring the dyadic nature of sexual behavior. These individual level approaches have been summarized in several reviews (Neumann et al., 2002; Oakley, Fullerton, & Holland, 1995). Several psychological theories have been developed to understand the influence of individual level factors on behavior. For example, the Transtheoretical Model (TTM; Prochaska, DiClemente, & Norcross, 1992) and Social Cognitive Theory (SCT; Bandura; 1986) have been used to examine how self-efficacy mediates the relationship between individual beliefs, including outcome expectancies, perceived susceptibility (Wulfert & Wan, 1993), decisional balance (pros and cons of condom use); (Gazabon, Morokoff, Harlow, Ward, & Quina, 2007) and condom use behavior. In the present study we incorporated the SCT constructs of condom use beliefs (outcome expectancies) and self-efficacy into the Social Ecological Model to describe the individual level influences that mediate the relationship between broader social and environmental factors, and condom use, strengthening our ability to explain complex high risk sexual behaviors. Substance use before sex was also included as a mediating individual-level variable believed to effect condom use behavior and self-efficacy in our sample.

Self-efficacy and Condom Use Beliefs. Self-efficacy is one's belief that she or he is capable of performing a behavior in a given situation. It is a process of cognitive appraisal by which one integrates knowledge, outcome expectancies, emotional states, and past experiences to form a judgment about whether or not s/he can perform the

behavior (Bandura, 1986). Self-efficacy has been related to greater condom use among sex workers around the world (Ford, Nyoman, & Fajans, 1998; Oladosu, 2005). In a large study performed in five countries in Central America (Costa Rica, Nicaragua, El Salvador, Honduras, Guatemala), FSWs who reported that they would use condoms despite increased monetary rewards for unprotected sex were 1.8 times more likely to have used condoms with all clients (Oladosu, 2005). The nature of sex work exposes FSWs to men of different characters and temperaments. FSWs who have higher levels of self-efficacy, or beliefs that they can negotiate condom use in various situations, have been found to perform more safe sex behaviors. Contrary to previous findings in which intention is the immediate antecedent of action and serves as a mediator between attitudes and behavior, a recent study exploring the applicability of the TTM in a diverse sample women living in the United States found support for a model in which readiness to use condoms and actual condom use behavior were both outcome variables that were mediated by self-efficacy (Gazabon, Morokoff, Harlow, Ward, & Quina, 2007; Figure 2 path A). This suggests that an individuals' self-efficacy may simultaneously influence condom-use intentions and behavior (Gazabon, et al., 2007). Recent findings have supported the applicability of this model in FSWs living in China, showing that self-efficacy mediated the relationship between various condom beliefs (e.g., condom use can destroy natural feelings of sex) and condom use in the sample (Wang et al., 2007; Figure 2 path E).

Drug and alcohol use has been found to relate to condom use self-efficacy in disadvantaged women living in the United States (Tucker et al., 2005) but few studies have explored this relationship in FSWs (Denner, Organista, Dupree, & Thrush,

2005). Drug use and drinking to intoxication were associated with HIV-related cognitions, including women's perceived ability to refuse unwanted sex and condom use self-efficacy (Figure 2 paths B-C). Drinking to intoxication was associated with lower perceived ability to refuse unwanted sex and higher condom use self-efficacy at baseline whereas drug use was associated with an increase in condom self-efficacy over time. Denner and colleagues (2005) examined predictors of HIV transmission in a sample of marginally housed Hispanics (21% sex workers) and found a relationship between alcohol use and lower condom use self-efficacy (Figure 2 path C). Using drugs or alcohol before having sex is a distinct construct that links use to risk behavior more explicitly. In using a more proximal measure of substance use we hypothesized that using drugs or alcohol before sex with a client would be negatively related to a woman's condom use self-efficacy. Substance use before sex may reduce the FSWs ability to have condoms available every time they have sex from impaired judgment and/or may impact condom skill while under the influence, thereby lowering condom use self-efficacy. Incorporating self-efficacy into the model as a mediator of condom use behavior will aid in understanding the relationship between interpersonal factors, community factors, substance use and condom use behaviors in FSWs.

Several studies have found that increasing knowledge regarding HIV transmission does not directly increase condom use in FSWs (Ford, Wirawan, Reed, Muliawan, & Sutarga, 2000; Williams et al., 2003). A recent study examined the relationship between AIDS knowledge and condom use in FSWs in Bali, Indonesia and found no relationship between increased AIDS knowledge and increased condom use (Ford et al., 2000). In South Africa, researchers implemented a peer-educator

program to increase knowledge among mine workers, sex workers, and other adults in the biggest gold-mining complex in the world and found that knowledge of HIV/AIDS and awareness of the epidemic increased but condom use remained low (Williams et al., 2003). Although we hypothesized that knowledge would not be related to condom use in our sample, knowledge was hypothesized to relate to the FSWs level of condom use self-efficacy by influencing their condom use beliefs, or their expectancies regarding the outcome of using condoms (Figure 2 path D). According to SCT self-efficacy beliefs provide the foundation for human motivation and are influenced by an individual's knowledge, outcome expectancies, and past experiences (Bandura, 1986). Bandura (1997) proposed that "people's level of motivation, affective states, and actions are based more on what they believe than on what is objectively true" (p.2). For this reason, how people behave can often be better predicted by the beliefs they hold rather than the concrete knowledge that informs their beliefs.

A growing empirical literature indicates that outcome expectancies (OEs) are an important influence on motivation to engage in health-protective practices (O'Leary et al., 2005). OEs about condom use are beliefs about the likelihood of outcomes occurring from using condoms and include both positive and negative beliefs about condom use. A study examining predictors of condom use in a sample of FSWs from Central America found that having positive perceptions of condom use (e.g., condoms prevent AIDS, condoms do not diminish pleasure) was a significant predictor of condom use (Oladosu, 2005). In Bali, Indonesia FSWs who believed that sex with a condom protected against AIDS were more likely to use condoms consistently with their clients than those who did not (Thorpe, Ford, Fajans, &

Wirawan, 1997). The current study hypothesized that HIV knowledge would be related to individuals' beliefs about condom use (outcome expectancies) would influence condom use both directly and indirectly by increasing an individual's self-efficacy for condom use (Figure 2 paths E-F).

Substance Use. In addition to examining self-efficacy and condom beliefs as mediators of condom use, substance use was included in the current study as an individual level mediator of social and environmental factors that impact condom use behavior (Figure 2 paths G-H). Increased substance abuse has been strongly associated with sex work around the world, including in the United States and Mexico (Plant, 1990; Potterat et al., 2004; Valdez, Cepeda, Kaplan, & Codina, 2002). Research examining FSWs and substance use in the United States found that FSWs are more likely to report injection drug use (Paone et al., 1999), and have higher rates of alcohol and crack use (Cohen, Navaline, & Metzger, 1994) when compared to women who use drugs but are not sex workers. In Mexico, FSWs have been found to have high percentages of drug and alcohol use. In Ciudad Juarez, Mexico more than half of the FSWs surveyed reported cocaine (56.6%) and marijuana (50.5%) use in the past month while in Tijuana almost all women (97%) reported alcohol use and 34.6% reported methamphetamine use in the past month (Patterson et al., 2006b).

Alcohol and other forms of drug use are related to sexual behavior and HIV risk in several important ways. First, the risk of contracting HIV through injection drug use has been well established (CDC, 2002). Secondly, the use of such substances, due to their relaxing or disinhibiting effects, may increase the prospect of high-risk sexual activity. In the United States, women who reported exchanging sex

for money also reported engaging in sex with injection drug users and engaging in sex with HIV positive individuals, and were more likely to share injection equipment (Jones et al, 1998; Paone et al., 1999). Female sex workers who use drugs often exchange sex for drugs rather than money, further increasing their risk of becoming infected with HIV or other STIs (Sherman, German, Cheng, Marks, & Bailey-Kloch, 2006; Weeks, Grier, Romero-Daza, Puglisi-Vasquez, & Singer, 1998). Economically motivated sexual behaviors, (e.g., exchanging sex for money or drugs, more money for non-condom use), reduce women's ability to use safer sex strategies and can impede their ability to be concerned about the long-term consequences of their actions.

Substance use is of particular risk to the FSW population since using drugs or alcohol before having sex with a client will affect the sex workers' ability to negotiate condom use and therefore reduce their likelihood of using a condom. Methamphetamine use is particularly high before sexual encounters and users of methamphetamine report using this drug to initiate, enhance, and prolong sexual encounters, thereby increasing the impact intoxication has on lapses in judgment with regard to safe sex (Urbina & Jones, 2004; Reback, Larkins, & Shoptaw, 2004; Volkow et al., 2007). In women, alcohol use has also been shown to impair decision- making skills and reduce the ability to fight off aggressive advances (Naranjo & Bremner, 1993; Testa & Parks, 1996). Intoxication has been shown to reduce an individual's perception of risk, thereby reducing their likelihood of using protection during high-risk sexual encounters (Testa, Vanzile-Tamsen, Livingston, & Buddie, 2006; MacDonald, Zanna, & Fong, 1995).

Access to alcohol and drugs varies by environment. Women who work in bars may have greater access to alcohol compared to those who work on the street, increasing the probability that they will drink before having sex with their clients thereby making unprotected sex more likely (Agha & Nchima, 2004). A recent study among FSWs working in the Philippines found women who reported greater alcohol use before sex were more likely to have an STI when compared to those women who did not engage in drinking before sex with a client (Chiao et al., 2006). Understanding the differential impact of these environmental determinants of behavior is important so that prevention efforts can be appropriately tailored and be as effective as possible.

Interpersonal factors

Previous research has ignored the implications of relationship dynamics on a woman's risk for acquiring HIV. For example, male partner attitudes toward safer sex, male-perpetrated violence against women partners, the role of gender-based power, and the role of socioeconomic factors, such as poverty, should be considered important elements in establishing HIV risk (Amaro & Raj, 2000). On the other hand, social relationships can provide important social resources including emotional support, information, and tangible aid that can be protective factors for women involved in sex work. To better understand the contextual factors that influence HIV risk in sex workers, interpersonal domains are extremely important to include in our explanatory model. The current study included previous abuse, social support, and client factors (abuse, power dynamics, increased monetary rewards) as important interpersonal variables hypothesized to impact condom use behaviors.

Abuse. Previous research has found that intimate partner violence (IPV) is associated with a number of sexual HIV/STI transmission risk related factors, including (1) engaging in unprotected sex (Amaro, 1995; Gilbert et al., 2000); (2) higher rates of STDs (El-Bassel, Gilbert, Wu, Go, & Hill, 2005); (3) sex with multiple partners (Gilbert et al., 2000); (4) engaging in unprotected anal sex (El-Bassel, Gilbert, Schilling, & Wada, 2000); (5) positive HIV status (North & Rothenberg, 1993); (6) trading sex for drugs or money (El-Bassel et al., 2000); and (7) having a risky sexual partner (e.g., one who injects drugs, is HIV positive and/or has had sex with multiple partners) (Gilbert et al., 2000). Condom negotiation behaviors, such as requesting or insisting that a partner use condoms, have also been found to be associated with IPV (El-Bassel et al, 2005). A recent temporal examination of IPV and its relationship to condom use behavior found that women who reported always using condoms at baseline were significantly less likely to have experienced IPV 6 months later, when compared to women who reported inconsistent or no condom use at baseline (El Bassel et al., 2005). This finding may be explained by examining the power distribution within the relationship. FSWs' male partners may perceive their (FSWs) request to use condoms as a breach of gender role expectations thereby threatening the male's sexual decision-making power. This may lead to relationship conflict and IPV, as some men resort to using IPV as a mechanism to repair their self-esteem and maintain power (Figure 2 path I). A woman who has experienced IPV may be less likely to feel comfortable negotiating condom use with her intimate partner but in the case of FSWs this may also influence her ability to negotiate condom use with clients (Figure 2 path J). Understanding the role that culture has in defining gender roles and

power dynamics is important when considering the impact of violence on condom use. When examining condom use in Latinas, research has found that the threat of violence is a significant predictor of whether Latina women would use condoms (Gomez & Marin, 1993). Both IPV and physical and sexual abuse perpetrated by clients, also known as commercial partner violence (CPV), are important in determining HIV risks in FSWs. In street-based FSWs working in New York City a recent study found high rates of lifetime physical and sexual abuse by both intimate (73%) and commercial partners (50%) with women reporting a greater level of sexual violence from commercial partners (El-Bassel, Witte, Wada, Gilbert, & Wallace, 2001). Findings from this study suggested that women who experienced childhood physical and sexual abuse and those who currently used drugs were more likely to report sexual abuse by a commercial partner as an adult when compared to those women without a history of abuse or current drug use. In exploring predictors of condom use in FSWs within the United States, current physical or sexual abuse by a commercial partner has been found to reduce the probability of condom use thereby increasing the risk of becoming infected with HIV in this population (Witte, Wada, El-Bassel, Gilbert, & Wallace, 2000). For FSWs, CPV (abuse by paying clients) may be a better predictor of condom use behaviors in this population. In developing the model for the current study, special attention was paid to the relationship between past abuse, individual level factors of drug use, and commercial partner violence.

Previous emotional or sexual abuse has also been linked to an increased risk of contracting STIs. Examining these relationships is important when exploring women's risk since women are more likely to experience emotional and physical

abuse. A recent study in the United States examining the impact of childhood trauma (emotional, physical, and sexual abuse) on STIs in a drug using population, found that the proportion of women reporting ‘‘severe to extreme’’ abuse was five times the corresponding proportion in men (Medrano & Hatch, 2005). In both men and women, significant associations were found between child abuse histories and lifetime prevalence of sexually transmitted infections, but in women, a dose response relationship emerged, such that increasing severity of abuse (emotional, physical, and sexual) related to increasing numbers of STIs. Childhood victimization (physical, sexual abuse, neglect) increases the likelihood individuals will use drugs in adulthood (Widom, Marmorstein, & White, 2006) but does not directly increase the likelihood of excessive drinking, (Widom White, Czaja, & Marmorstein, 2007) or alcohol dependence (Sartor, Lynskey, Bucholz, McCutcheon, Nelson, Waldron et al, 2007; Figure 2 path K). Previous studies have shown that street-FSWs in Mexico are more likely to use drugs (Strathdee et al., in press b; Larios et al., 2006) and since there has been a relationship found between drug use and abuse the current study hypothesized that there would be more experiences with abuse in the women who work on the streets. In was also hypothesized that street-FSWs would also report more client abuse. Men might be less abusive toward FSWs if they are in a structured and protected setting, e.g. a bar where women could call for help if needed. The women working on the streets may not have this level of support and therefore may have more experiences with client abuse than their bar counterparts.

Social support. Social support has been found to relate to several HIV risk behaviors. It has been shown to be an important factor in reducing HIV–related drug

injection risk among injection drug users (IDUs). For example, one study found that as social support from friends increased, the likelihood of sharing injection equipment decreased (Stein, Charuvastgra & Anderson, 2002). Social support has been associated with high-risk sexual behaviors in FSWs. Researchers found that women who reported low levels of social support were almost 3 times more likely to have unprotected sex (Dandona et al., 2005; Figure 2 path L). Social support has also emerged as a significant factor in reducing frequency and intensity of drug and alcohol use in a recent study of high-risk women. Findings showed that women who reported higher levels of social support engaged in significantly less frequent marijuana use and marginally less frequent episodes of drinking to intoxication over time (Tucker et al., 2005; Figure 2 paths M-N). Other studies have not found the same associations. El-Bassel and Schilling (1994) reported no association between social support and either the frequency of condom use or the frequency of sex with IDUs during the prior six months. In comparison, other research has found that individuals who report higher social support have better profiles in terms of substance use, HIV-risk behavior, health care utilization, and mental health (Nyamathi, Leake, Keenan, & Gelberg, 2000). Studies have also shown a relationship between increased social support and greater self-efficacy for condom use (Wulfurt & Wan, 1995), and other health behaviors (Woodgate, Brawley, & Sheilds, 2007; Figure 2 path O). Further research examining the role of social support as a protective factor for HIV risk behaviors is needed. Understanding the importance of relationship dynamics on HIV risk behavior is imperative since several risk behaviors involve the cooperation of another person (e.g. sexual activity, sharing injection equipment).

In the present study we hypothesized that women who work in bars would have more social support when compared to the women who work on the street. It was also hypothesized that since the women who work on the street would not have the same structural and social supports that the women working in bars have, this group would be more dependent on the client when making decisions related to sexual behaviors. A decrease in perceived social support may also reduce FSWs condom use self-efficacy (Wulfurt & Wan, 1995) making this an important contributing factor for condom use for the women who work on the streets that might be less important for the women who work in the bars since they are hypothesized to have a greater level of social support.

Client factors. Few studies have examined the impact of client/partner characteristics on condom use in the context of prostitution (Wong, Chan, & Koh, 2007; Ford et al., 1996). Clients are an important "epidemiological bridge" between FSWs and the broader population (Ghani & Aral, 2005). Therefore, understanding the relationship dynamics between FSWs and their clients is important to further increase safer sex practices in this context.

Despite extensive research examining the personal determinants of condom use behavior (Neumann et al, 2002; Oakley et al., 1995; Gazabon et al., 2007) several studies have found condom use to be associated with characteristics of the clients rather than that of the sex workers. In general, clients who were better educated (Pickering, Quigley, Hayes, Todd, Wilkings, 1993), paid higher charges, (Estebanez, Rua-Figueroa, Aguilar, Bru, & Roq Emilio Zunzunequi, 1996) and had higher self-perceived risk (Graaf, Gertjan, Vanwesenbeeck, Straver, & Visser, 1997), were more

likely to use condoms. A recent study examining client factors that contribute to condom use found that clients were approximately twice as likely to use condoms if the sex workers initiated condom use (Wong, Chan, & Koh, 2007). When examining the main reasons for not using condoms, clients responded with mainly extrinsic reasons related to the situational context of the sexual act such as unavailability of condoms, sex workers did not ask, heat of the moment, and drunkenness. The interaction between client characteristics and behavioral factors of the sex workers shows the dynamic nature of condom use negotiation and highlights the importance of examining the types of relationship barriers that prevent FSWs from suggesting condom use with their clients. Based on previous research examining the influence of relationship dynamics on sexual practices we hypothesized that previous client abuse (commercial partner violence), level of relationship power perceived by the FSWs, and increased monetary incentives would be important influences on condom use behaviors, and would be more salient predictors of condom use in the women who work on the streets.

Relationship Power. Relationship power has been defined as relationship control and decision making power within the context of a relationship, with abuse perpetuating the imbalance in relationship power. The conventional assumption rests on the notion that women would be less able to assert their wishes for protection due to having less power in situations of presumptively lower male investment, thereby increasing their chances of high risk sexual practices (e.g. unprotected sex, drug use before sex); (Sprecher & Felmlee, 1997). In a predominantly low socioeconomic status Latina sample, Pulerwitz, Gortmaker, and DeJong (2000) found that lower

relationship power (i.e., less autonomy over sexual decision-making) was not only associated with lower condom use (Figure 2 path P), but also with lower education and relationship satisfaction and higher sexual and physical male partner-perpetrated abuse (Figure 2 path I). Another study found that women who reported a high level of relationship power were almost 6 times more likely to report consistent condom use than women with a low level of relationship power, while women with a medium level of power were 3.66 times more likely (Pulerwitz, Amaro, De Jong, Gortmaker, & Rudd, 2002). These studies indicate that relationship power is an important contextual variable that shapes women's ability to engage their partners in HIV-related protective behaviors. These gender based power dynamics prevent women from initiating and sustaining sexual risk reduction in the context of their relationships, especially in marginalized populations.

Relationship power has not been examined explicitly in FSWs and their clients. The interplay between poverty, traditional gender roles, and cultural values puts FSWs in Mexico at an increased risk and reduces the amount of power they can hold. Furthermore, the nature of sex work also reduces the amount of relationship power one has; sex workers have little control over where, when, how, and with whom they have sex, a core component of relationship power (Figure 2 path Q). Previous physical or emotional abuse by a client will further decrease their level of perceived power thereby increasing their risk for contracting HIV. It was hypothesized that fear of requesting condom use by FSWs would be influenced by previous abuse and relationship power. As previously discussed, it is believed that women who work on

the street are more susceptible to client abuse and as a result may have lower levels of perceived relationship power, increasing their risk of acquiring HIV.

Individuals who report that their partners have more control over them (i.e., low relationship power) report fewer days abstinent from drugs after treatment (Reihman, Iguchi, Zeller, Morral, 2003). Decreased power in intimate relationships may increase the likelihood that individuals use drugs together. Although the present study is looking at drug use in FSWs and relationship power is measured in relation to their commercial partners it is possible that these relationship dynamics will be similar, with reduced power being related to increased drug use with commercial partners as well (Figure 2, path R).

A recent study found that when compared to non-violent men, those men with a history of violence were more likely to make negative attributions regarding condom use requests, increasing the chance of a negative or violent response to this request (Logan, Cole, & Leukefeld, 2002). This suggests that not only are women at risk for HIV infection because of the behavior of their partners, but also that asking their partners to change their behavior could put women at an increased risk for violence. For similar reasons FSWs may feel unable to refuse drug use before sex with their commercial partners because of a fear of violent retaliation. Examining past commercial partner violence and level of relationship power as predictors of condom and drug use behaviors in this population will help inform HIV prevention campaigns that target both the FSWs and their clients as sources of change.

A recent qualitative study with sex workers in Mexico found that one of the major barriers to condom use in this population is financial incentive for non-condom

use. FSWs reported that some clients offer an increased monetary incentive to have sex without a condom (Bucardo et. al., 2004). Considering the main reason women become involved in sex work is monetary necessity, augmented earnings with non condom use is extremely important to address as a barrier to safer sexual practices (Figure 2 path S). In the previously described qualitative study, approximately 40% of the sample consisted of single mothers who needed money to support their children, and most women reported engaging in sex work as a "way out," where selling sex appears as the only alternative to survival (Bucardo et. al., 2004). In the present study 95% of the women reported having children, making economic necessity an influential factor in our sample. Understanding the interaction between poverty, power, and sexual behavior will help in developing and implementing effective interventions within this population.

Structural Factors

Condom use by FSWs is now acknowledged as being largely affected by a number of socio-structural and external environmental factors. Some of these factors include the availability of condoms in the workplace (Tran, Detels, & Lan, 2006), policy mandating condom use (Morisky, Pena, Tiglao, & Lui, 2002), and the support of establishment and brothel managers (Morisky et al., 1998). These structural factors describe the physical and social environment in which individual behavior takes place. Cohen and colleagues (2000) described four categories of structural factors that can explain and influence health behaviors, including: (1) availability of protective or harmful consumer products; (2) social structures and policies; (3) physical structures; and (4) and media and cultural messages. Using this framework, the current study

examined availability of condoms, working conditions, and location of sex work as structural factors that are hypothesized to relate directly and indirectly to condom use behavior.

Availability of Condoms. Availability refers to the accessibility of consumer products that are associated with either harmful or protective health outcomes (Cohen, Scribner, & Farley, 2000). Tobacco, alcohol, and firearms are examples of harmful consumer products and are associated with the most common causes of death in the United States. Condoms and sterile needles are examples of consumer products that can protect health. In general the more access you have to a product, the greater the consumption of the product will be and having less access is associated with lower consumption (Figure 2 path T). Obviously, if condoms are unavailable, they cannot be used when sex occurs. This is also true for women involved in sex work. In FSWs condom unavailability has been found to be associated with lower condom use (Tran, Deteles, & Lan, 2006; Morisky et al., 1998). Having access to protective consumer products can facilitate healthier behaviors and increase self-efficacy related to these behaviors (Figure 2 path U). Although the direct relationship between access to condoms and self-efficacy has not been formally tested in FSWs it was hypothesized that having an increased access to condoms would increase an individuals belief that they can use condoms appropriately. Theories of self-efficacy state that mastery experiences are important in developing self-efficacy (Bandura, 1986), therefore, having access to condoms so that one can use condoms is important in building these mastery experiences. Source of condoms is also an important factor to consider. Women report pharmacies as a major source of condoms but they also endorsed being

able to obtain condoms at the karaoke/hotel/massage parlors, where they work. Because cost can be a barrier to condom availability, having access to condoms in the working environment can facilitate condom use. Source of condoms has been shown to influence condom use behavior in a group of FSWs working in various countries in Central America (Costa Rica, Nicaragua, El Salvador, Honduras, Guatemala). Sex workers who bought condoms from brothels used them more consistently than those who did not (Oladosu, 2005). Exploring how access to condoms impacts condom use in different work environments will help inform future HIV prevention efforts that target these structural factors to improve condom use in FSWs.

Work environment. Social structures refer to laws or policies that require or prohibit behaviors. Social structures set guidelines to limit high risk behaviors and can provide a framework for encouraging low risk behaviors (Cohen et al., 2000). Women who work in bars/brothels have a different social structure than those who work on the street. Establishment based FSWs often work under conditions that promote condom use between the sex workers and their clients (Morisky et al., 2002). Examining the impact of establishment influences on condom use studies has shown that establishment influences are more likely to be associated with condom use than individual factors (Morisky et al., 1998; Figure 2 path V). Having condoms available at the establishment was the best predictor of condom use but having rules for condom use or having been taught to use condoms by someone at the establishment were also predictors of consistent condom use. Previous studies in India and Mexico have found that less structured working environments also relate to less condom use (Dandona et al., 2005) and more injection drug use (Strathdee et al., in press b) in FSWs.

Examining the relationship between working conditions and condom use in bar and street workers will aid in describing how structural factors impact condom use behaviors in this population.

Location of Sex work. Physical structures refer to the physical characteristics of structures that either reduce or increase opportunities for healthy behaviors (Cohen et al., 2000). The establishment (bar, brothel) provides a situational context for condom use among FSWs, which differs from the situational context that women who work on the streets occupy. Studies have found substantial differences in use of condoms between these different types of FSWs, with the street-based FSWs being nearly 3.5 times less likely to use condoms when compared with the brothel-based FSWs (Dandona et al., 2005). In Mexico, studies have shown that different venues may cater to men of different backgrounds (Strathdee et al, in press a), and FSW characteristics have also been found to vary by primary location of sex work (Strathdee et al., in press b). By examining model fit across work site, this study explored if there were differences in condom use behaviors and then, described how these differences manifest across work site.

Community Factors

The Social Ecological Model has operationalized community in various ways. For the purpose of our study, community was described as a mediating structure, one that connects the individual to the larger social environment and can provide social resources and social identity. Specifically, this study examined how established social norms within the sex worker community influence condom use behavior.

Two important determinants of sexual networks are social norms and the physical spaces in which networks form (e.g., bars, street). Social norms are shaped by cultural factors at the societal level and continue to develop within the networks themselves, to influence individual and partnership behaviors within the community (Doherty, Padian, Marlow, & Aral, 2005). Perceived social norms have been examined in the Theory of Reasoned Action (TRA) where they have been defined as the perception that personally significant-others think that one should or should not perform a behavior (Ajzen & Fishbein, 1980). Network members can support healthy practices, but they may also serve as negative role models by providing environmental cues that reinforce risk behaviors (Bandura, Adams, & Beyer, 1977; Ajzen, 1991; Figure 2 path Z). In FSWs living in Mexico social networks may be related to increased risky behaviors. A recent study showing that women who inject drugs are more likely to report that their fellow sex workers also injected drugs highlights this possible influence (Strathdee et al., in press b; Figure 2 path W). The present study defines social norms as the common belief found within a community rather than another individual, in order to gauge the social norms for condom use within the sex worker community.

Social norms have been found to affect condom use behaviors in women. A study examining the impact of perceived social norms found that women who did not endorse social norms that promoted women's sexual passivity were more likely to report consistent condom use (Dancy & Berbaum, 2005; Figure 2 path X). Another study examined peer norms about condom use and found similar results. Sex workers in Singapore who believed their peers always used condoms were more likely to use

condoms (Wong, Chan, Chua, & Wee, 1999). Fostering women's responsibility to their community and supporting nonrestrictive social norms may promote women's personal ownership of HIV-risk-reduction (Albarracin, Kumkale & Johnson, 2004; Figure 2 path Y). It was hypothesized that people from societal groups who exchange information about sex and condom use with their social networks would be more likely to base their decisions on social norms; whereas people from groups with minimal informational social support may not possess relevant norms. Women who work in the bars may be more likely to discuss condom use with their fellow sex workers, increasing the importance of social norms in condom use behavior. These discussions would be important in modifying the individual's perceptions regarding condom use and its benefits (Figure 2 path Z). Street workers may have less of a formal social network (Pyett & Warr, 1997), and therefore, social norms may have less influence on condom use behavior. Despite this finding, further research exploring social networks among FSWs in Mexico is needed to better understand social cohesion among street-based FSWs working in Mexico.

Current Study

The current study used the Social Ecological Model to understand the contextual factors that are associated with HIV risk behaviors in commercial sex workers in Mexico (See Figure 1). Specifically, contextual factors that influence condom use were examined while comparing FSW's who work in bars to those who work on the street.

Primary Aim 1: The current study sought to establish the use of the Social Ecological Model as an appropriate framework for examining condom use behaviors in a sample of FSWs.

Overarching Hypothesis 1: It was hypothesized that the constructs defined in the model (i.e. latent variables) would be appropriate for examining condom use behaviors in both street workers and bar workers.

Hypothesis 1a: The Interpersonal component of the model was hypothesized to have two separate exogenous latent variables named Social Support and Client Factors. The social support latent variable was hypothesized to be composed of four observed variables including social support, lifetime abuse, partner abuse, and previous abuse from a pimp. It was predicted that the abuse variables would negatively load on this latent variable. The Client Factors latent variable was hypothesized to be composed of three observed variables, power dynamics with regular and non-regular clients, previous commercial partner violence (client abuse), and increased monetary rewards for unprotected sex.

Hypothesis 1b: The Structural/Institutional exogenous latent variable was hypothesized to be composed of three observed variables including two that measure access to condoms and one that measures working conditions.

Hypothesis 1c. The Community exogenous latent variable was hypothesized to be composed of three observed variables including two that measure social norms related to drug use and one that measures social norms related to condom use.

Primary Aim 2. This study examined if components of the Social Ecological Model impact condom use behaviors similarly in FSWs who work in bars compared to those who work on the street.

Hypothesis 2a. It was predicted that interpersonal factors would have a greater impact on condom use in women who work on the streets than in women who work in bars.

*Hypothesis 2b***.** It was hypothesized that community factors would have a greater influence on condom use in bar workers than in street workers.

Hypothesis 2c. It was hypothesized that bar workers would have more institutional support for condom use and these institutional factors would have a greater influence on condom use behaviors in bar workers than street workers.

CHAPTER 2

RESEARCH DESIGN AND METHODS

Hypotheses were examined through baseline data from a larger study conducted by Dr. Thomas Patterson (Patterson et al., 2006a). The study was funded to implement and evaluate the efficacy of a culturally relevant sexual risk reduction intervention to increase condom use among FSWs who perform high risk behaviors in Tijuana and Ciudad Juarez, Mexico. The current study uses data from the Tijuana site only. To participate in the intervention women had to be at least 18 years of age, and report any form of unprotected sex (vaginal, oral, anal) with commercial partners (clients) in the past two months. Informed consent was obtained from the participants in accordance with the UCSD'S Institutional Review Board's Human Subjects protocol. If women met the eligibility criteria they participated in one counseling session approximately 30 minutes in duration. Intervention counselors used motivational interviewing techniques to address a core set of interrelated constructs (i.e., attitudes, intentions, knowledge, and self-efficacy) to reduce high-risk sexual behavior (Patterson, et al 2006a). Prior to and following the intervention, study participants completed the "Sexual Risk Appraisal" (SRA), which was administered in Spanish via an interview format to ensure that participants understood each question. The women who participated in the intervention were compensated $30 for their time.

Participants. The current study uses the baseline data collected between September 2004 and March 2006 from women participating in the above-mentioned intervention. Four hundred and seventy four women met eligibility criteria and completed baseline measurements in Tijuana. Only women who reported sex work

their main source of income were included in the analyses, leaving a sample of 472 (See Table 1 for participant characteristics). In our sample, the FSWs had attended an average of 6.7 years of school and were approximately 32.9 years old. They reported working an average of 44 hours a week (Inter-Quartile Range (IQR) 30-56 = 26) and had met with an average of 20 clients in the past six months (IQR = 5-23 = 18). A majority of the women reported having children (92.2%) and within the sample women reported having a mean of 2.25 (IQR= 1-3 = 2) financial dependants. More than half of the sample was single (54.2%) and almost a fifth reported cohabitation or marriage (19.3%).

Measures

The SRA administered to the participants before and after the intervention included measures that tapped specific aspects of the Social Ecological Model, including level of social support, community norms, and access to condoms. The measures used for the current study are described below.

Individual

Condom Use Beliefs/Outcome Expectancies. A 5-item scale was used to measure participants' condom use beliefs. This scale was found to be moderately reliable in the current sample with an alpha coefficient of .64 and inter-item correlations ranged between -.003 and .449. The positively worded question "(I believe that condoms will protect me from getting HIV") was the item with the lowest inter-item correlation, even after recoding. Considering the scale was still moderately reliable the item was retained in the final scale. The other 4 questions that composed the scale were: "I believe that condoms interfere with sexual pleasure;" "I believe that

stopping to put on a condom ruins the moment;" "Using a condom will feel unnatural;" and "My clients will not be sexually satisfied if we use a condom." Response options ranged from 1 (*strongly disagree*) to 4 (*strongly agree*). A composite score was created by obtaining an average of the participant's responses with higher scores indicating more negative beliefs about condom use. This scale was developed to be a measure of outcome expectancies for condom use but items assess beliefs about condoms and the scale is an appropriate measure of the beliefs an individual has about condom use and its consequences.

HIV/AIDS Knowledge. Eighteen true/false questions were administered to assess the participant's HIV/AIDS knowledge. The measure included questions relating to the transmission and prevention of HIV/AIDS (e.g., "Using Vaseline or baby oil with condoms lowers the chance of getting HIV;" "Coughing and sneezing DO NOT spread HIV"). A composite score was created based on the number of correct answers, with higher scores indicating a higher level of knowledge. Coefficient Alpha for this measure was adequate, at .62, in this sample.

Condom Use Self-efficacy. Participants' condom use self-efficacy was measured with 5 items scored on a 4-point Likert scale. Items included, "I can use a condom properly;" "I can use a condom every time I have vaginal or anal sex;" "I can have condoms available every time I have vaginal or anal sex;" "I can use a condom for sex while under the influence of drugs or alcohol;" and "I can use a condom without any instruction." Response options ranged from 1 (*strongly disagree*) to 4 (*strongly agree*). Scores were averaged to create a composite score that was used in the analyses. This scale was found to be reliable with an alpha coefficient of .77.

Substance Use Before sex. Participants were asked to respond to two questions measuring the frequency with which they were drinking alcohol or using drugs before having sex with their clients in the past month, as follows: "In the past month how often did you use alcohol before or during sex with a client;" "In the past month how often did you use an illegal drug before or during sex with a client?" Response options included never, sometimes, often, or always. Questions were standardized and Z scores for each item were used separately in the analyses.

Interpersonal

Social Support

Abuse. Three scales measuring lifetime abuse, abuse from partners in the past six months, and abuse from pimp in the past six months were administered. Four separate questions assessed participant's experiences with physical abuse; "In the past six months has your pimp caused or threatened to cause you physical harm such as slapping, punching, kicking, hitting with an object, assaulting with a knife or other weapon?" emotional abuse: "In the past six months has your pimp made you feel bad through harsh words, humiliation, manipulation?" sexual abuse: "In the past six months has your pimp raped, forced sexual advances or non-consensual sex acts?" and sexual harassment: "In the past six months has your pimp made inappropriate physical contact, stalking, using threats to secure sexual contact?" For each question, the response option was either yes (1) or no (0). Responses were summed to create a composite score that was used in the analyses, with higher scores indicating more abuse.

Social Support. Participants' perceived social support was measured using a 7-item questionnaire, scored on a 4-point Likert scale. Participants were asked to note their level of agreement with the following questions; "The people close to you let you know they care about you;" "You have a friend or a relative in whose opinions you have confidence;" "You have someone that you feel you can trust;" "You have people around you that help you keep your spirits up;" "There are people in your life that make you feel good about yourself;" "You have at least one friend or relative you want to be with when you are down or discouraged;" and "You have at least one friend or relative you really confide in." Response options included strongly disagree, disagree, agree, and strongly agree. Scores were averaged to create the composite score of social support used in the analyses. The social support scale was found to be highly reliable in this sample with an alpha coefficient of .85.

Client Factors

Commercial Partner Abuse. Four separate questions assessed participants' abuse experiences with clients in the past 6 months, in the following specific areas: physical abuse; "In the past six months have any of your clients caused or threatened to cause physical harm such as slapping, punching, kicking, hitting with an object, assaulting with a knife or other weapon?" emotional abuse; "In the past six months have any of your clients made you feel bad through harsh words, humiliation, manipulation?" sexual abuse; "In the past six months have any of your clients raped, forced sexual advances or non-consensual sex acts?" and sexual harassment; "In the past six months have any of your clients made inappropriate physical contact, stalking, used threats to secure sexual contact?" For each question the response option was

either yes (1) or no (0). Responses were summed to create a composite score with higher numbers representing more experience with abuse and/or violence from commercial partners.

Client Power Dynamics. To examine the level of empowerment participants felt in their relationships with their regular and non-regular clients, two 9-item scales were administered (Sexual Relationship Power Scale; Pulerwitz, Gotmaker, De Jong, 2000). Participants were asked to think about their regular (or non-regular) clients over the past month and describe the degree to which they agreed or disagreed with the following questions: "If I asked my regular (non-regular) client to use a condom he would get violent;" "If I asked my regular (non-regular) client to use a condom he would get angry;" "When my regular (non-regular) client and I are together, I'm pretty quiet;" "My regular client (non-regular) has more to say than I do about important decisions that affect us both;" "If I asked my regular (non-regular) client to use a condom, he would think I'm having sex with other people;" "My regular (non-regular) client does what he wants, even if I don't want him to;" "I am more committed to our relationship than my regular (non-regular) client is;" "My regular (non-regular) client gets more out of our relationship than I do;" and "My regular (non-regular) client might be having sex with someone else;" Response options ranged from 1 (*strongly disagree*) to 4 (*strongly agree*) on both scales. Pearson correlation analyses showed a high degree of relationship between these scores on the assessment of empowerment with regular and non-regular clients ($r = .62$, $p<. 01$) and as a result mean scores for each measure were averaged to create the composite score used in the final analyses with higher scores representing a lower level of empowerment and more perceived

client power. Alpha coefficient's for the regular (α = .65) and non-regular (α = .66) clients power scales were found to be moderately reliable in this sample.

Increased monetary rewards for unprotected sex. During the interview, participants were asked how much money they earn per sex act if they use protection and how much they earn if they perform sex without a condom. These qualitative data were examined to determine if participants are being offered more money for performing sex acts without protection. For the analyses, a variable describing how much more money a FSW reported receiving for sex without a condom was created by subtracting the amount of money a woman reported making if wearing a condom from the amount of money she reported making for not wearing a condom.

Institutional/Structural

Condom Access. To measure condom access a composite score was created by summing all of the locations participants report getting condoms, (e.g., municipal clinic, from your fellow sex workers, from your pimp), and how often they reported getting condoms for free which was measured as never (0), sometimes (1), often (2), and always (3). Higher scores represented greater access to condoms, scores ranged between 3 and 6 (M=3.78, SD=. 85) in the current sample. Participants were also asked if they are able to get condoms at work. Response options were either yes (1) or no (0).

Working conditions. One question was asked to measure FSWs perceived working conditions. Participants were asked to rate their overall working conditions, according to the following response options; extremely bad, bad, neither good nor bad, good, or extremely good. Higher scores indicated better working conditions.

Community

Social Norms for Condom use. One item was used to measure social norms for condom use. Participants were asked to think about their fellow sex workers and describe to what extent they feel their fellow sex workers have unprotected sex with clients. Participants were asked to rate the frequency in which they believed this behavior occurred, response options ranging from 1 (*never)* to 4 (*always*).

Dependent Variable

Condom Use. Our primary outcome variable of condom use was measured by asking the participants to recall the number of unprotected sex acts she performed in the past two weeks. Women were asked, "In the past two weeks how often did you not use condoms for oral, vaginal, and anal sex with your male clients?" Responses across the three types of sexual acts were summed to create a total score for unprotected sex with higher scores representing less condom use. This variable showed an extreme positive skew and a log transformation was performed to standardize the variable.

CHAPTER 3

RESULTS

The data set was examined using SPSS v 15.0 to determine accuracy of data entry, missing data, and skewness. Several variables were found to be positively skewed (condom use, age, amount of money earned for non-condom use) and were logarithmically transformed. Most variables had less than 10% missing data, while the extreme missing data was found on the condom access variable (>50%). This was handled using full information maximum likelihood estimation (FIML). FIML estimation has been found to provide unbiased estimates if the data are missing at random. Missing at random (MAR) is a condition that exists when missing values are not randomly distributed across all observations but are randomly distributed within one or more subsamples (e.g., missing more among whites than non-whites, but random within each subsample; Klein, 2005). Some authors have suggested that Maximum Likelihood estimates will tend to show less bias than estimates based on pairwise deletion or listwise deletion even when the data deviate from "missing at random" criteria (Little & Rubin, 1989; Muthén, Kaplan, & Hollis, 1987). AMOS version 7 (Analysis of Moment Structures; Arbuckle, 2006) was used to run FIML to handle missing data on all of the variables.

Participant Characteristics.

In the sample, 42.7% (n=202) of the women described the street as their main venue for sex work, 49.3% (n=233) identified themselves as bar workers, and the remaining 7.8% (n=37) identified "other" as their primary venue. Those who identified as "other" (n=37) were not included in the remainder of the analyses. The

women working in the bars reported an average of 6.79 (IQR= 5-9) years of education and a mean age of 33.48 (IQR 26-39). (Table 2) They reported working an average of 43.17 (IQR=32-56) hours a week, and an average of 288.11weeks (IQR=42.5-364) or 5.54 years working in the sex trade. Approximately 32.2% (n=75) of this subgroup reported being registered with Tijuana's Municipal Health Department. The women working on the street had a mean age of 32.57 (IQR=25-38) and an average of 6.44 (IQR= 4-9) years of education. FSWs working on the street reported an average of 318.50 weeks (IQR=104-416) or 6.13 years working in the sex trade, and only 7.4% (n=15) report being registered with Tijuana's Municipal Health Department.

Correlations

In primary aim 1 it was hypothesized that latent constructs consistent with the Social Ecological Model would be composed of several indicator variables (Figure 3). A correlation matrix was run to explore bivariate relationships among the variables (See Table 3). Previous abuse from clients was related to relationship power (-.198, p<. 01), lifetime abuse (.322, p<. 01) and unprotected sex (.101, p<. 05) but not to increased monetary rewards for unprotected sex (.014 ns) which was hypothesized to be an important client variable. Working conditions was related to condom access (.102, p<. 05) and unprotected sex (-.113, p<. 05). Community norms for unprotected sex were related to community norms for injection drug use (.130, p<. 01), community norms for substance abuse (.216, p<. 01), and frequency of unprotected sex (.183, p<. 05). Community norms for substance use and injection drug use were also positively correlated (.237, p<. 01).

Comparison of Bar and Street Workers

Chi-square tests were used to compare differences for binary variables and Analyses of Variance (ANOVAs) were used to examine differences on the continuous independent variables between bar and street workers.

The women who worked in the bars reported more financial dependants than the women who worked on the streets ($F(1,434)=9.70$, $p=.002$, $\eta^2= .02$) and fewer regular ($F(1,430)=4.29$, $p=.039$, $\eta^2= .01$) and non-regular clients ($F(1,430)=16.59$, $p<.001$, $\eta^2= .04$). As hypothesized, the women who worked in the bars reported more condom use than women who worked on the street ($F(1,427)=9.63$, $p<.01$, $\eta^2= .02$).

Women who identified the bars as their main location for sex work also reported having greater access to condoms ($F(1,189)=5.54$, $p=.02$, $\eta^2= .03$), a higher level of condom use self-efficacy ($F(1,430)=5.30$, $p=.02$, $\eta^2= .01$), and more emotional support ($F(1,430)=7.10$, $p=.008$, $\eta^2= .02$). (See Table 4). Street workers reported more commercial partner violence than the women working in the bars ($F(1,430)=4.16$, $p=.04$, $\eta^2= .01$). Although women did not significantly differ in the amount of money earned for sexual intercourse in general, a significant difference was found when comparing the amount of money women earned for not wearing a condom. Bar workers reported making an average of 20 dollars more per unprotected sex act than the women who worked on the street for sex without condoms ($F(1,421)=5.79$, $p=.017$, $\eta^2= .01$).

Differences among the women on several drug use variables were examined to determine the nature of drug use in each sample. (See Table 5 for all drug use comparisons between bar and street workers). Chi-square statistics compared bar and

street workers on the types of drugs ever used and route of ingestion. Overall, women who worked on the street used more drugs and were more likely to have ever injected drugs ($\chi^2 = 41.01$, p<. 001) when compared with the women working in bars (See Table 5). ANOVAs comparing bar and street workers showed that the women working in bar settings reported more alcohol use before sex (F= 63.63, p<. 001, η^2= .06), whereas the women working on the street were more likely to use drugs before sex with a client relative to bar workers (F= 22.37, p<. 001, η^2= .03). Significant differences show an overall higher level of drug use in the women working on the street while alcohol use was found to be higher among the women working in the bars.

Primary Aim 1

Confirmatory Factor Analysis. The current study sought to establish the use of the Social Ecological Model as an appropriate framework for examining condom use behaviors among FSWs. To do this we used Structural Equation Modeling to model relationships between unobserved (latent) variables (Social Support, Client, Community, Institutional) and the outcome variable (condom use). It was hypothesized that the Community and Institutional levels would each be represented by one latent variable, while the Interpersonal level was hypothesized to be composed of two latent variables, Social Support and Client (See Figure 3 for proposed indicators for latent variables). In structural equation modeling, a confirmatory factor analysis tests how well the observed indicators can be explained by, unobserved latent variables (referred to as the measurement model). We used a Confirmatory Factor Analysis (CFA) to test whether the measurement model had an adequate model fit. To evaluate model fit of a CFA the following criteria were used: convergence of the

model, Chi Square Statistic (with non-significance indicating better overall model fit), and standardized factor loadings of individual indicators on latent variables (significant if p<.05; Klein, 2005).

Using data from the entire sample (N=472), a CFA was performed using AMOS version 7 to examine the hypothesized latent structure of the proposed individuals predictors (Figure 3). For the Social Support latent variable a Chi-Square statistic (χ^2 (df 2)= 1.62, p=. 45) was provided, but reported the solution was not admissible due to negative error variances and the latent variable could not be identified. There were three significant standardized factor loadings for individual predictors (social support: β= -.26, p<. 01; partner abuse: β= .87, p<. 001; and previous abuse from a pimp: β= 1.10, p<. 001) and one non-significant factor loading (lifetime abuse: β= .38 ns). The Client latent variable could not converge and no chi-square statistic was provided. Individual variables were, previous commercial partner violence (β= .29, ns.), power dynamics with regular and non-regular clients (empowerment; β= -.69, ns.), and increased monetary rewards for unprotected sex (β= -.20, p<. 01).

Considering Institutional and Community latent variables, neither latent variable converged after the default number of iterations allotted by AMOS and no Chi-Square statistics could be computed. However, the individual predictors (e.g., norms related to injection drug use, norms related to alcohol use) did load significantly. Items that loaded significantly onto the Institutional latent variable were "can you get condoms at work" (β= 5.72), access to condoms (β= .55), and working conditions (β= -.01). Items that loaded significantly onto the Community exogenous

latent variable were social norms related to alcohol use (β= .66, p<. 01), social norms related to injection drug use (β= .37, p<. 001), and social norms related to condom use (β= .34).

Since none of the four proposed latent factors (Social Support, Client, Institutional, Community) met all the criteria for good model fit (convergence, non-significant Chi Square statistic, had significant factor loadings), the results show that the independent variables do not appear to represent latent constructs. Thus, path analysis was more appropriate to explore the relationship among the observed variables in the model.

Path Analysis: Path analysis is a form of Structural Equation Modeling that is used when there are only single measures of the theoretical constructs available. A model was developed with observed variables (Figure 4) to explain relationships between individual predictors and condom use in the full sample.

In path analysis, the use of the chi-square likelihood ratio test to assess model fit has been deemed unsatisfactory for numerous reasons (see Tanaka, 1993). Many researchers have suggested using multiple measures of model fit because of these limitations (e.g., Hoyle, 2000; Tanaka, 1993). In the present study, the following measures were employed, as recommended by Hu and Bentler (1999): 1) the Comparative Fit Index (CFI; Bentler, 1990), with values greater than .95 indicating reasonable model fit; and 2) and the Root Mean Square Error of Approximation (RMSEA; Steiger, 1990), with values less than .06 indicating reasonable model fit. A model was determined to fit well if both criteria were met. In evaluating the statistical

significance of individual model parameters (e.g., factor loadings, structural [path] coefficients), a statistical significance level of .05 was employed.

For the path analysis, a total abuse variable was created by summing the participant's responses on the abuse scales (partner, pimp, lifetime) to create a continuous measure of abuse that the women have experienced. Pearson Product-Moment Correlation analyses showed a high level of correlation between pimp and partner abuse in the 8 women who had data on both measures (r =. 98, p<. 001). Partner abuse was moderately correlated with lifetime abuse (r =. 29, p<. 001) whereas pimp abuse was not (r = -.02). As a result, pimp abuse was dropped and only lifetime abuse and partner abuse were summed and entered in the path analysis as the abuse variable.

The observed variables that were originally hypothesized to load on latent variables (commercial partner violence, social norms for unprotected sex, social support, working conditions) were entered in the path analysis as exogenous variables and the client power variable was entered as an endogenous variable. The observed variable "Do you get condoms at work?" was not included but condom access observed variable was retained. In addition, age and length of time working as a sex worker were entered in the model to explore the influence of demographic factors on condom use and to control for these in estimating the model.

After model specification, Amos v.7 was used to run the non-recursive model using the entire sample to establish model fit among all women (Figure 4). Model chi-square was significant (χ^2 =433.45, df = 80), the root mean square error of

approximation (RMSEA) was .10, and the comparative fit index (CFI) = .341, all indicating a poor fit of the model.

To obtain a parsimonious model and better model fit, all paths of the initial model that were not statistically significant were deleted (see Figure 5). Specifically, the variable assessing "working conditions" was dropped from the model due to non-significance, leaving the following exogenous variables for the final model: age, previous abuse, social support, client power, commercial partner violence, monetary rewards for unprotected sex, condom access, community norms for unprotected sex, alcohol use before sex, knowledge, and length of time as a sex worker. Endogenous variables were drug use before sex, condom beliefs, self-efficacy for condom use, and unprotected sex. Direct causal paths were defined from the client empowerment variable, community norms, monetary rewards, self-efficacy and length of time working as a sex worker exogenous variable, to the unprotected sex endogenous variable. Several interpersonal exogenous variables (social support, previous abuse, and empowerment with clients) had significant causal paths to the drug use before sex endogenous variable and condom access was also significantly related to drug use before sex. Previous commercial partner violence was negatively related to level of empowerment with clients (see Table 6 for all path estimates for the full model). Social support was significantly related to condom use self-efficacy in the entire sample and this path was included in the final model. Other variables were significantly related to self-efficacy, including: drug use before/during sex, alcohol use before/during sex, condom access, community norms for unprotected sex, and condom use beliefs. There was also a significant path between knowledge and condom use

beliefs but not between knowledge and unprotected sex, supporting our previous hypothesis.

Primary Aim 2

Baseline model fit. In addition to establishing individual, interpersonal, institutional, structural, and community components as important factors related to condom use, this study examined if these components impact condom use behaviors similarly in FSWs independent of working environment. To do this we first sought to determine fit for the previously developed model (Figure 5) in the sample of bar workers (see Figure 6) and in the street sample (see Figure 7) independently. Fit indices for these two models are presented in Table 7. Chi-square, RMSEA and CFI all indicated that the model did not fit well in either group.

To obtain a parsimonious model and better model fit, all paths of the initial model that were not statistically significant were deleted. In addition, modification indices (MI) were used to explore how model fit would improve if paths between variables were estimated. The Lagrange Multiplier (LM) test predicts the amount by which estimating a fixed path would cause decreases in the overall model chi-square statistic. Thus the greater the value of the modification index the greater the improvement in overall fit if that path were added to the model. It should be emphasized that although modification indices have been found to be effective in reducing misspecification of models (Sorbom, 1989) prior theory must be used specify a final model that is relevant, meaningful and interpretable.

The LM test indicated that in the bar sample adding a path from social support to empowerment with clients (MI=13.79), and from empowerment with clients to

condom use beliefs (MI=64.50) would improve overall model fit. Incorporating the modification indices, dropping the drug use variable, and the path between social support and self-efficacy in the bar workers lead to a significant improvement in overall model fit (CFI = .890, RMSEA =. 062; see Table 8 for Goodness of Fit Statistics). In the street sample the LM test found that adding a path from increased monetary rewards to self-efficacy (MI=4.40) and correlating client abuse with previous abuse (MI=27.90) would improve our model fit substantially. After adding the suggested paths, deleting the alcohol use variable, while also deleting the paths from empowerment with clients (client power) to self-efficacy and drug use as well as the path between length of time as a sex worker to unprotected sex, since they were non-significant, led to an improvement of overall model fit. The chi-square statistic became non significant ($\chi^2 = 31.59$) while CFI (.928) and RMSEA (.040) signifying better model fit (Table 8).

Figures 8 and 9 show baseline models with significant paths and standardized and unstandardized regression coefficients for bar workers (Figure 8) and street workers (Figure 9). Comparisons of paths found that drug use before sex was positively related to previous abuse (B =. 20, p<. 01) and negatively related to condom use self-efficacy (B =-.27, p<. 001) in the street workers whereas these paths were not included in the final bar model. Length of time working as a sex worker (B =. 17, p<.01) was related to more unprotected sex in the bar workers but this relationship was not included in the final street model.

Overall, baseline models demonstrated similarities and differences between the two groups of sex workers. In both groups, community norms for unprotected sex

were not significantly related to unprotected sex and lower levels of unprotected sex were related to higher levels of perceived empowerment with clients. Condom use self-efficacy was also negatively related to unprotected sex in all women, with higher self-efficacy indicating less unprotected sex. Several paths were shown to be different between the bar and street workers. Unstandardized estimates showed that higher perceived client power was related to greater substance use before sex in the women who work on the streets (B = .48, p<. 05). For these women, receiving more money for unprotected sex (B =. 27, p<. 01) was related to more unprotected sex and lower self-efficacy for condom use (B = -.40, p<. 05) but for the women who work in the bars these paths were not significant (Figure 8). Condom access also showed differential effects in bar and street workers. Significant paths were found between condom access and condom use self-efficacy (B =. 34, p<. 001) in the bar workers while condom access was related to drug use before sex (B =. 55, p<. 001) in the street workers but not to self-efficacy (B=. 30).

Multiple Group Partial Structure Invariance. After the overall baseline model was established in both samples, a multiple group path analysis was used to establish structural invariance across both groups. During multiple group analyses, the theoretically derived model is re-run but constrained so that the structural paths are set to be equal across groups. A chi-square value and its accompanying degrees of freedom are provided as a goodness of- fit index at each step. The chi square difference test is then used to determine if the groups differ on these paths. If the chi square difference test is non-significant the multiple group solution fits better, and no differences are found between the groups on the paths tested. If the baseline and

constrained models are not different, we can infer that the model fits appropriately in both groups. The Lagrange Multiplier (LM) test for releasing constraints was also used to determine if any constrained path should be freed and estimated separately in each group. If LM test for releasing constraints is significant, the path estimates are significantly different between the two groups. In our sample only the five paths that were found to be similar in the two models were constrained and compared, thereby testing partial structural invariance.

To test the hypothesis about the similarity or invariance of the baseline models of the bar and street workers EQS 6.1 was used to run the multiple group analysis. The five paths tested include the paths between empowerment, self-efficacy, monetary rewards and unprotected sex, the path between condom access and self-efficacy, and the path between client abuse and empowerment with clients. Full information maximum likelihood estimation (FIML) was not possible with EQS, due to a limitation in the software, and therefore our sample size was reduced by more than 50% for these analyses, bar (n=103, 44%) and street (n=79, 39%). Multiple group analyses showed that the Chi-square statistic and the degrees of freedom did not decrease significantly from Step 1 ($\chi^2(77) = 94.29$) to step 2 ($\chi^2(82) = 100.59$) when path coefficients were assumed to be the same in both groups ($\Delta\chi^2(5) = 6.30$). In examining the Lagrange Multiplier Test for releasing constraints, the path between more money for condom use and unprotected sex approached significance ($\chi^2(1) = 3.28$, $p = .07$). However this did not warrant releasing this constraint to be tested separately in each group. These findings show that the model did not differ significantly across bar and street workers amongst the five paths that were tested.

CHAPTER 4

DISCUSSION

In the present study we explored the applicability of the Social Ecological Model (SEM) to explain condom use behaviors in a sample of sex workers living and working in Tijuana, Mexico. After comparing bar and street workers, we found that individual level factors (self efficacy, condom use beliefs, knowledge, alcohol use) and institutional level factors (condom access) were important in explaining condom use in bar workers. For the women who worked on the street interpersonal level predictors (social support, previous abuse) and drug use were indirectly related to unprotected sex.

Our preliminary analysis found the variables thought to represent the social support, client, community and structural constructs were not correlated enough to statically converge as latent factors to be measured in Structural Equation Modeling. Although disappointing, it does not diminish the value of this model for explaining complex health behaviors that are influenced by environmental factors (Sallis et al., 2006). Measuring complex interactions between the environment and the individual requires careful planning and the selection of adequate measures for the constructs of interest. The self-reported nature of the measures used in the current study limits our ability to accurately measure environmental level factors such as working environment or institutional support for condom use. Nonetheless, when a path analysis was used to explore each observed variable separately, environmental level factors were found to significantly impact self-efficacy for condom use in FSW. Access to condoms differed significantly between the bar and street workers, with bar workers reporting

more access, and was related to increased self-efficacy in this group. Community level social norms were significantly related to unprotected sex in the entire sample but were later non-significant when tested separately in the bar and street samples. This may be related to a restriction of power as a result of the reduction in sample size. The consistent finding that bar and street workers differ on condom use, drug use and the factors associated with these behaviors, lends credence to the inclusion of structural and environmental targets when developing interventions for this population. The combination of more clients, less condom use, and higher drug use places the women who work on the streets at a very high risk of contracting HIV. These women are more likely to benefit from interventions that address their drug use (e.g., needle exchange), in addition to their condom use, while increasing access to condoms could specifically benefit bar workers. As hypothesized, one of the institutional factors proposed (i.e., condom access) was related to condom use indirectly by increasing condom use self-efficacy in the bar workers but not in the street workers. Although the current study did not explore policy level factors, future research should explore the relationship between policies requiring condom use, the enforcement of these policies and actual condom use in FSWs around the world. Research with more appropriate measurement of SEM components is necessary before this model can be used to explain condom use. However, the findings of the current study show that it is a promising way of conceptualizing condom use behaviors.

In exploring the role of interpersonal level factors on condom use behaviors, we found that in the women who worked on the street, every interpersonal variable measured was significant in the final model. Although not directly related to condom

use, greater perceived social support was a protective factor that related to lower rates of drug use before sex, whereas lifetime abuse-either physical, sexual, or sexual harassment was related to a higher level of drug use. These findings are consistent with previous research that has found a relationship between previous abuse, social support, and drug use (El-Bassel et al, 2001; Tucker et. al., 2005), highlighting both the protective and harmful effect that interpersonal factors can have on an individual's substance use and other health behaviors. All client factors (client abuse, client power, and increased incentives for non-condom use) were found to be significant in the final street model. In these women experiences with client abuse were negatively related to their perceived level of client power that, in turn, was negatively related to condom use. In other words, increased experiences with client abuse actually increased the level of empowerment women felt in the relationship with their clients and this led to less condom use. Thus, unexpectedly, higher levels of FSW empowerment were related to more unprotected sex. It is possible that if women feel more comfortable or in control with their clients, they may feel less of a threat and, therefore, could be less concerned about condom use. A qualitative study exploring the emotional meaning that British FSWs attach to condoms in a sample of establishment-based sex workers found condoms were used as a form of containing or controlling the commercial sex act (Sanders, 2002). For the women who felt like they had no power, or an imbalance of power, condom use may be a way of regaining a feeling of power by imposing a physical barrier between themselves and their clients. A similar study in Mexico City found that FSWs considered condoms as a "physical and symbolic barrier" that separated their professional lives from their personal lives

(Castaneda, Ortiz, Allen, Garcia, & Hernandez, 1996). Exploring the association between relationship control and substance use before sex revealed that higher levels of client power were related to greater drug use before sex in street workers. In this study a lower level of perceived empowerment put FSW's at a higher risk for drug use before sex, and it is through this mechanism that these women were placed at risk for HIV/STI transmission. Drug use was related to lower self-efficacy, which in turn translated into less condom use.

Consistent with previous qualitative findings, the current study showed that more money for not wearing a condom was related to more unprotected sex in the women working on the street (Bucardo et. al., 2004) and also to lower levels of self-efficacy to use condoms. The importance of interpersonal factors in the women who work on the street supports our hypothesis that these women may lack other avenues of environmental support and have to rely heavily on others when making decisions related to condom use behaviors. It is also noteworthy that the individual level factors significantly related to condom use in bar workers (i.e., knowledge, condom use beliefs) did not explain condom use in the street workers.

One of the most striking differences found when comparing the women who work in the bars to those that work on the street was their use of alcohol and/or drugs before or during sex in the past month. The women who worked in the bars were more likely to use alcohol before meeting with a client while women who identified as street workers were significantly more likely to use an illegal drug before or during sex with a client. Descriptive information showed that nearly two thirds of the women working on the street reported using methamphetamine. Although data were not

collected on the type of drug used in the context of prostitution, it is possible to assume that in some instances methamphetamine was used, considering its impact on sexual performance and its use to enhance sexual desire (Urbina & Jones, 2004; Reback et al., 2004; Volkow et al., 2007). Many studies have explored the role that drug and alcohol use have on condom use, and the current study suggests that this relationship may be mediated by condom use self-efficacy.

Interestingly, in the women who worked on the street, increased access to condoms was related to a greater amount of drug use before sex. Qualitative analysis of the data noted the "prevemovihl" as a source of condoms for these women. This customized van, donated by the University of California San Diego, serves as a mobile HIV prevention clinic, and provides HIV testing and prevention materials in la Zona Norte, a neighborhood with high levels of drug use and sex work (Strathdee, 2006). The drug using women working on the streets are accessing condoms from this van in higher numbers than the bar workers, yet for street workers having access to condoms did not increase condom use self-efficacy or condom use. Drug use was found to be a more salient factor in describing condom use, when compared to other individual, institutional, and interpersonal factors for the women working on the street.

Understanding the role of substance use in prostitution and its relationship to self-efficacy has important implications for developing effective interventions for FSWs. Street workers use more illegal drugs and this may be a driving force for their prostitution. In examining the bar (Figures 6 &8) and street models (Figures 7 & 9), we found that despite the fact that women who worked in the bars were offered on average $20 more for not wearing a condom than the women working on the street,

this discrepancy did not contribute to whether or not they wore a condom. On the other hand, street workers who were being paid less for the same act were more likely to have unprotected sex if there was a monetary incentive and reported lower levels of condom use self-efficacy with increased incentives. Although there are other factors that may be contributing to this phenomenon (e.g., age or length of time as a sex worker), these variables were not found to differ significantly when comparing the two groups. Greater motivation to have unprotected sex because they need the money to support their drug habit is just one possible explanation of this finding but it is an important factor to take into consideration when designing interventions that address the needs of FSWs in Mexico.

In looking at the factors that influence self-efficacy in the women who work in the bars, we found significant relationships with alcohol use before sex, knowledge, empowerment in their relationships with clients, increased access to condoms and condom beliefs (i.e., outcome expectancies). If women believed that using condoms was a positive experience (positive condom use beliefs), they were more likely to feel that they could use condoms appropriately (high self-efficacy). This supports previous research on the influences of self-efficacy and social cognitive theory that describes the role of positive outcome expectancies or beliefs as bolstering self-efficacy (Wang et al., 2007; Bandura, 1986). Both knowledge and client power were found to relate to negative condom beliefs in the current bar worker sample. Surprisingly, women with greater HIV knowledge reported more negative beliefs surrounding condom use. Bandura has proposed that factual knowledge has less of an impact on motivation than the individual's perception of the knowledge (1997). Knowledge regarding HIV and

how it is transmitted may indicate a greater awareness but may not translate into a change in beliefs since there are other influences on the development of condom beliefs, specifically experiences with clients. As shown in Figure 8, for the women who work in the bars, more client power was related to more negative condom use beliefs and those with greater knowledge about HIV transmission also reported more perceived client power.

In the current bar worker sample, we found that length of time as a sex worker (measured in weeks) was significantly related to unprotected sex. Specifically, women who had been working in the bars longer reported more unprotected sex. According to T. L. Patterson, (personal communication, June 11, 2007) the bar community values novelty and youth, and it is possible that as women get older and better known in the bar scene, they may need to be more flexible and not use condoms to be competitive with the younger, less experienced women. For the women who work on the street, length of time in the sex trade was not significantly related to unprotected sex. In their case, financial incentive was more important in determining condom use. As hypothesized, for the women who worked in the bars, individual and institutional level factors (i.e., condom access) played a greater role in their condom use than in the street workers.

HIV prevalence in FSWs living and working in Tijuana is on the rise (Patterson et al., 2006a; Strathdee et al, in press b) and a large number of FSWs in the present study identified having both Mexican and American clients. Understanding the factors that influence condom use in this population is an important public health issue for both Mexico and the United States. FSWs who have clients from the U.S.

are more likely to have STIs, including HIV, highlighting the importance of a binational approach to HIV prevention among FSWs that live and work in border cities (Strathdee et al., in press a). HIV knows no borders and transmission occurs between individuals irrespective of ethnicity or citizenship. The present study hopes to inform the development of tailored, multifaceted interventions to target the factors known to increase HIV risk in this population, (i.e., drug use, non-condom use). Although cross-sectional studies are limited in their ability to provide information regarding whether observed associations are causal, examining associations between different psychosocial or contextual constructs and condom use is useful for hypothesizing routes of causality and can add to the body of evidence in the literature on determinants of behavior change.

It is important to note some limitations of the current study. The sample for the study was taken from baseline measurements of an intervention targeting women who were all practicing high-risk behaviors. The inclusion criteria for the study required women to report unprotected sex with clients in the past two months. Caution should be taken when generalizing the findings of the current study to all FSWs. The current findings do not reflect predictors of condom use in women who are using condoms consistently with their clients. Future studies should examine how the variables included in the present study (e.g. substance use, self-efficacy, access to condoms) interact to explain condom use in FSWs who do use condoms consistently.

To compare the baseline models in the bar and street workers, EQS 6.1 (Bentler, 2003) was used. Unfortunately, EQS is unable to impute large amounts of missing data and uses listwise deletion as a means of managing any missing data.

This resulted in a reduction of sample size of more than 50% in each group. This loss of power is a major limitation of the current study, and specifically, the finding that the path between greater incentives for condom use and level of unprotected did not differ between the two groups when compared in the multiple group analysis. Considering the fact that during model development this path was non-significant for the bar workers and significant for the street workers, and that the LaGrange Multiplier Test for constraints approached significance (p=. 07) during the multiple group analysis it is extremely probable that the reduction of power resulted in this non-significant finding.

Another limitation of the current study is the statistically driven nature of the models' development. One can surmise that if the model is modified on the basis of the data, we are in reality performing an exploratory analysis and the findings of such an analysis should be subjected to a confirmatory analysis in a subsequent dataset.

Considering the differences that were found between bar and street workers in condom and drug use behaviors implementing tailored interventions that address context specific influences seems appropriate. For the bar-FWSs interventions that increase self-efficacy and motivation combined with structural approaches that facilitate access to condoms may be better suited for this population. For street-FSWs addressing drug use and client factors associated with HIV risk, including increased monetary rewards for unprotected sex and client power dynamics would be important targets of a street focused intervention. In street-FSWs drug use was found to be an important factor related to their unprotected sexual behavior, and having interventions that reduce their drug use, (e.g. methadone maintenance, facilitation of treatment

engagement), may be effective in reducing the transmission and acquisition of HIV in this high-risk population.

Future research exploring health behaviors should apply a broad understanding of human behavior and it determinants. Understanding how multiple levels of influence interact with individual factors to promote less risky sexual behavior is vital to help develop more effective HIV prevention interventions for the sex worker population. Context and culture are extremely important in shaping human behavior and should be explored and addressed when developing interventions targeting individuals at a high risk for contracting HIV. Women working in the sex trade would benefit from a multifaceted approach to HIV prevention that addresses both individual and environmental determinants of condom use, including poverty, drug and alcohol use, and location of sex work.

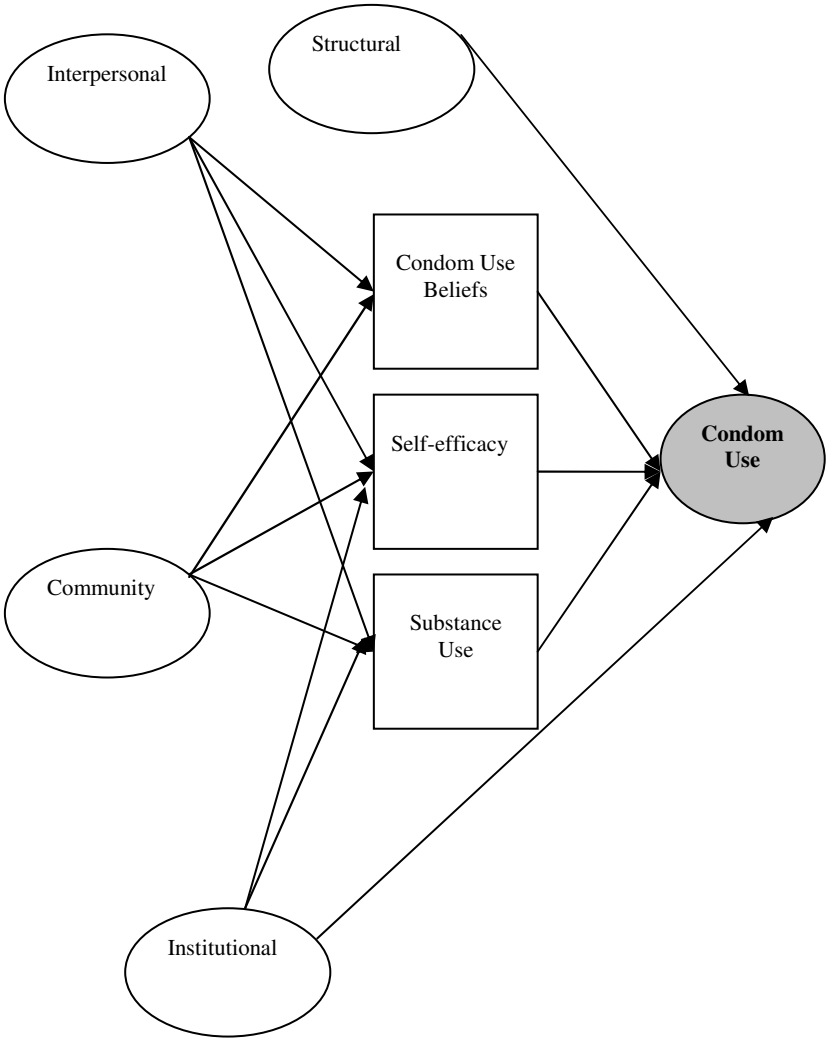


Figure 1: Proposed Social Ecological Model for Condom Use

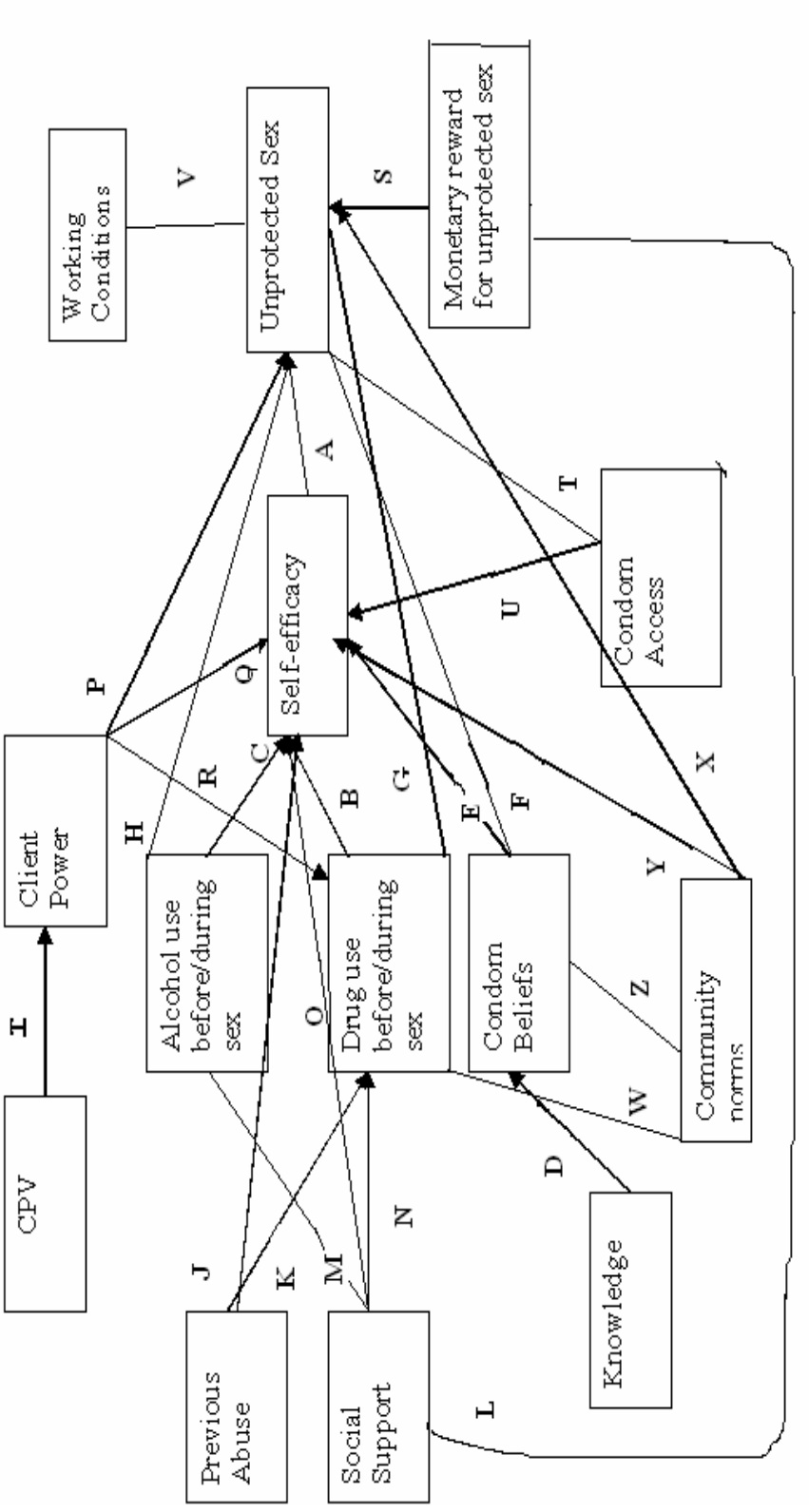


Figure 2: Conceptual Figure of Social Ecological Components and Condom Use

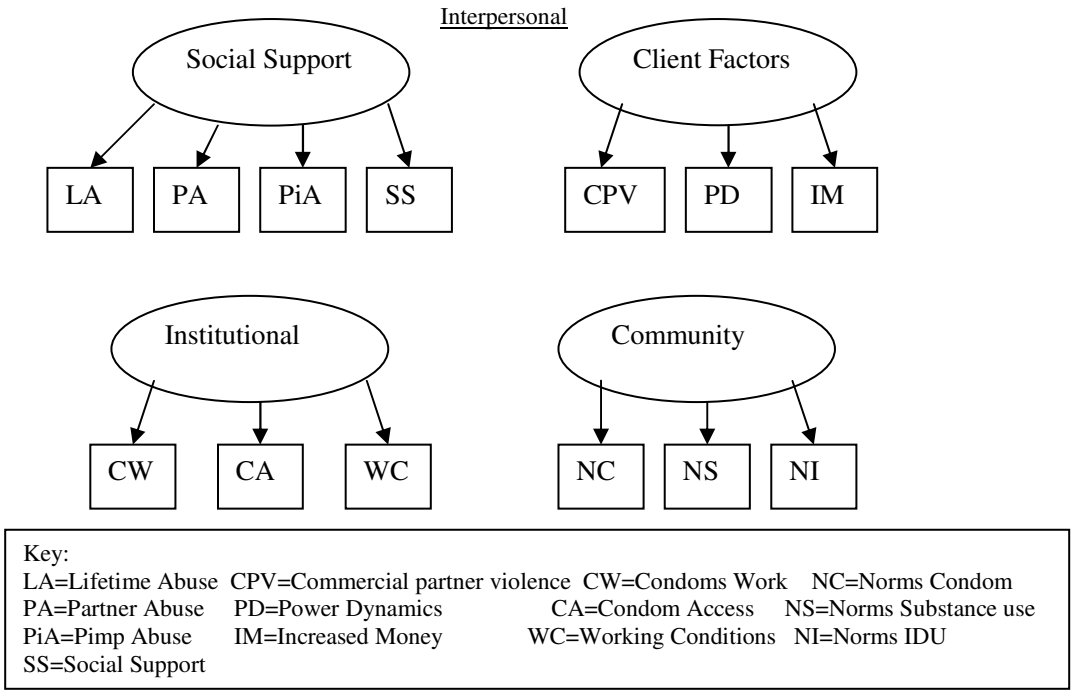


Figure 3: Proposed Latent Variables for Street and Bar Workers

Table 1. Characteristics of Entire Sample

	Entire Sample		
	N		Quartiles (25, 75)
Age	472	M= 32.9	25.00, 38.75
Number of years completed in school	465	M = 6.7	5.00, 9.00
Number of weeks working in sex trade	467	M = 300.63	63.50, 416.00
Number of regular clients (past month)	470	M = 5.40	2.00, 6.00
Number of non-regular clients (past month)	470	M = 13.71	2.00, 15.00
Marital Status	472		
Married		10 (2.1%)	
Separated		74 (15.7%)	
Divorced		29 (6.1%)	
Living Together		81 (17.2%)	
Single		256 (54.2%)	
Widowed		22 (4.7%)	
Have Children	472	435 (92.2%)	
Number of Children	469	M=2.74	1.00, 4.00
Registered with city as a sex worker	162	101 (21.3%)	
Number of unprotected vaginal sex acts (past month)	465	M= 12.69	2.00,14.00
Number of unprotected oral sex acts (past month)	272	M= 9.44	1.00, 11.00
Number of unprotected anal sex acts (past month)	94	M= 6.61	1.00, 7.25
Previous HIV test	472	311 (65.6%)	

Table 2: Demographics for Bar and Street Workers

	Bar			Street		
	N		Quartiles (25, 75)	N		Quartiles (25, 75)
Age	233	M = 33.48	26.00, 39.00	200	M = 32.57	25.00, 38.00
Marital Status	233			201		
		6 (2.6%)			4 (2.0%)	
Married		**47(20.2%)****			**23 (11.4%)****	
		20 (8.6%)**			**6 (3.0%)****	
Separated		**27(11.6%)****			**48 (23.9%)****	
		119 (51.0%)			113 (56.2%)	
Divorced		14 (6.0%)			7 (3.5%)	
Living Together						
Single						
Widowed						
Number of years completed in school	230	M = 6.79	5.00, 9.00	196	M = 6.44	4.00, 9.00
Number of financial dependents	233	**M= 2.50****	1.00, 4.00	202	**M = 1.96****	0.00, 3.00
Number of weeks working in sex trade	231	M= 288.11	42.50, 364.00	199	M= 318.50	104.00, 416.00
Number of regular clients (month)	231	**M = 4.50***	1.00, 5.00	200	**M = 6.70***	2.00, 6.50
Number of non-regular	231	**M = 9.62****	1.00, 10.00	201	**M = 19.08****	4.00, 20.00
Unprotected vaginal sex with clients in past month	227	**M = 9.48***	1.00, 10.00	201	**M = 16.98***	3.50, 19.50
Unprotected oral sex with clients in past month	115	**M = 10.64***	1.00, 8.00	132	**M = 12.62***	1.00, 14.00
Unprotected anal sex with clients in past month	33	M = 5.45	1.00, 6.00	50	M = 7.46	1.00, 8.00
Total unprotected anal/vaginal sex with clients (past month)	227	**M = 10.27***	1.00, 10.00	201	**M = 18.84***	4.00, 22.50
Previous HIV test	233	**167 (71.7%)***		202	**123 (60.6%)***	

Table 3. Correlations of study variables

	1 N=458	2 N=468	3 N=468	4 N=468	5 N=468	6 N=468	7 N=468	8 N=201	9 N=468
1.Unprotected sex									
2. Self Efficacy	**-.269****								
3.Condom Use Beliefs	-.106	-.043							
4. Rel. Power	**-.207****	**.151****	**.292****						
5. Lifetime Abuse	.072	-.019	-.051	**-.203****					
6. Social Support	-.086	**.188****	.039	.088	**-.142****				
7. Client Abuse	**.101***	-.016	**-.095***	**-.198****	**.322****	-.025			
8. Condom Access	**-.150***	**.244****	.067	**.240***	-.004	.079	.050		
9. Working Conditions	**-.113***	**.102***	.083	**.148****	-.087	**.134****	**-.120***	**.102***	
10.Community Norms	**.183***	-.117	-.062	-.091	**.135****	**-.116***	**.133****	**-.117***	-.075

** p<.01, *p<.05

Table 3 continued

	Drug use before sex N=467	Alcohol use before sex N=468	Age N=466	Weeks as a sex worker N=463	More $ unpsx N=467	Knowledge N=468
Drug use before sex						
Alcohol use before sex	-.022					
Age	.004	-.033				
Weeks as a sex Worker	**.094***	-.051	**.495****			
More $ unpsx	.061	**-.118***	**.093***	.085		
Knowledge	**.110***	.039	**-.187****	**-.116****	-.024	
Unprotected sex	**.103***	-.005	-.056	**.102***	**.129***	-.040
Self Efficacy	**-.132****	**-.133****	.030	-.006	**-.093***	.085
Condom Use Beliefs	**-.131****	.039	**-.144****	**-.131***	-.024	**.262****
Rel. Power	-.001	-.024	-.063	**-.102***	**-.112***	**.192****
Lifetime Abuse	**.249****	.000	.038	**.151****	.021	.026
Social Support	**-.150****	.020	-.066	-.048	**-.103***	**.100***
Client Abuse	**.096***	-.015	-.061	.085	.014	-.038
Condom Access	.005	.085	-.068	-.079	-.005	**.145***
Working Conditions	-.071	.025	-.069	-.072	**-.100***	**.135****
Community Norms	.126	-.011	.010	.038	.054	.006

Table 4: Analyses of Variance for Bar and Street workers

	Bar			Street					
	N	Mean	SD	N	Mean	SD	df	F	Effect Size (η^2)
Condom Access	109	3.89	.91	81	3.60	.68	1,189	5.54	**.02***
Total Abuse (lifetime, partner, pimp)	231	2.78	1.51	200	3.05	1.92	1,430	2.70	.01
Commercial partner violence	231	.58	.94	200	.80	1.20	1,429	4.16	**.01***
Condom use self-efficacy	231	3.00	.47	200	2.90	.51	1,430	5.30	**.01***
Condom use beliefs	231	2.67	.43	200	2.67	.42	1,430	.00	.00
Average amount earned without a condom	233	296.63	1018.12	202	205.27	258.27	1,434	1.54	.00
Average amount earned with a condom	225	160.93	190.44	197	142.34	138.59	1,421	1.28	.00
Extra amount women earn for unprotected sex	225	34.36	111.67	197	14.57	30.96	1,421	5.79	**.01***
Relationship power	231	2.39	.36	200	2.39	.34	1,430	.01	.00
Emotional Support	231	2.85	.54	200	2.71	.47	1,430	7.10	**.02****

p<.01**, p<.05*

Table 5: Drug use among Sex Workers in Tijuana

	Bar Workers n (%)	Street Workers n (%)	Pearson Chi-Square df (1)
Ever used Alcohol	225 (97.4)	180 (90)	**10.36****
Ever used Marijuana	91 (39.4)	118 (59.0)	**16.50*****
Ever used Methamphetamine	99 (42.9)	127 (63.5)	**18.32*****
Ever Injected Methamphetamine	7 (7.2)	20 (16.3)	**4.12***
Ever used Cocaine	63 (27.3)	81 (40.5)	**8.43****
Ever used Ecstasy	5 (2.2)	15 (7.5)	**6.90****
Ever used Heroin	24 (10.4)	76 (38.2)	**46.30*****
Ever used Cocaine & Heroin mixed together (speedball)	8 (3)	34 (17)	**22.51*****
Ever Injected Illegal Drugs	23 (10)	71 (35.5)	**41.01*****
	Mean (SD)	Mean (SD)	F df (1, 431)
How often used alcohol before/during sex (past month)	2.28 (1.03)	1.54 (.87)	**63.63*****
How often used illegal drug before/during sex (past month)	1.40 (.84)	1.85 (1.10)	**22.37*****

p<.001***, p<.01**, p<.05*

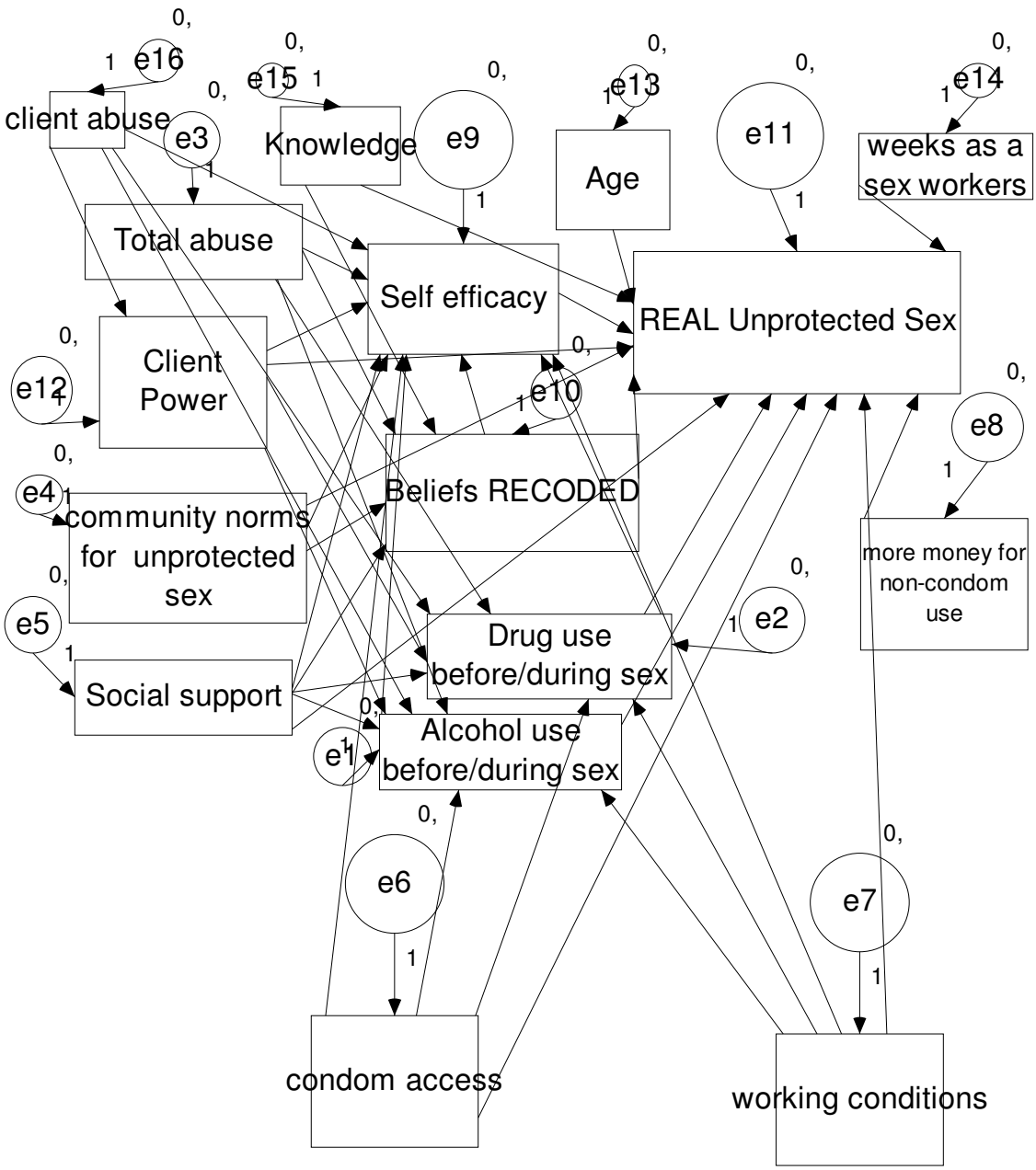


Figure 4: Full Model

Table 6: Path Estimates for Full Model in the Entire Sample

	Endogenous Variables										
Predictor Variables	Self-efficacy		Condom Beliefs		Drug use before/during sex			Alcohol use before/during sex		Unprotected Sex	
	Std	SE	Std	SE	Std	SE		Std	SE	Std.	SE
Age										-.028	.196
Weeks as a sex worker										.140**	.040
Total Abuse	.062	.047	-.053	.044	.228***	.047		-.011	.049		
Commercial partner violence	-.011	.046			.025	.047		-.017	.050		
Client Power	.157***	.126			.056	.129		-.039	.136	-.127	.069
Social Support	.152***	.044	-.001	.045	-.117**	.044		.018	.047	-.002	.024
Community Norms for Unprotected sex	-.083	.044	-.057	.045						.119**	.024
Condom Access	.185**	.076			.157*	.077		.050	.081	.007	.044
Working Conditions	.061	.043			-.044	.044		.050	.047	-.037	.024
Increased monetary reward for non-condom use										.077	.024
Self-efficacy										-.233***	.026
Condom Beliefs	-.118**	.043								-.062	.025
Knowledge			.264***	.044						.031	.025
Drug use before/during sex	-.155**	.047								.020	.025
Alcohol use before/during sex	-.150**	.044								-.011	.024

Note. Std., standardized. *p<.05, **p<.01, ***p<.001

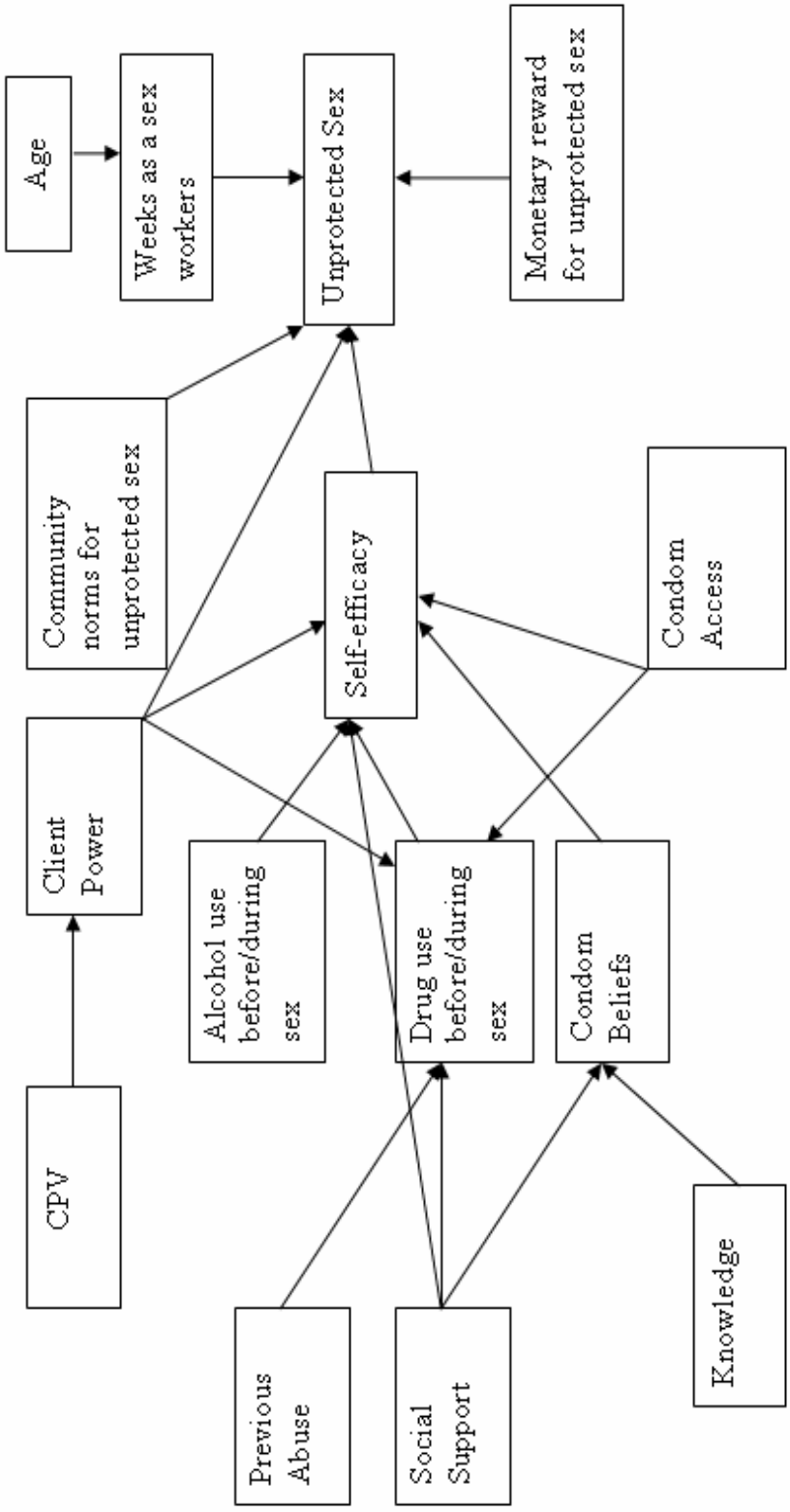


Figure 5: Model Tested in Bar and Street Samples

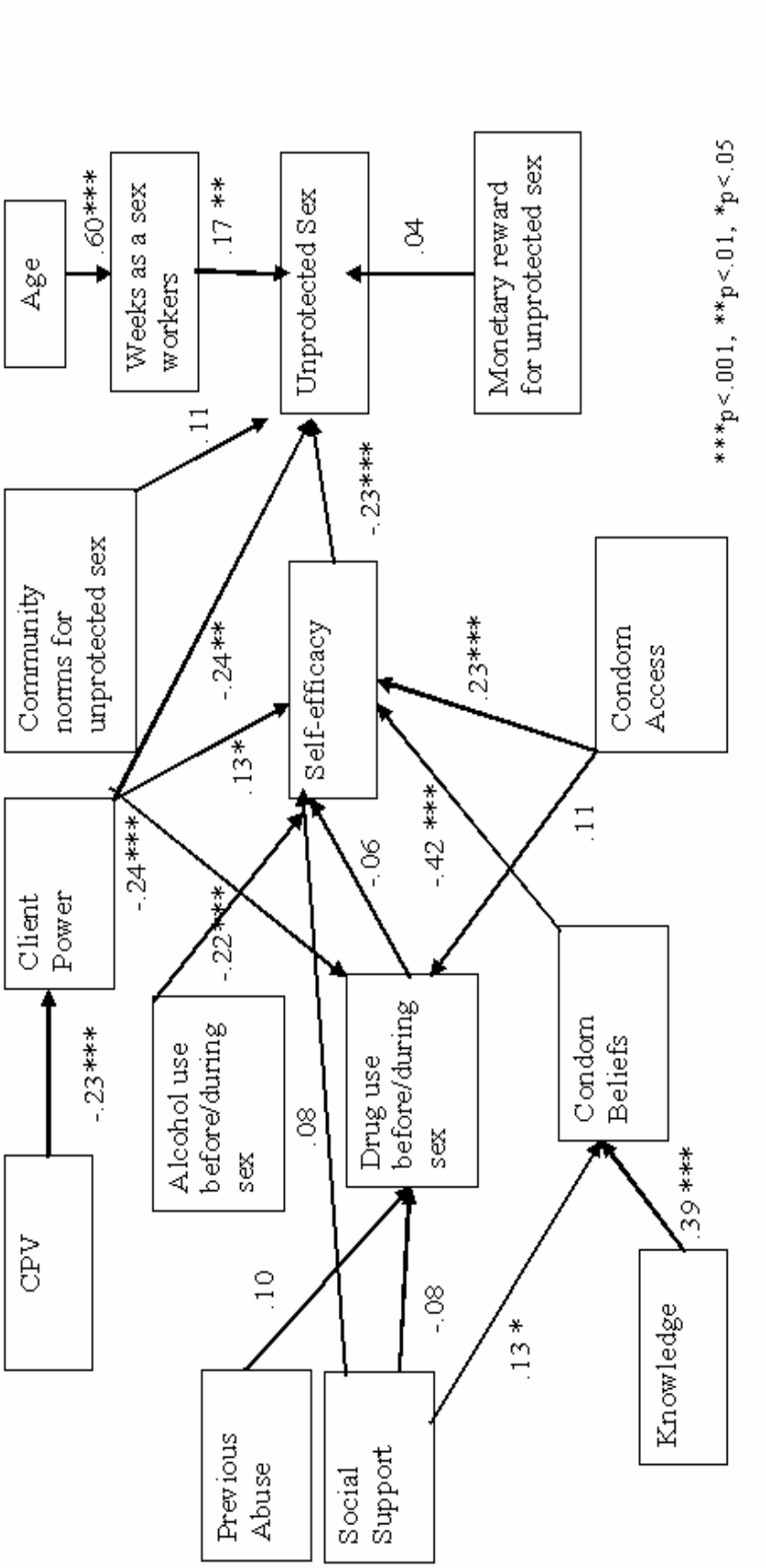
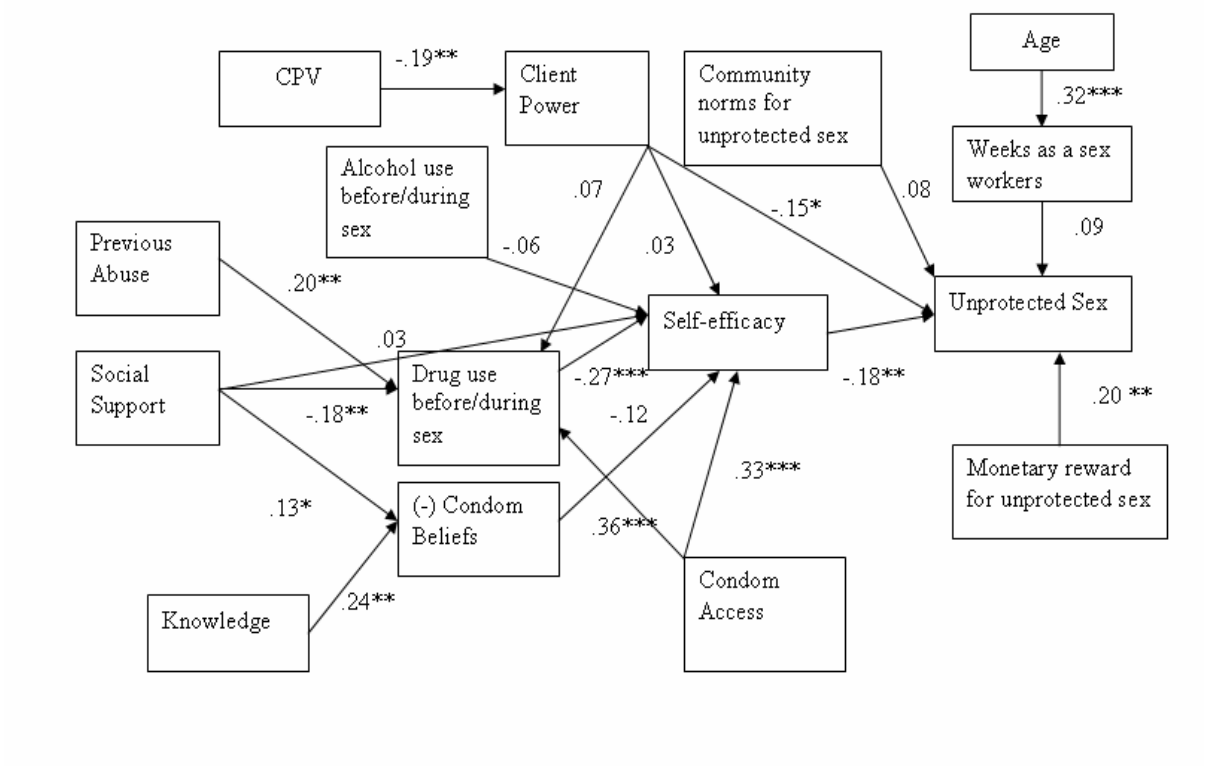


Figure 6: Model in bar workers including standardized regression weights

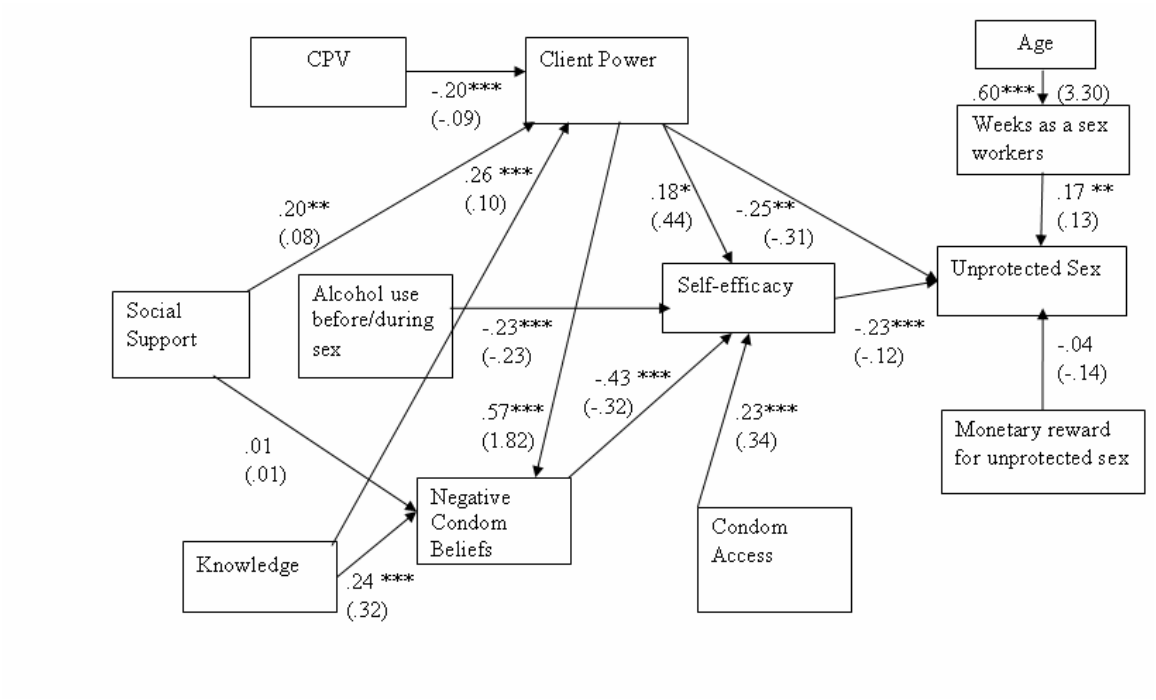


***p<.001, **p<.01, *p<.05

Figure 7: Model in street workers including standardized regression weights

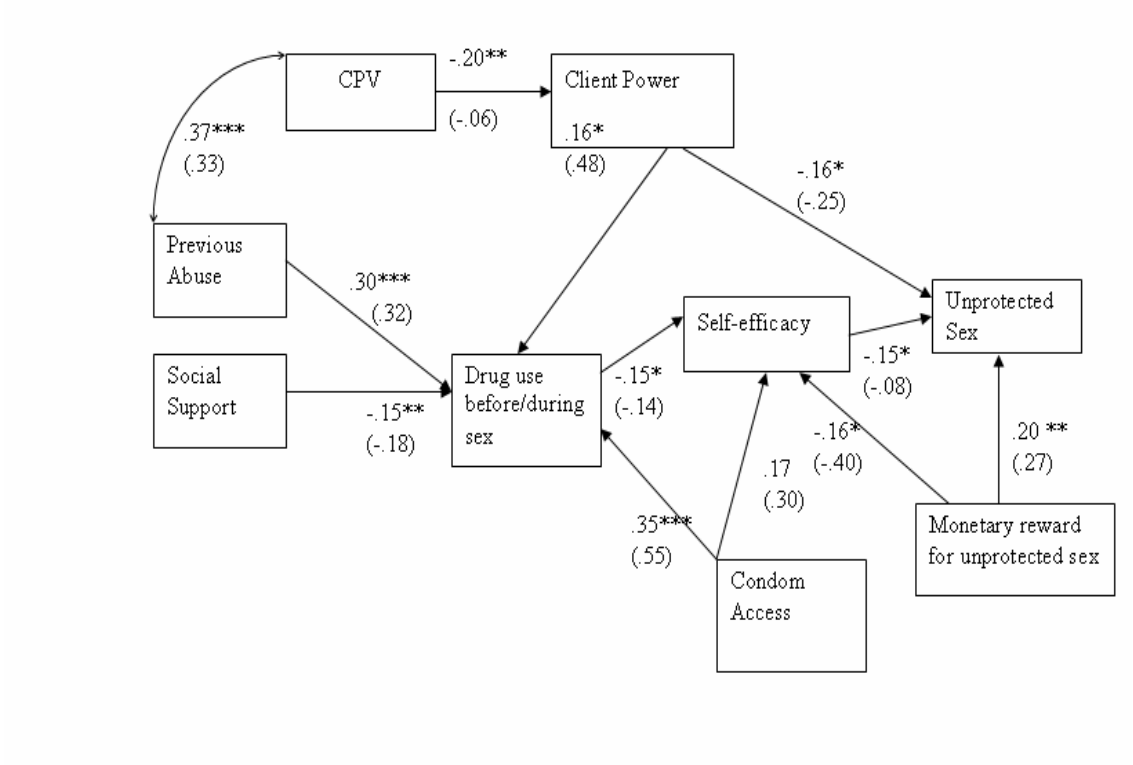
Table 7: Model Goodness of fit statistics for bar and street workers

Goodness of Fit Indexes	Bar df (84)	Street df (84)
Chi-square	272.72	135.92
Root mean square error of approximation	.098	.055
Comparative fit index	.599	.747
Probability Level	.000	.000



***p<.001, **p<.01, *p<.05

Figure 8: Baseline Model in bar workers with standardized and (unstandardized) regression weights



***p<.001, **p<.01, *p<.05

Figure 9: Baseline Model in street workers including standardized and (unstandardized) regression weights

Table 8: Goodness of fit statistics for Model 2 (Final Model) in each group

Goodness of Fit Indexes	Bar df (51)	Street df (24)
Chi-square	96.63	31.59 ns
Root mean square error of approximation	.062	.040
Comparative fit index	.890	.928
Probability Level	.000	.354

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