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The relationship between community structural characteristics, the context of crack use and HIV risk behaviors in San Salvador, El Salvador¹

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Abstract

This paper explores community structural factors in different low-income communities in the San Salvador, El Salvador that account for differences in the social context in which crack is used and in the HIV risk behaviors among crack users. Results suggest that both more distal (type of low-income community, level of violent crime and poverty) and proximate structural factors (type of site where drugs are used, and whether drugs are used within or outside of community of residence) influence HIV risk behaviors among drug users. Additionally, our results suggest that community structural factors influence the historical and geographic variation in drug use sites.

Crack use and related sexual risk are growing problems in urban El Salvador. The prevalence of crack use in El Salvador is high (Santacruz Giralt and Concha-Eastman 2001; Dickson-Gomez 2004; United Nations Development Program 2004). Studies have identified a 4.9% prevalence of crack use among 18 year olds (Organization of American States 2002), and 65% prevalence among young gang members (Santacruz Giralt and Concha-Eastman 2001). In 2006, 100% of those receiving drug treatment in El Salvador received treatment for cocaine and crack (United Nations Office for Drug Control and Crime Prevention 2005). High risk sexual practices are common among crack users (Boyle and Anglin 1993; Inciardi 1993; Ratner 1993; Ratner 1993). In particular, our research has identified high levels of sexual risk behavior among crack users in El Salvador including sex with multiple partners, inconsistent or non-use of condoms, and high rates of sex exchanges (Dickson-Gomez 2010).

Much research has shown that the sexual risk associated with crack use is dependent on the social context in which crack is used (Geter 1994). As in other urban environments, crack is used in a variety of social settings in the San Salvador Metropolitan Area including private residences, *trances* (special locations in which crack is sold and used), motels, abandoned buildings or the street (Dickson-Gomez, Bodnar et al. 2007; Dickson-Gomez 2010). These different settings are also the context of sexual risk practices such as sex exchanges for money or drugs, sex while high, and sexual victimization (Dickson-Gomez, Bodnar et al. 2007; Dickson-Gomez 2010).

HIV research has increasingly called attention to the need to better understand structural factors that increase certain populations' vulnerability to HIV infection (Blankenship, Friedman et al. 2006; Albarracin, Tannenbaum et al. 2010; Latkin, Weeks et al. 2010). Structural factors have been variously defined, but often refer to factors that are outside individuals' immediate control (Latkin, Weeks et al. 2010). Structural factors include

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environmental, economic or contextual characteristics that have more proximal or distal impacts on individuals' behaviors and health outcomes (Rose 1992; Sweat and Denison 1995; Blankenship, Friedman et al. 2006; Glass and McAtee 2006; Gupta, Parkhurst et al. 2008). HIV research among drug users has explored the effects of a number of structural factors on HIV risk behaviors, from more distal community-level factors such as policing practices, crime and social disorder, and economic opportunities (Storr, Chen et al. 2004; Bluthenthal, Phuong Do et al. 2007; Latkin, Curry et al. 2007), to more proximate factors such as the social settings where drugs are consumed (Carlson 2000; Blankenship and Koester 2002). However, the reasons distal factors affect HIV risk remain unclear because research often does not explore how these distal factors affect more proximate determinants of HIV risk. In other words, research is often segmented, looking either at the impact of distal factors on HIV risk behaviors, or on the more proximate factors such as the social contexts in which drug use and sexual risk occur without considering the relationship between these different levels.

An example of the segmented approach to studying the structural determinants of HIV risk behavior is research that has attempted to explain the clustering of drug arrests and the prevalence of HIV and other blood borne diseases within disadvantaged neighborhoods. Such research has attempted to link community-level structural factors to sexual and drug risk behaviors (Storr, Chen et al. 2004; Bluthenthal, Phuong Do et al. 2007; Latkin, Curry et al. 2007). Some studies have examined the association of neighborhood demographic characteristics and HIV risk behaviors and failed to show significant associations (Bluthenthal, Phuong Do et al. 2007). Other researchers have focused on the influence on sexual risk and drug use of more specific factors, including neighborhood physical and social disorder, and discovered significant relationships (Latkin, Curry et al. 2007; Genereaux, Bruneau et al. 2009). This disparity in findings can be explained by differences in the community factors measured. More distal and unspecific factors such as poverty and race, for example, appear to have a more obscure or indirect impact on sexual and drug risk behaviors than indicators of social disorder, such as quality of life crimes. Thus, understanding the effects of broader community factors on sexual risk and drug use may require understanding different levels of conditions. To be sure, the availability of spaces for risk and prevention (e.g. shooting galleries, drug markets and the availability of HIV prevention services) might be better predictors of differences in sexual- and drug-related risk behaviors (Bluthenthal, Phuong Do et al. 2007). However, broader community factors may influence whether these spaces flourish in some communities but not in others. Discovering how these more distal factors interact with the more proximal neighborhood context may help to explain how neighborhood disadvantage leads to greater HIV risk.

Other research has focused exclusively on proximate structural factors such as the social context in which drugs are used, without considering how more distal factors may impact these settings. A large body of research on drug use suggests that the social context in which drugs are consumed varies geographically and historically (Chitwood, McCoy et al. 1990; Latkin, Mandell et al. 1994; Koester 1995; Carlson 2000; Weeks, Clair et al. 2001). Crack use sites vary from established places where crack users gather to buy, sell or use crack, and exchange sex for crack, to crack users' residences where acquaintances gather informally to use crack (Bourgois and Dunlap 1993; Ratner 1993). The social dynamics and HIV protective and risky norms within these sites are equally variable and can affect the likelihood of HIV risky behaviors occurring in these sites (Sterk-Elifson and Elifson 1993; Dickson-Gomez, Weeks et al. 2004; Dickson-Gomez, Bodnar et al. 2007). These social dynamics include, for example, whether there is a gatekeeper who controls access to the site, whether drugs are sold, and whether sex exchanges occur. For example, crack houses can be sites where individuals exchange sex for crack as well as places of sexual victimization and degradation (Ratner 1993; Inciardi 1995; Jones, Irwin et al. 1998). However, because of the

gatekeeper control, crack houses can also be places where prevention materials, such as condoms, are provided (Dickson-Gomez, Weeks et al. 2004).

Examination of community structural factors associated with different drug use sites has relied mainly on secondary analyses of historical data or retrospective accounts of drug users. Factors hypothesized to influence the types of places drugs are used include absent landlords and disinvestment in urban neighborhoods resulting in a proliferation of abandoned buildings used as shooting galleries, and gentrification and quality of life policing resulting in the proliferation of drug use in private residences with gatekeeper control (Weeks, Clair et al. 2001). Despite anecdotal evidence that community-level structural factors affect drug use sites in structure, location, and social dynamics, little research has explicitly compared communities to determine which sites are more prevalent, and which structural characteristics of the community (e.g. crime and disorder, policing practices, poverty) affect the stability, location and type of drug use sites. Thus, understanding how community-level structural factors affect the context of drug use may help explain differences in HIV risk in neighborhoods characterized by different forms of disadvantage.

A second limitation of previous research on the influence of distal community-level factors on HIV risk is that it assumes a direct relationship between the neighborhood in which one lives and the HIV risks one is exposed to when this relationship may be complex or indirect. For example, even when there is ready access to drugs, people may choose to buy and use drugs outside their high risk neighborhoods of residence to avoid physical or sexual assault or police harassment (Shannon, Rusch et al. 2008; Shannon, Strathdee et al. 2009). They may also buy drugs in other sites because they want to hide drug use and engagement in sex exchanges from family members or neighbors (Page and Salazar Fraile 2001). Thus, the decision of whether or not to use drugs within one's neighborhood of residence may not only depend on the risk characteristics of the neighborhood but also on other factors such as neighborhood monitoring, the possibility of violence, and arrest.

In this paper, we examine the relationships between community-level structural factors and the more proximate context of drug use, and how these factors interact to affect HIV risk behaviors. We do this by taking a step-wise approach. First, we examine differences in structural factors among different types of low-income communities in the San Salvador Metropolitan area. We explore the types of physical and social contexts of drug use that are more common in low income communities with different characteristics in terms of histories of formation, poverty, attitudes toward police, and level of violent crime and how the structural characteristics of the community influence patterns of drug use inside and outside the community. Finally, we examine the effects of community-level structural factors (community type, level of violent crime, attitudes toward the police, and poverty), drug use site types, and whether crack is used within or outside the community of residence on sexual risk for HIV.

Methods

Study Sites

Qualitative formative research was conducted in seven low-income communities that represent three distinct community types, Marginal Communities (3 communities), Asentamientos Urbanos Populares (AUPs) (1 community), and Older Central Communities (3 communities). Communities were selected because they represented the three community types of interest and because they had high levels of drug use and sales within the communities. Additionally, it was necessary to select communities in which researchers had contacts with individuals who held leadership positions, either because they formed part of

the community advisory boards, or held positions in important non-governmental or religious organizations in the communities. These contacts helped introduce the research team to others in the community and gain community buy in to the project. In at least a couple of occasions, initial community contacts or members of community boards of directors advised us not to conduct research in their communities due to fears of violence stemming from tensions between rival gangs, or gangs and community members.

The three community types are distinguishable based on their histories of formation, physical layout and infrastructure, and housing types. Unlike many cities in developed countries, neighborhoods and communities in the San Salvador Metropolitan area have names and distinct boundaries universally recognized by residents living in or adjacent to the communities. The physical boundaries of many low-income communities are the main street or streets in which the entrance or entrances to the community are located. Particularly in the case of Marginal and AUP communities, there may be only one or two entrances to the community from a main road, with the rest of the houses located along narrow, pedestrian only *pasajes* (Dickson-Gomez 2010).

Marginal Communities are typical of many of the squatter settlements found throughout the developing world. In El Salvador, these formed as migrants fled to the city to escape the 12-year Civil War that occurred between 1980 and 1992, or after natural disasters destroyed their homes. Housing was built on vacant land without any central planning or zoning and initially consisted of makeshift shelters made of scrap metal and other materials without any sanitation services, electricity, sewage or potable water. Many marginal communities subsequently have gained legal tenure of their land and housing and infrastructure improvement with the help of national and international non-governmental organizations (NGOs) (Stein 1989; Zchaebitz 1999; Ramirez 2001).

AUPs were formed as part of a government program in the 1970s through loans to low income workers employed in the formal economy provided by the Fondo Social para la Vivienda or “Social Housing Fund” (Lungo 2001). As such, they are similar to many housing developments throughout the world that offer low-income housing to working class residents, and unlike Marginal Communities, were always legally recognized by the government. As such, AUPs, while still poor and overcrowded, have access to basic services such as sanitation, potable water, and sewage. AUPs are generally located on the outskirts of the San Salvador metropolitan area, close to the food processing and textile factories of the free trade zone.

Older Central Communities are located in the historic center of San Salvador and resemble many “skid row” areas of cities in both the developing or developed world. In the past, Older Central Communities were mixed residential and commercial zones. Now they are characterized by highly transient populations of migrant workers, commercial sex workers and crack users (Dickson-Gomez, Corbett et al. 2010). Housing is often temporary, with residents renting rooms by the day or month in motels, shelters, or *mesones* (colonial style houses in which single rooms are rented with communal bathing and cooking facilities), or sleeping in public places such as the street or parks. The Older Central Communities are hubs of transportation with many large market places and brothels. They are also locations where social services, including AIDS Service Organizations, are concentrated (Dickson-Gomez, Corbett et al. 2010).

Participants and procedures—We used Respondent Driven Sampling (RDS) to recruit active crack users in the San Salvador Metropolitan area. RDS is a modified version of snowball sampling in which network data is gathered from each participant and chains of referral are monitored (Heckathorn, Seaman et al. 2002; Salganik and Heckathorn 2004).

RDS has been shown to be highly effective in reaching hidden populations, and given long enough chains of referral the composition of the sample becomes stable (reaches equilibrium) and is reflective of the population of crack users regardless of initial seed selection (Salganik and Heckathorn 2004). Eligibility criteria included being 16 years or older, living in the San Salvador Metropolitan area, and having smoked crack in the last two weeks. Twenty-two seeds were selected from 7 low-income communities in which we gathered qualitative data (3 to 4 seeds per community) and represent the three different community types described above (N=420). Seeds were identified during the qualitative phase of the study and selected based on their having large numbers of crack users within their network. At least one woman was seeded for each community.

Four Salvadoran field staff, who had bachelor's degrees in Community Psychology, conducted face-to-face surveys with participants at an AIDS Service Organization. Each seed was screened for eligibility and, after completing the interview, given three coupons to refer other crack users to the project. All participants gave written informed consent prior to screening. Participants were paid \$5 US for completing a survey and \$3 for each eligible participant, maximum three, they recruited into the project. All study procedures were approved by Institutional Review Boards at the Medical College of Wisconsin, the Universidad Centroamericana, and the Institute for Community Research.

Measures—In addition to basic demographic information (age, gender, level of education, and monthly income), we measured the frequency and quantity of use of alcohol and crack use in the past month.

We also included the identification number of the person who referred the participant (*recruitment group*) in order to account for possible non-independence of participants due to the method of recruitment. Seed participants were included with their referrals only if they referred other participants into the study.

Community type captured the type of community in which participants resided which were coded on the basis of the structural characteristics of the community described above. Community types included: Marginal Communities (formed as squatter settlements); Asentamientos Urbanos Populares (AUPs) (formed with low-income loans provided by the government and located near free-trade zones); Older Central Communities (located in the historic downtown area of San Salvador and formed prior to 1950). Another category (Other) was created for crack users who were homeless residing in commercial areas, or those who lived in middle class communities (n=48). Four independent coders coded each community for community type. Inter-rater reliability was very good (Cohen's Kappa = 0.81, 95% CI=.76-.85). Discrepancies among coders were resolved through consensus.

Community-Level Structural Factors

These factors were assessed through self report as national population wide surveys in El Salvador measuring economic, employment, and demographic characteristics cannot be disaggregated beyond the municipal level. Measures included 6 items assessing *Poverty and Under-employment*. Sample items are: "People in your neighborhood have work?" "How many people in your neighborhood earn enough to get by?" and "How many people in your community have completed higher education (university or technical school)?" Response options were captured on a 4-point scale (1="most" to 4="none", $\alpha=.84$). *Attitudes toward the Police* was assessed with 16 items. Sample items are: "The police are effective in combating crime in your neighborhood" and "The police view people in your neighborhood as criminals." Response options were captured on a 4 point Likert type scale (1="strongly agree" to 4="strongly disagree", $\alpha=.85$). *Level of Violent Crime* in neighborhoods was assessed with 8 items. Sample items are "How often do shootings occur in your

neighborhood” and “How often do extortions occur in your neighborhood.” Response items were captured on a 4-point Likert-type scale (1=“almost never” to 4=“almost always”). We also asked participants about the presence of gangs in their community and, if so, which gangs. Finally, we asked participants about the level of police presence in their communities including a permanent police substation, by patrol, or only when called in emergencies.

Drug Use Sites were elicited by asking participants to select from a list of options the type of place they used drugs most frequently in the last 30 days. Response options included: your own house or apartment; someone else’s house or apartment; an abandoned house/building; in the street/alley; motel; brothel; bar/club; *trance* (place where crack is used and sold); destroyer (abandoned house used by gangs); park/recreational area; vacant lot; or other place. These were recoded to include: private residence (own or someone else’s house); public place (abandoned building, street park/recreational area, destroyer, vacant lot); motel; *trance*; and other.

Drug Use Location

To assess location, we also asked participants whether the place they used most frequently was located within or outside their community of residence.

Social Dynamics of the Drug Use Site Used Most Frequently

Social dynamics were measured by asking participants whether there was gatekeeper control of the location (i.e. someone who had to approve entry to the site); whether crack was sold within the location; whether sex was exchanged for crack or money at the site; whether non-transactional sex occurred; and whether condoms were available in the site.

Sexual Risk Outcomes

Outcomes assessed included last month number of sex partners with whom a condom was not used, number of times participants exchanged sex for money without a condom, and number of times participants exchanged sex for crack without a condom. These outcomes were chosen because they constitute extremely high risk behaviors that have often been associated with crack use.

Data Analyses

To examine whether there were structural differences between different community types, we first conducted univariate analyses (Chi square for categorical data and ANOVA for continuous variables) to determine the relationship between community type and other community-level structural characteristics (level of poverty, violent crime, and attitudes toward the police). Next, to determine the relationship between more distal community-level and proximate structural factors, we conducted univariate analyses to determine the relationship between community type and drug use sites and whether drugs were bought or used outside the community. We also conducted Chi square analyses to examine the social dynamics in each drug use site type by testing whether there were differences in gatekeeper control, whether crack was sold, whether sex exchanges occurred, whether non-transactional sex occurred, and whether condoms were present in the different drug use sites. Finally, to identify the effects of more distal and proximate structural characteristics on HIV risk, we conducted univariate Poisson regressions using community-level structural characteristics (community type, level of violent crime, level of poverty, attitudes toward the police), drug use sites and drug use location, controlling for demographic characteristics, and crack and alcohol use to predict sexual risk outcomes. Those factors that were found to be significant at $p < .10$ were included in multivariate Poisson regressions to examine the effects of community type, other community-level structural factors, drug use sites, and drug use

location on sexual risk behaviors after controlling for demographic characteristics (gender, age, level of education, and income), and frequency of crack and alcohol use. Recruitment group was included in multivariate analyses to control for the non-independence of participants. Poisson regressions were used to account for skewness in the data.

Results

Demographics

While crack users were initially seeded in the 7 community sites where qualitative research was conducted, chains of referral quickly led to participants living in 97 other communities in the San Salvador Metropolitan area. As seen in Table 1 below, participants were predominately male, low income and with low levels of educational attainment. It can also be seen that the majority of participants came from Older Central Communities.

Community Characteristics—Table 2 shows self-reported differences in structural characteristics for different types of communities. There were no significant differences between level of police presence or presence of gangs among community types. However, Older Central Communities had higher levels of poverty, more negative attitudes toward the police and greater overall perceptions of violent crime in the community, followed by Marginal Communities which were intermediate on these measures, and AUP communities which showed the least poverty, more favorable attitudes toward the police and less perceived violent crime.

Relationships between community type, drug use sites and drug use locations—As seen in Table 3 below, there were significant differences in the type of drug use site most common in each community type ($p < .001$). Drug use in a private residence was more common in AUP communities, while drug use in a public location was more common in Older Central Communities. Residents of Marginal Communities were almost equally likely to use in private residences or public locations. Residents of Marginal Communities and Older Central Communities were also more likely to use in *trances* (places where drugs are sold and used) than residents of AUPs, where *trances* were seldom used. Using in private residences was very rare in Older Central Communities. Finally, no participant reported using in a motel in AUP or Marginal Communities. Public locations and *trances* were the most frequently used drug use sites for residents of Other Communities, regardless of whether they used most frequently within or outside their community of residence.

Residents of Marginal and AUP communities were significantly more likely to use drugs in a site located within their community of residence than outside their communities of residence. However, those residents of Marginal Communities who used drugs most frequently outside their community of residence were more likely to do so in public locations. AUP residents were equally likely to use in public locations, private residences or *trances* if they used outside their community of residence, compared with if they used most frequently within their community of residence.

There were also significant differences in type of location most commonly used and the social dynamics (gatekeeper control and whether crack was sold on the site) and HIV risky and protective behaviors reported by participants (sex for money or crack exchanges, non-transactional sex and the availability of condoms in the site). Sex exchanges were reported to be common in public locations, *trances* and motels, but condoms were only commonly available in motels.

Multivariate analyses—We conducted univariate Poisson regressions to guide our selection of variables to be included in the final multivariate model. Variables significant at <0.1 in univariate regressions were included in a multiple Poisson regression model. Referral group was included in the multivariate model to control for recruitment effects.

Personal factors

Being female was positively associated with number of sex partners with whom a condom was not used, and number of times had sex in exchange for money without a condom, and approached significance for number of times had unprotected sex for crack. Age was associated with number of times had unprotected sex in exchange for money, and number of times had unprotected sex in exchange for crack. Neither education nor income was associated with sexual risk behaviors in the multivariate model. More frequent alcohol use was positively associated with number of sex partners with whom a condom was not used and unprotected sex for crack exchanges, while greater crack use was associated with number of times sex was exchanged for money without a condom.

Distal community-level structural factors

Living in a Marginal Community (compared to living in an AUP) showed a trend toward significance and was positively associated with number of sex partners with whom a condom was not used and number of unprotected sex for crack exchanges, but negatively associated with unprotected sex for money exchanges. Living in an Other Community was positively associated with unprotected sex for money exchanges. Poverty was negatively associated with sex for money exchanges. Frequency of violent crime was positively associated with all sexual risk outcomes.

Drug use site and drug use location

Sex for crack exchanges were predicted by using drugs most often in a public site (compared to a private residence), using in a *trance*, and using drugs most often within community of residence. In contrast, using drugs most frequently within community of residence was negatively associated with frequency of unprotected sex for money exchanges. Using most often in a *trance* was positively associated with number of sex partners with whom a condom was not used and unprotected sex for crack exchanges, while using most often in a motel was negatively associated with number of sexual partners with whom a condom was not used.

Discussion

Results from this study indicate that community-level structural factors can impact proximal structural factors such as the social context in which drugs are used. While many researchers have argued for distinguishing between more distal and more proximate structural factors (Blankenship, Friedman et al. 2006; Latkin, Weeks et al. 2010), in practice most HIV and other health research has focused on only one level of structural factors. In part, this is because considering all possible structural determinants of health in one model would be impossibly complex (Marmot 2000; Burris 2002). Marmot (2000) suggests a systematic step-wise approach for integrating different levels of structural factors into a single theoretical model. The first step is to focus on one level of structural factors while identifying potential mediating factors. The next step is then to integrate research models and results from different levels. In this paper, we attempt to do this first by examining the relationships among more distal community-level factors (e.g. community type, levels of violent crime, poverty and underemployment, and attitudes toward police). We then examine differences among community type and the context of drug use (i.e. the types of drug use site used and whether or not participants in different community types tend to use

within or outside their community of residence). Finally, we examine the effects of more distal community-level factors, proximate factors (the types of sites and location where drugs are used), and personal characteristics into a single model to examine their independent effects on sexual risk behavior. These multiple steps illuminate reasons for geographic differences in the context in which crack use and sexual risk occurs and thus contributes to a greater understanding of factors contributing to the sexual risk of crack users in the San Salvador Metropolitan Area.

Our study confirmed that low-income communities in El Salvador are not homogenous and are thus characterized by different structural characteristics. Participants from Older Central Communities reported having higher levels of poverty and underemployment, higher rates of violent crime, and more unfavorable attitudes toward the police than residents of other community types. Important for our study, these different types of communities were associated with differences in the sites where participants used crack within their communities, and the degree to which they chose to use crack inside or outside their communities of residence.

Participants in Marginal and AUP communities were more likely to use within their communities of residence, while participants from Older Central and Other Communities were equally likely to use within or outside their communities of residence. Our qualitative research conducted in 7 different low-income communities (3 Marginal Communities, 3 Older Central Communities and 1 AUP Community) suggest reasons for these patterns of difference. These include: the transience of the population, the level of neighborhood monitoring and cohesion; normalization of drug use; gang control of drug sales; and the presence of HIV prevention services in the community (Dickson-Gomez 2010; Dickson-Gomez, Corbett et al. 2010).

Residents of Older Central Communities tend to be highly transient, either living on the streets or in temporary housing such as motels, shelters or *mesones* where rooms can be rented by the week or month (Dickson-Gomez 2010). Drug sales and commercial sex work are concentrated in Older Center Communities in the center of San Salvador and these areas are also commercial and transportation hubs. Older Central Community Residents reported that they often traveled to adjacent communities to buy and use drugs if the price or quality was better. Similarly, residents of Other Communities most often are homeless and live in commercial zones with no residential housing or in middle class communities. In addition, “Other Community” residents from middle class communities may not have lived in areas where crack was sold. They may, therefore, have been more likely to use crack in the areas outside their communities where they also bought drugs.

In contrast, Marginal and AUP communities are almost exclusively residential and are often located adjacent to other communities controlled by rival gang members (Dickson-Gomez 2010). Residents of both AUP and Marginal Communities report that it is difficult for outsiders to enter their communities without being assaulted, although residents themselves are relatively safe from violence because they are known to their neighbors (Dickson-Gomez, Corbett et al. 2010). In addition, residents of AUPs often live on the outskirts of the San Salvador Metropolitan Area and often report fear of being robbed or assaulted by rival gangs while on public transportation (Corbett et al. In review). Residents of AUP and Marginal Communities may have been more comfortable and perceived themselves as safer using in their communities of residence.

The type of drug use site common within the community types also differed. Drug use in private residences was common in Marginal and AUP communities, but seldom occurred in Older Central or Other Communities in which public places, particularly *trances*, were more

often used. Residents of Marginal Communities also used *trances*, although less often, but residents of AUP communities seldom used trances when using in their community of residence. Motels were not used by AUP or Marginal Community residents who used within their communities, but were used by residents of Older Central and Other Communities. Community structural factors other than community type did not predict these differences, suggesting that communities may differ in important respects not captured by our survey instruments.

Public places, *trances* and motels may have been more commonly used among residents of Older Central and Other communities, because they were often homeless or highly transient. Thus, many residents may not have private residences in which to use and were thus forced to use in public locations or *trances*. In addition, there is likely little monitoring of their drug use behaviors and little community cohesion (Dickson-Gomez 2010; Dickson-Gomez, Corbett et al. 2010). In-depth interviews from residents of these areas reported not worrying about other members of the community observing their drug use, because they lived far from family and others who knew them, and because drug use is ubiquitous in these neighborhoods. Likewise, motels are common in Older Central and some Other Communities which are both more commercial areas and locations in which commercial sex work is common. In contrast, motels do not exist in AUP or Marginal Communities and cannot therefore be used as drug use sites within the community. Residents of Marginal and AUP communities have both the opportunity to use in private residences, and are motivated to keep their drug use private from neighbors. Crack users in in-depth interviews reported that they knew their neighbors well and tried to keep their drug use hidden from them in order to avoid gossip and shaming their family members (Dickson-Gomez 2010). However, residents of Marginal Communities reported using in public places and *trances* located within their communities to a much greater degree than residents of AUP communities. Residents in some Marginal Communities reported that drug selling and use was normalized to a great extent and therefore did not try to hide drug use and used in public locations or trances. In addition, our qualitative interviews indicate that *trances* are uncommon in AUP communities because gangs control drug selling and do not allow crack users to smoke crack in their presence (Dickson-Gomez 2010).

Our results also suggest that different drug use sites offer different opportunities for sexual risk and protective behaviors. Sex exchanges were extremely common in public locations, trances and motels but condoms were only readily available in motels, indicating little presence of HIV protective norms in these other drug use sites. As mentioned above, motels are places where commercial sex work is common in Older Central Communities. Older Central Communities are also the only neighborhoods with any organizations providing HIV prevention services, including condom distribution. Most of these interventions are targeted to commercial sex workers (Dickson-Gomez, Corbett et al. 2010). Therefore, commercial sex workers in Older Central Communities may have established condom use norms to a much greater extent than crack users in other community types, even those who exchange sex. Further supporting this interpretation, in multivariate analyses, sex work in motels was negatively associated with unprotected sex for money exchanges while using drugs in *trances* and public places was associated with unprotected sex for crack exchanges.

Multivariate analyses indicated that community type was associated with sexual risk outcomes. Interestingly, while living in a Marginal Community was positively associated with number of sexual partners with whom a condom was not used and unprotected sex for crack exchanges, although not quite reaching statistical significance, it was negatively associated with unprotected sex for money exchanges. Living in an Other Community, on the other hand, was associated with unprotected sex for money exchanges.

These results support interpretations of the other analyses mentioned above regarding the influence of the relative transience of the populations, community cohesion and monitoring, and the presence of HIV prevention services in the different community types. In Marginal Communities, neighbors know one another, and commercial sex work is likely to be noticed and commented upon. They are also places where it would be difficult for clients from outside the community to enter to seek commercial sex workers, due to the closed nature of the neighborhoods, and the danger of assault faced by outsiders entering the community. The positive association with unprotected sex for crack exchanges within Marginal Communities may be due to the relative hidden nature of sex exchanges in drug use sites such as *trances* and public places such as abandoned buildings where condoms are seldom available. Other Communities are often commercial areas where sex work strolls are located, but are not locations where HIV prevention services for commercial sex workers are located. In contrast, Older Central Communities are locations where HIV prevention services for commercial sex workers are concentrated. Thus, sex work is likely also accompanied by a more prevalent use of condoms which are distributed free to sex workers in the area. No such efforts have been made in other types of communities located outside the center of San Salvador, although sexual risk, particularly sex for crack exchanges, are also prevalent in these areas (Dickson-Gomez, Corbett et al. 2010).

Few associations were found between other community-level structural characteristics and sexual risk. However, frequency of violence was strongly associated with increased sexual risk in this study. Violence, or the threat or fear of violence, may reduce individuals' ability to negotiate condom use, particularly in sex exchanges where sexual partners may not be well known. Many studies, including our own previous research among female commercial sex workers in El Salvador, indicates that commercial sex workers and crack users who exchange sex for crack often use condoms when they can, but are unable to when faced with sexual assault (Inciardi 1995; Jones, Irwin et al. 1998; Falck, Wang et al. 2001; Dickson-Gomez, Bodnar et al. 2006).

This is one of the first papers to attempt to study the relationship between community-level structural characteristics, proximal structural characteristics including the context of drug use, and the sexual risk behaviors of crack users. The fact that the only distal structural factors to predict sexual risk were community type and level of violent crime, however, suggests that we may not have captured the most important community-level structural factors to explain differences in the more proximate context of crack use and HIV risk. Our interpretations of our results are largely based on ethnographic knowledge of the San Salvador Metropolitan Area, in particular differences in the transience of residents in the area, community monitoring, presence of commercial sex work strolls, presence of HIV prevention materials, and in some cases, gang control of drug sales. These interpretations suggest a number of other important characteristics to measure such as: the extent to which a neighborhood is residential, commercial or mixed; the transience of residents; community cohesion and monitoring; the presence of HIV prevention resources in the community; and presence of commercial sex work strolls. In future research we will measure community cohesion and monitoring, presence of HIV resources as well as the other factors measured in this paper to evaluate a multi-level HIV prevention intervention.

Although the relationship between more distal and proximate structural factors on HIV risk is complex, results from this study suggest areas for intervention both in El Salvador and in other countries in which sexual risk associated with drug use is common. Community characteristics influence the context of crack use, which in turn effects the possibilities for HIV risk and protective behaviors. Interventions can help promote risk reduction in drug use locations in which risk behaviors are more likely to occur and few risk reduction norms exist. For example, many interventions have focused on changing the context of drug use by,

for example, providing safe injection sites (Stolz, Wood et al. 2007), or training gatekeepers or users of drug use sites to distribute condoms and injection materials (Dickson-Gomez, Weeks et al. 2006). In El Salvador, HIV risk reduction strategies could include providing condoms to gatekeepers of trances and public places and private residences used as drug use sites.

However, results from this study indicate that attention to larger community characteristics is also important. HIV prevention and treatment efforts in many developing countries have been concentrated in the centers of urban areas, in part because of limited resources (Kelly, Somlai et al. 2006; Dickson-Gomez, Corbett et al. 2010). In the San Salvador Metropolitan Area, HIV prevention efforts largely have been concentrated in the Older Central Communities. While in many ways this may seem a rational allocation of resources, given that commercial sex work is highly visible and concentrated in these areas, our results indicate that crack users in other communities also engage in high levels of risk. However, our results suggest that residents from AUP and Marginal Communities are less likely to leave their communities to use drugs and may therefore be reluctant to go to other parts of the city to receive services. In addition, it may be more difficult for service organizations to enter these communities to provide services (Dickson-Gomez, Corbett et al. 2010). It is necessary, therefore, to work with the existing leadership structure both to enter the communities and provide services, as well as to tailor HIV prevention programs to the particular social context of drug use and sexual risk within these communities. The prevailing wisdom of global health initiative (such as the Global Fund to Fight against AIDS, Tuberculosis, and Malaria) has been to donate to NGO's who are thought to have better access to vulnerable populations and better perceived legitimacy than government agencies (Kelly, Somlai et al. 2006; Doyle and Patel 2008). However, our research suggests that the reach of NGOs is limited and that working with a larger network of formal and informal community organizations to increase the reach of HIV prevention programs is necessary.

Perhaps more problematically, HIV prevention efforts in El Salvador have targeted "risk groups" such as commercial sex workers. This again follows HIV prevention strategies in many countries. However, as seen in this paper, residents of AUP and Marginal Communities avoid direct sex for money exchanges and may eschew the label of commercial sex worker because of concern about what neighbors may think. Interventions that attempt to professionalize and empower commercial sex workers, therefore, may not be well accepted in these communities, although sex for crack exchanges are common. This is not dissimilar to the situation for women in many developed and developing countries, who may maintain sexual relationships with multiple partners who help them economically, but who would not consider themselves to be commercial sex workers (Stoebenau, Nixon et al. 2011). While neighborhood cohesion and monitoring may have many positive effects, such as lowering perceptions of crime and insecurity as seen among residents of Marginal and AUP communities, they may also have negative effects in that residents of those communities were more likely to hide their drug use and sex exchanges from friends and neighbors and, thus, engage in more risky behavior. Prevention efforts must address stigmatizing attitudes toward drug use and sex exchanges.

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Table 1

Sample characteristics of the crack smokers in San Salvador, El Salvador.

	<i>Entire sample (n=420)</i>	<u><i>Subgroups by Sex</i></u>	
		Males (n=387)	Females (n=33)
Demographic Characteristics			
Age [mean (median)]	36.8 (36)	37.0 (36)	34.3 (33)
Education			
Less than 3 rd grade [% (n)]	19.8 (83)	18.1 (70)	39.4 (13)
Less than 9 th grade	70.7 (297)	69.5 (269)	84.8 (28)
Monthly income [mean (median)]	252 (200)	247 (200)	309 (160)
Community Type [% (n)]			
Marginal Community	19.8 (83)	19.9 (77)	18.2 (6)
AUP	21.4 (90)	22.5 (87)	9.1 (3)
Older Central Community	47.1 (198)	45.5 (176)	66.7 (22)
Other	11.4 (48)	11.9 (46)	6.1 (2)

Table 2

Mean and Standard Deviation of Community Characteristics Scales

	Marginal Community (n=83)	AUP (n=90)	Older Central Communities (n=198)	Other (n=48)	Kruskal- Wallis (df=3)
Poverty	9.8 (2.6)	8.8 (2.3)	10.5 (2.5)	10.4 (2.4)	31.2 **
Unfavorable Attitudes toward the Police	43.5 (7.3)	41.7 (8.4)	44.6 (7.9)	42.9 (8.1)	9.0 *
Levels of Violence	14.8 (6.1)	13.0 (7.1)	17.2 (6.4)	14.3 (6.5)	28.5 **

*
p=0.03,**
p=0.000

Table 3

Type of Drug Use Site Most Common within Community Types.

	Marginal Community (n=83)	AUP (n=90)	Older Central Community (n=198)	Other (n=48)	Between community Chi-square	Signif.
Drug use site within own community, %(n)	72.3 (60)	80.0 (72)	57.1 (112)	60.4 (29)	16.7 (df=3)	.001
Sites inside neighborhood						
Private Residence, %(n)	(n=60)	(n=72)	(n=112)	(n=29)	79.4 (df=12)	.001
Public	45.0 (27)	61.1 (44)	6.3 (7)	24.1 (7)		
Motel	36.7 (22)	33.3 (24)	61.6 (69)	44.8 (13)		
Trance	0.0 (0)	0.0 (0)	11.6 (13)	6.9 (2)		
Other	13.3 (8)	2.8 (2)	15.2 (17)	17.2 (5)		
Sites outside neighborhood						
Private Residence, %(n)	5.0 (3)	2.8 (2)	5.4 (6)	6.9 (2)	27.4 (df=12)	.007
Public	(n=22)	(n=18)	(n=84)	(n=19)		
Motel	9.1 (27)	27.8 (5)	3.6 (3)	21.1 (4)		
Trance	68.2 (15)	27.8 (5)	59.5 (50)	36.8 (7)		
Other	4.5 (1)	5.6 (1)	13.1 (11)	5.3 (1)		
Drug use inside versus outside own community	4.5 (1)	27.8 (5)	21.4 (18)	26.3 (5)		
Chi-square (df=4)	13.6 (3)	11.1 (2)	2.4 (2)	10.5 (2)		
Signif.	14.9	20.9	2.9	0.91		
	.003	.001	.59	.94		

Table 4

Social Dynamics within Drug Use Sites.*

	Private Residence (n=48)	Public (n=188)	Motel (n=27)	Trance (n=61)	Other (n=18)	Chi- square (df=4)	Signif.
Gatekeeper Control	87.5%	21.3%	96.3%	80.3%	44.4%	134.6	<.001
Crack sold	10.4%	36.2%	14.8%	95.1%	16.7%	106.7	<.001
Sex in exchange for drugs or money	33.3%	68.6%	84.6%	78.7%	27.8%	42.3	<.001
Sex not in exchange for drugs or money	33.3%	48.4%	65.4%	50.8%	27.8%	10.3	.036
Condoms present	37.5%	16.0%	81.5%	13.1%	11.1%	66.8	<.001

* Excludes 77 subjects whose only drug use in the last 30 days was alone.

Table 5
Mixed-effects Poisson multiple regression predictors of sexual risk behaviors in last 30 days.

Predictor *	# partners had sex without a condom		# times had sex in exchange for money without condom		# times had sex in exchange for crack without a condom	
	t	Significance **	t	Significance **	t	Significance **
<u>Personal factors</u>						
Female	5.84	.0001	4.85	.0001	1.82	.07
Age	1.17	.24	5.33	.0001	3.99	.0001
Less than 9 th grade education	-.51	.61	1.14	.26	1.39	.17
Income	-.27	.79	1.44	.15	.43	.67
#times used alcohol in last 30 days	2.31	.022	.43	.67	3.20	.002
#times used crack in last 30 days	.68	.50	3.42	.0008	1.35	.18
<u>Community-level structural</u>						
Marginal community [ref. AUP community]	1.74	.08	-1.79	.08	1.94	.054
Older Central community [ref. AUP community]	.32	.75	1.48	.14	.11	.91
Other community [ref. AUP community]	.93	.36	3.15	.002	-.13	.89
Poverty	.18	.86	-3.64	.0004	.94	.35
Attitude towards police	-.10	.92	1.09	.28	1.45	.15
Frequency of violence	3.05	.003	3.14	.002	3.22	.002
<u>Drug use context</u>						
Public site is most often drug use site [ref. Private site]	.61	.54	1.40	.16	3.30	.001
Trance site is most often drug use site [ref. Private site]	2.53	.012	-.30	.77	2.88	.004
Motel/other site is most often drug use site [ref. Private site]	-2.10	.037	-1.05	.29	1.55	.12
Most often drug use site inside own neighborhood	-1.23	.22	-2.44	.016	4.54	.0001

* Personal, community-level, and drug use factors were tested in a series of univariate models. All predictors that achieved a p-value < .10 in any of these regressions were then entered in the multiple regression models for all 3 outcomes. Referral ID was included as a random effect. Number of cases with complete data used in multivariate analyses equals 387. The sign of each t-value indicates the direction of the relationship with the outcome.

** GLIMMIX (SAS Institute)—Generalized Linear Mixed Model—was used to fit a mixed-effects multiple Poisson regression model to data. A random-effect variable was included to account for correlation among data collected on subjects referred by the same individual. Adjustment for extra-dispersion in the Poisson distribution of outcome variable was implemented.