Spatial Bridging in a Network of Drug-Using Male Sex Workers

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ABSTRACT *This study sought to determine whether drug-using male sex workers (MSWs) spatially bridge sexual networks across cities and to determine whether the behaviors of MSWs who bridge differ from the behaviors of those who do not. Data were collected from 42 MSWs in Houston, Texas, between May 2003 and February 2004. Spatial bridging was defined as having traded sex for money in another city before traveling to and trading in Houston. Cities bridged by MSWs were geographically plotted and were primarily located in the Gulf Coast and in Florida. Slightly less than half of MSWs were identified as spatially bridging from one city to another. A significantly higher proportion of MSWs who bridged cities were homosexual (55% vs. 23%) and HIV positive (31% vs. 5%). Those who bridged cities used marijuana and injected drugs more frequently and had significantly more male sex partners than MSWs who did not bridge cities. Despite the small sample size, this study found that many drug-using MSWs spatially bridge sexual networks in cities where they trade sex for money.*

KEYWORDS *Drug Use, HIV/STDs, Male Sex Workers, Sexual Networks.*

INTRODUCTION

A concept derived from the social network paradigm, bridging, is useful for understanding how individuals or groups at low risk for HIV might be linked to persons or groups at high risk.^{1,2} In its most literal sense, a bridge is a line in a network graph that connects two components in the graph. The components are no longer linked if the link is taken away. In a network representing people at risk for HIV because of drug-use or sexual behaviors, network components are groups, links between individuals and groups are social behaviors, and bridges are social behaviors that connect groups. Social behaviors such as drug use and sex involve choosing partners, but partner choice is not random and is constrained by factors that define group boundaries.

Many sociodemographic, cultural, and economic characteristics can act as group boundaries.³ Among those that have been investigated are age,⁴⁻¹⁰ race/ethnicity,⁵ sexual orientation,¹¹⁻¹⁵ and socioeconomic status.¹⁶ In addition to these,

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geography acts as a group boundary constraining partner choice.³ Most people choose drug use or sex partners near where they live or spend time, but travel spans geographic space, and human travel can carry HIV and other sexually transmitted diseases (STDs) from place to place. When a person travels from one location to another and engages in drug-use or sexual behavior, the person is bridging the geography or “space” between the locations.¹⁷ Early in the AIDS epidemic, Klov Dahl¹⁸ showed that travel between cities played a critical role in spatially bridging networks of men who have sex with men. Other studies in Africa and India have shown that travel can link urban areas of high seroprevalence to rural areas of low seroprevalence.^{19,20} Studies conducted in Scotland and Sweden found that HIV was introduced into networks of drug injectors because of travel between low- and high-seroprevalence areas.^{21,22} Spatial bridging was found to be a key factor in introducing HIV into networks of drug injectors in low-seroprevalence cities in the United States.¹⁷ In addition, spatial bridging may be important in maintaining some STDs at endemic levels within a population.²³ Other studies have shown that individuals who spatially bridge networks may be characteristically different and may exhibit higher levels of risk behaviors than other nonbridging network members.^{16,24,25} Male sex workers (MSWs) have been shown to bridge some HIV risk groups²⁶ and to engage in behaviors that suggest that they may spatially bridge sexual and drug-use networks in different cities.^{27–30}

The purpose of this study, conducted in Houston, Texas, was to determine whether MSWs spatially bridge sexual networks across cities and to determine whether the behaviors of MSWs who bridge cities differ from those who do not bridge cities. Spatial bridging was defined as having engaged in sex work in a city before traveling to and engaging in sex work in Houston. The time frame for spatial bridging was not limited because unlike many other viruses that cause STDs, HIV is infectious throughout the lifetime of an infected person (although viral load often is reduced with antiretroviral therapy).

METHODS

Data for this study were collected from May 2003 to February 2004 in Houston as part of a larger study examining the social, drug-use, and sexual networks of drug-using MSWs. Study procedures and data collection instruments were approved by the Committee for the Protection of Human Subjects at the University of Texas Health Science Center at Houston. A purposeful sampling plan was used wherein key informants who were knowledgeable about male sex work in the city were interviewed to identify neighborhoods where MSWs were known to solicit money for sex. Solicitation in the identified neighborhoods and locations was confirmed by direct observation. Key informants were then asked to recruit MSWs as focal participants. The criteria for a focal participant included being a MSW at least 17 years old who self-identified as male, had exchanged sex for money in the previous week, and had smoked crack cocaine or injected an illicit substance in the 48 hours before being screened.

Data collection in the networks involved three levels, where the first person interviewed was the focal participant. Focal participants were asked to name their social, sexual, and drug-use contacts in the last 48 hours. After the interview, a list of named contacts was created and weighted by drug-use and sexual risk behaviors. Names were then selected from the list such that those weighted higher had a

greater likelihood of selection and corresponded with individuals who engaged in drug-use and sexual risk behaviors. The focal respondent was given the names of the selected individuals and asked to recruit them as secondary contacts. This process was repeated with the secondary contacts to sample tertiary contacts. To increase the chances that focal and secondary participants would refer selected individuals, we paid each participant \$20 for successfully referring a contact. A successful referral was one brought by the participant to the data collection center whose name was in the sample list and whose identity could be verified by picture identification. The data collection center, where the interviews were conducted, was a small office suite in the neighborhood where most of the participants resided or solicited money.

Measures

Interview data were collected by trained research assistants using the Sexual Network Questionnaire. Participants, including focal, secondary, and tertiary, were paid \$30 for their time responding to survey questions.

The Sexual Network Questionnaire is designed to collect self-reported data on the sociodemographic characteristics and histories of HIV/STDs, drug use, and sexual behaviors^{31,32} of respondents and their contacts. The questionnaire collects data on characteristics of drug and sexual relationships between respondents and their partners, as reported by respondents. Respondents were asked to report the number of times they used drugs or engaged in sexual activity in the past 7 days before the interview as well as the number of sexual partners they had in the past 30 days. A sexual partner was defined as either a paying or a nonpaying partner with whom the respondent had oral, anal, or vaginal sex.

Spatial bridging, or exchanging sex for money or drugs in another city before coming to exchange sex for money in Houston, was measured by asking respondents whether they had traded sex in a city before trading in Houston. If they responded “yes,” they were asked to name the city and how long they had traded sex in that city. Respondents were then asked whether they had traded sex in another city before trading sex in the named city. Again, if they responded “yes,” respondents were asked to name that city and how long they had traded sex there. The question was repeated for up to four cities.

Analysis

For this investigation, any reports of trading sex for money and drugs in another city before coming to Houston were considered as spatially bridging. The cities bridged by MSWs were geographically plotted and displayed on a map. To assess geographic distance, we grouped cities into major regions in the United States, with the exception of cities in Florida. There were so many cities named in Florida that the state was treated as a distinct category.

Sociodemographic characteristics and drug-use and sexual behaviors were compared between bridging MSWs and nonbridging MSWs. Sociodemographic characteristics were tested using Fisher’s exact test. Because of the small sample size, and to avoid making a type II error, we set the level of significance for Fisher’s exact tests at .10. Differences in the number of times drugs were used in the past 7 days and the number of sex partners in the past 30 days were tested using a one-way analysis of variance (ANOVA). For these tests, it was hypothesized that bridging MSWs would exhibit riskier drug-use and sexual behaviors than nonbridging MSWs.

The direction of the difference could be established a priori; therefore a one-tailed F test was used to determine significance.

RESULTS

Network data were collected from 109 interviewed respondents, of whom 42 reported having traded sex for money 7 days prior to being interviewed. These 42 MSWs constituted the sample for the analysis. They were relatively young, ranging in age from 20 to 46 ($M = 29.8$ years; median = 29), and had been exchanging sex for money in Houston for an average of 7 years ($M = 88.9$ months; median = 60). As shown in Table 1, about two thirds were White, a fifth Hispanic, and the rest African American. Half the sample self-identified as bisexual, a third as homosexual, and the rest as heterosexual. The men were relatively undereducated, having on average less than a high-school education ($M = 10.6$ years; median = 10.5). Most reported being homeless at the time they were interviewed. All respondents had a history of crack-cocaine use and smoked heavily. The average number of times they reported smoking crack in the 7 days before the interview was 67.9 (median = 40). The average number of partners with whom the men reported trading sex for money and drugs in the prior 7 days averaged 33.5 (median = 20).

Almost half (48%) of the MSWs met the definition for spatially bridging networks across cities. Of those who had traded sex in another city before coming to Houston, nine (45%) had traded in one other city, five (45%) in two cities, and six (30%) in three or more other cities. The average time spent trading sex in other cities was 26 months, with a range of 2 months to 9 years. The distribution of time trading in other cities was bimodal, that is, about half (45%) spent less than the average of 12 months trading in other cities, and about half (45%) spent more than 24 months. As shown in Figure, the men who bridged cities often traded sex for money and drugs in cities along the Gulf Coast. A quarter (24%) traded in West Coast cities and a fifth (10%) in Florida cities. One reported trading sex for money and drugs in a city in Mexico. If Florida cities are included as part of the Gulf Coast, more than half the cities bridged were located along the Gulf of Mexico.

A significantly higher proportion of MSWs who spatially bridged cities also self-identified as homosexual (55% vs. 23%, $P < .03$) and HIV positive (31% vs. 5%,

TABLE 1. Drug-use and sexual behaviors of bridging compared with nonbridging male sex workers (MSWs)

Race/ethnicity	
White	69%
Hispanic	17%
African American	14%
Sexual orientation	
Homosexual	38%
Bisexual	48%
Heterosexual	14%
Considers self homeless	
Yes	43%
Traded sex in a city before trading in Houston	
Yes	43%

FIGURE. Cities where male sex workers (MSWs) had traded sex for money before coming to Houston. A line indicates a bridge between cities. At least one male sex worker (MSW) traded sex for money in each of the two cities connected by the lines.

$P < .07$). The average number of times bridging MSWs reported having been in jail was significantly higher and almost twice that of nonbridging MSWs (29.1 vs. 16.1, $P < .03$). As shown in Table 2, there were significant differences in drug-use and sexual behaviors between the groups of MSWs. Compared to nonbridging MSWs, bridging MSWs had smoked marijuana almost twice as much, had injected drugs almost three times as often, and had used more powdered cocaine and methamphetamines. Significant differences were found in the number of male sex partners, with the average number of male sex partners reported by bridging MSWs more than double that of nonbridging MSWs.

TABLE 2. Drug-use and sexual behaviors of bridging compared to nonbridging male sex workers (MSWs)

	Bridging	Nonbridging	<i>P</i>
Times used			
Marijuana	40.1	18.2	.10
Crack cocaine	69.8	66.1	.45
Powder cocaine	16.7	4.0	.11
Amphetamine	16.0	5.5	.11
Heroin	0.5	0.2	.36
Injected	20.4	4.9	.04
Number of sex partners			
Male	102.1	40.5	.02
Female	4.5	7.8	.25

CONCLUSIONS

This study found that many drug-using MSWs spatially bridge sexual networks in the cities where they trade sex for money. Some of the MSWs who bridged sexual networks across cities injected drugs and were doing so at higher rates than their nonbridging counterparts. It is likely that MSWs who inject drugs and travel between cities spatially bridge both sexual networks and networks of injection drug users. The cities bridged by these MSWs were not uniformly distributed throughout the United States, with the majority clustered along the Gulf Coast and in Florida. This geographic concentration suggests that spatial bridging by MSWs may be regionally bounded. However, spatial bridging beyond the region occurred, between Houston and cities along the eastern and western US coasts that are recognized HIV/AIDS epicenters. Spatial bridging across cities beyond the regional boundaries may have a role in introducing HIV/STDs, potentially including drug-resistant strains, into lower seroprevalence cities.

Bridging MSWs were significantly more likely than nonbridging MSWs to be homosexual and HIV positive and to have been in jail. They injected drugs more frequently and had more male sexual partners. Nonbridging MSWs may have local origins and exchange sex for money solely as a means to support their drug habits. Bridging MSWs, on the other hand, may come from outside the city, may be more transient, and may have a more unstable lifestyle. These MSWs may view trading sex as their only recourse for income generation.

The conclusions that can be drawn from this study are limited by the small size and single-site location of the sample, both of which limit the extent to which the findings can be generalized to other populations of MSWs. Also, the findings are limited by self-reported data. The most likely measurement errors are those associated with clustering events and failure to recall specific events. Although most self-reported data appear to be reasonably accurate, under- and/or overestimates of actual events are likely.

Despite these limitations, the findings indicate that drug-using MSWs spatially bridge sexual networks across different cities. In so doing, drug-using MSWs may play an important role in the spreading of HIV/STDs across disparate drug-use and sexual networks associated with male sex work and potentially throughout a local network. A network approach can be useful for understanding how drug-use and sexual risk behavior, including sex work, might influence local HIV epidemics. Data from this network-based study suggest that HIV epidemics should not be viewed as “local,” nor should prevention efforts be. Rather, HIV epidemics and efforts to prevent them in one city will be influenced by the extent of HIV and prevention efforts in other cities. At minimum, local HIV epidemics are most strongly influenced by regional factors as well as by broader, national factors. Replicating a network-based study of this type across multiple cities in other regions of the country would help us ascertain the extent to which these findings occur elsewhere. A multisite study would shed light on a recurring pattern suggested in this study where bridging MSWs released from jail or prison had turned to sex trading as a form of income generation, used drugs, and lived a transient lifestyle until eventually they were arrested and returned to the prison system.

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