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Original article

Social place as a location of potential core transmitters—implications for the targeted control of sexually transmitted disease transmission in urban areas

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ABSTRACT

Purpose: Places are an important determinant of risk for sexually transmitted infection (STI) acquisition and transmission. We sought to identify social places that are critical for targeted STI control activities. The objective of this study was to determine whether sex partner meeting places characterized by drug markets, sex markets, and separately, drug and/or sex markets were more likely to have potential core transmitters as compared with other sex partner meeting places in one urban setting.
Methods: In 2008–2009, heterosexual sex partner places or venues were identified in Baltimore, MD using a venue-based study approach.
Results: A total of 1334 participants aged 18 to 35 years were enrolled at 85 venues. In those participants, 39 potential core transmitters were identified and 31% of venues had at least one potential core transmitter. In final age-adjusted and gender-adjusted models, core transmitters were significantly more likely to be identified at drug markets (OR = 1.37; 95% CI = 1.23–1.53), sex markets (OR = 1.27; 95% CI = 1.14–1.41), and drug and/or sex markets (OR = 1.49; 95% CI = 1.32–1.68).
Conclusions: This study identified key characteristics of venues, such as drug and sex market activity, that may be important in identifying places for the targeted control of STI transmission.

Introduction

A body of work in the field of sexually transmitted infections (STIs) supports the role of environment as a driver of STI transmission risk with some arguing that the risk environment is the most important determinant of STI acquisition and transmission [1–5]. The risk environment is defined as the social and physical space in which factors exogenous to the individual interact to increase infection risk for an individual. The risk environment may include, for example, social venues such as bars, clubs, and street corners [1,6]. These social venues may be an important source of risk for STIs in three ways—by attracting individuals who practice STI-related risk behaviors (e.g., inconsistent condom use), encouraging or enabling individual risk-related behaviors (e.g., having multiple sex partners), and/or by creating the opportunity for high-risk individuals to coalesce into risk-related sexual networks with specific structural characteristics (e.g., cohesiveness, concurrency).

There has been direct and indirect evidence supporting the importance of social venues and their characteristics for STI transmission risk. Seminal work in this area by Potterat et al. (1985) in Colorado Springs demonstrated, for example, that gonorrhea occurs in small, socially definable segments of the population and that the individuals in the segments showed significant social association via nighttime social venues [1]. Another study by Potterat et al. (1999) [7] in a comparison between two distinct networks of individuals at risk for STIs and HIV suggested that transmission was associated with structural characteristics of networks (i.e., network cohesion). In a multilevel cross-sectional household study among youth in an urban setting, Jennings et al. (2012) demonstrated that neighborhood drug market venues (specific venues where illicit

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drug dealing occurs) were associated with an increased likelihood of selecting a high-risk sexual partner and, separately, of current infection with a bacterial STI [4,5]. These latter results support the hypothesis that specific social venues, that is, neighborhood drug market venues, have the necessary and sufficient factors to maintain disease transmission, namely disease prevalence and highly interconnected network structures. Drug market venues with their economies of drug trade and often co-occurring economies of sex work are likely places with highly interconnected network structures, which potentiate STI transmission [7]. This premise is further supported by other work that has found drug dealers and users have high STI prevalence [8,9].

In the present study, we extend this work to look directly at individuals congregating at venues to determine whether drug and/or sex market venues are more likely to be frequented by individuals most likely to transmit STIs, that is, core transmitters than other venues. Core transmitters are defined here by their sexual network connectivity and disease status, that is, self-report of sexual concurrency and diagnosis of a current bacterial STI [10]. To the extent that we can establish a direct link between these venues and transmission risk, these venues may be effective targets for structural and individual-level STI control activities.

The objective of this study was to determine whether sex partner meeting places characterized as drug markets, sex markets, and separately, drug and/or sex markets were more likely to have potential core transmitters as compared to other sex partner meeting places in one urban setting. We tested the independent association of each type of market in an attempt to tease out the importance of each as well as the potential interaction of the two types of venues.

Methods

Study setting

Host to longstanding syndemics of poverty, illicit drug use, and STIs, Baltimore is located in the Mid-Atlantic United States with an estimated 2010 population of 619,493 people [11]. Baltimore is the sixth poorest metropolitan area in the United States with a poverty rate of 24%, nearly double the national rate [12]. Baltimore has high rates of injection drug use (IDU) and noninjection drug use [13–15]. Roughly 10% of Baltimore's population, 60,000 people, has been estimated to be illicit drug addicts [16,17]. Baltimore has endemic rates of STIs as well as racial and/or ethnic disparities in STIs that are two to four times the national average [18]. In 2011, Baltimore had the sixth highest chlamydia and tenth highest gonorrhea incidence among US counties and independent cities [18]. The Baltimore–Towson metropolitan area had the sixth highest HIV incidence of any US metropolitan area [19].

Study design

The study design was a venue-based, cross-sectional study of adults, 18 to 35 years of age, conducted in Baltimore, MD from October 2008 through December 2009. Potential high STI-risk sex partner meeting venues were identified using a three-phase, venue-based methodology described previously [20,21] and based on the Priorities for Local AIDS Control Efforts methodology [22]. Briefly, in phase one, multiple sources of information were used to identify specific sex partner meeting venues and high STI-risk areas (i.e., census block groups [CBGs], where sex partner meeting venues might exist). In phase two, brief windshield tours were conducted to identify venues where people congregated. In phase three, observational data were collected and venue informant interviews were conducted to identify high volume, heterosexual sex partner meeting venues.

Venue selection

In phase one, information about potential heterosexual sex partner meeting venues was obtained from three sources: (1) sex partner meeting places reported by syphilis and HIV infected individuals ($n = 309$) as a part of routine partner services interviews from 2003 to 2004 and 2006; (2) interviews with 26 key informants likely to be knowledgeable about sex partner meeting places, and (3) a 2006 online directory of strip clubs to generate a list of potential venues. We also used public health surveillance data and other administrative data sets to identify high-STI-risk CBGs with: (1) high (>92nd percentile) gonorrhea rates from 2002 to 2004 ($n = 30$); (2) high (95th percentile or more) violent crime counts and high (97.5th percentile or more) property crime counts from 2004 to 2005 ($n = 10$); (3) high drug prevalence ($n = 10$; defined as top ten factor scores based on a factor analysis of average count of narcotics-related 911 calls from 1998 to 2001 and average count of juvenile drug arrests from 1998 to 2003); and (4) high (95th percentile or more) heroin-related overdose fatality counts ($n = 7$) from 2004 to 2006. De-duplication of 77 CBGs yielded 68 unique CBGs, representing 9.6% (68 of 710) of CBGs in Baltimore.

In phase two, three brief windshield tours of each venue and high-STI-risk area were conducted, one each in the morning, afternoon, and evening [23]. A brief windshield tour consisted of a three-hour driving tour to record the locations and times of gatherings of three or more potential age eligibles exclusive of bus stops, bars, and package stores. Bars and package stores were excluded under the assumption that high profile bars were captured by phase one key informant interviews and the inclusion of strip clubs. A venue was included in phase three if people were observed to congregate there on more than one occasion.

In phase three, staff-administered venue informant interviews to three patrons, passers-by, or business owners at each venue, whereas again assessing the number of people congregating and/or passing by. Based on these data, venues were excluded if (1) all venue informants said no people met sex partners there; (2) no venue informant said sex partners met there, the interviewer observed less than three people, and all venue informants reported less than six people gathered at the venue at any time; or (3) staff reported the venue to be predominantly a meeting place for men who have sex with men. A venue was included if one or more venue informants reported it to be a sex partner meeting place or it was selected as part of a 66% random sample. The random sample was selected from among venues meeting neither exclusion nor inclusion criteria, that is, venues where venue informants answered "don't know" or "no" as to whether people met sex partners there and either: (1) greater than three people were observed by the interviewer; or (2) three venue informants reported at least six people would gather there at any time. All venues at which participants were later recruited met these venue selection criteria regardless of the original method used to identify the venue. Venues included nightclubs, bars, street corners, parks, high schools, and a college.

Participant recruitment and interview procedures

Operating from a modified recreational vehicle, a team of three staff members recruited and enrolled participants at the selected venues between 6 PM and 9 PM on consecutive nights until 20 participants had been recruited per venue. Staff approached anyone who stepped into the area of sidewalk adjacent to the van. Eligibility criteria included 18 to 35 years of age, English speaking, and sexually active within the last three months. Eligible and interested participants