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Original article

Associations of place characteristics with HIV and HCV risk behaviors among racial/ethnic groups of people who inject drugs in the United States

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ABSTRACT

Purpose: Investigate whether characteristics of geographic areas are associated with condomless sex and injection-related risk behavior among racial/ethnic groups of people who inject drugs (PWID) in the United States.
Methods: PWID were recruited from 19 metropolitan statistical areas for 2009 National HIV Behavioral Surveillance. Administrative data described ZIP codes, counties, and metropolitan statistical areas where PWID lived. Multilevel models, stratified by racial/ethnic groups, were used to assess relationships of place-based characteristics to condomless sex and injection-related risk behavior (sharing injection equipment).
Results: Among black PWID, living in the South (vs. Northeast) was associated with injection-related risk behavior (adjusted odds ratio [AOR] = 2.24, 95% confidence interval [CI] = 1.21–4.17; $P = .011$), and living in counties with higher percentages of unaffordable rental housing was associated with condomless sex (AOR = 1.02, 95% CI = 1.00–1.04; $P = .046$). Among white PWID, living in ZIP codes with greater access to drug treatment was negatively associated with condomless sex (AOR = 0.93, 95% CI = 0.88–1.00; $P = .038$).
Conclusions: Policies that increase access to affordable housing and drug treatment may make environments more conducive to safe sexual behaviors among black and white PWID. Future research designed to longitudinally explore the association between residence in the south and injection-related risk behavior might identify specific place-based features that sustain patterns of injection-related risk behavior.

Introduction

Human immunodeficiency virus (HIV) incidence among people who inject drugs (PWID) in the United States has declined since the early 1990s [1,2] as a result of targeted HIV prevention strategies and the adoption of safer injection and sexual behaviors among PWID [3–5]. However, PWID still account for a disproportionate share of incident cases of HIV and hepatitis C virus (HCV) [6–8]. This reality coupled with recent transitions from opioid pills to injection drug use, and related outbreaks of HIV and HCV infection [9–13], warrants sustained vigilance of risky injection behaviors that increase the risk of HIV or HCV transmission and sexual behaviors that increase the risk of HIV transmission among PWID. These trends also highlight the need to identify factors that increase risky injection and sexual behaviors.

According to recent surveillance in 20 metropolitan statistical areas (MSAs), risk behaviors that increase the risk of HIV or HCV transmission ("HIV/HCV risk behaviors") are prevalent among

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PWID, with 77% of PWID reporting condomless heterosexual sex or receptive syringe sharing at least once in the past year [14]. Several individual-level factors, including poor socioeconomic status, homelessness, recent incarceration, and low health care service use, prevent PWID from consistently engaging in safer injection and sexual behaviors [15–17]. As conceptualized by Rhode's "risk environment model," however, these potential individual-level determinants may result from broader economic, social, and political conditions that constrain the ability of PWID to earn a living wage, be stably housed, and use health care services [18–20].

The majority of studies that have investigated the possibility that place-based factors influence HIV/HCV risk behaviors among PWID have evaluated associations of spatial access to health care services with injection-related risk behavior [21–27]. A smaller number have determined whether other environmental features, including place-based socioeconomic factors, influence injection-related risk behavior and condomless sex among PWID [28–31]. Even fewer determine whether specific place-based features are associated with HIV/HCV risk behaviors among different racial/ethnic groups of PWID. One study, for example, demonstrated that greater proximity to syringe exchange programs was associated with less injection-related risk behavior among Latino PWID, but not among black or white PWID [23].

Similarly, place-based socioeconomic factors may differentially influence HIV/HCV risk behaviors among PWID of different racial/ethnic groups. Because of racial/ethnic residential segregation and housing discrimination, historically, predominantly low-income black and Latino people in U.S. cities have been disproportionately exposed to poor socioeconomic conditions [32–36]. Racial/ethnic residential segregation has been associated with sexual and injection behaviors [37,38] and sexually transmitted diseases, including HIV [39–41]. But residential segregation has also been suggested to discourage risky health behaviors. For example, Bluthenthal et al. [29] documented an inverse association between percentages of African American residents in census tracts and injection-related risk behavior among a diverse sample of PWID. The authors suggested that this finding may have related to the concentration of HIV prevention services in predominantly African American communities because of disproportionately high rates of HIV among African Americans [29].

Our prior research suggests that the "racialized" distribution of exposure to sociodemographic conditions persists among PWID [42]. This research also documents racial/ethnic differences in spatial access to HIV testing sites, drug treatment and syringe-exchange programs among PWID [42]. The differing degrees by which different racial/ethnic groups of PWID encounter socioeconomic affluence, destitution and proximity to harm reduction services may thereby influence whether these conditions differentially influence risk behavior among black, Latino, and white PWID. Further expanding the scope of research on place and HIV/HCV risk behaviors to investigate whether place-based features differentially influence risk behavior among Latino, black, and white PWID could possibly help tailor future place-based HIV/HCV prevention strategies.

Guided by the risk environment model, which elaborates connections between social, economic, and housing characteristics to HIV/HCV risk behaviors among PWID [18–20], this analysis sought to advance understanding of the relationships of place-based socioeconomic, housing and health care service characteristics at three geographic scales (ZIP code areas, counties, MSAs) to injection-related risk behavior and condomless sex among three racial/ethnic groups of PWID (Hispanic/Latino, non-Hispanic black, and non-Hispanic white) recruited from 19 MSAs in the United States in 2009.

Materials and methods

Study sample

PWID were recruited by respondent-driven sampling (RDS) for the 2009 cycle of the Centers for Disease Control and Prevention's National HIV Behavioral Surveillance (NHBS) system. The sampling procedures for NHBS have been described elsewhere [43]. Briefly, 2009 data collection for PWID surveillance was implemented in 20 MSAs with high AIDS prevalences in 2006 [44]. RDS chains began with <15 participants ("seeds") selected based on recommendations from key informants and community-based organizations. Seeds were invited to recruit ≤5 PWID from their personal networks, and recruits who completed surveys were given the same opportunity. Approximately 500 PWID were enrolled in each MSA as result of these recruitment efforts [45].

Study eligibility criteria stipulated that participants had not already participated in the 2009 cycle of NHBS; be ≥18 years; report injection drug use in the past year; demonstrate evidence of injection (e.g., track marks); reside in an NHBS-eligible MSA; and provide oral consent. The San Juan-Bayamon MSA in Puerto Rico was excluded because it lacked ethnic diversity (98% were Latino) and therefore would not permit assessment of racial/ethnic differences. A total of 9882 participants met eligibility criteria in the remaining 19 MSAs.

Analysis was restricted to 9702 Hispanic/Latino PWID, non-Hispanic/Latino black PWID, and non-Hispanic/Latino white PWID (hereto referred to as Latino, black, and white PWID, respectively). "Plurality" guidelines from the Federal Office of Management and Budget were used to group non-Hispanic/Latino biracial participants into the white and black racial categories [46]. Participants were excluded from the analytic sample if they had invalid and/or incomplete surveys ($n = 26$); invalid or missing ZIP code information ($n = 499$); participants who identified as transgender or did not report a gender identity ($n = 51$) because they were not asked questions about sexual behavior during data collection; or were missing information on key covariates ($n = 340$). The final analytic sample for the injection-related risk behavior outcome included 8786 participants. The analytic sample used to evaluate condomless sex further excluded 1085 participants who did not report having sex in the past year ($n = 7701$). Characteristics of participants included in the analytic sample did not differ considerably (<10% difference) from the characteristics of participants who were excluded.

Data collection and measures

Trained interviewers administered standardized questionnaires to collect participant information, including the ZIP codes and counties where they lived. Participants were assigned to MSAs and regions based on interview site and those who reported being homeless at the time of the interview were asked where they most frequently slept and were assigned to a ZIP code based on this information. Participants included in the analytic sample reported more homelessness than participants who did not provide ZIP codes (>10% difference). When participants lived in ZIP codes that crossed county lines, they were assigned to the county where most participants living in that ZIP code reported residing ($n = 341$).

The first outcome, injection-related risk behavior, was defined as using syringes, cookers, cotton, or water after someone else used them in the process of injecting—or using drugs that had been divided by a used syringe—in the past year. The second outcome, condomless sex, was defined according to separate questions in the questionnaire that asked participants to report whether they had vaginal or anal intercourse without a condom with at least one