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The association between neighborhood socioeconomic disadvantage and high-risk injection behavior among people who inject drugs

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ABSTRACT

Background: Although much research has been conducted on the determinants of HIV risk behavior among people who inject drugs (PWID), the influence of the neighborhood context on high-risk injection behavior remains understudied. To address this gap in the literature, we measured associations between neighborhood socioeconomic disadvantage and high-risk injection behavior, and determined whether these associations were modified by drug-related police activity and syringe exchange program (SEP) accessibility.

Methods: Our sample was comprised of 484 pharmacy-recruited PWID in New York City. Measures of neighborhood socioeconomic disadvantage were created using data from the 2006–2010 American Community Survey. Associations with high-risk injection behavior were estimated using multivariable Poisson regression. Effect modification by drug-related police activity and SEP accessibility was assessed by entering cross-product terms into adjusted models of high-risk injection behavior.

Results: Neighborhood socioeconomic disadvantage was associated with decreased receptive syringe sharing and unsterile syringe use. In neighborhoods with high drug-related police activity, associations between neighborhood disadvantage and unsterile syringe use were attenuated to the null. In neighborhoods with high SEP accessibility, neighborhood disadvantage was associated with decreased acquisition of syringes from an unsafe source.

Conclusions: PWID in disadvantaged neighborhoods reported safer injection behaviors than their counterparts in neighborhoods that were relatively better off. The contrasting patterns of effect modification by SEP accessibility and drug-related police activity support the use of harm reduction approaches over law enforcement-based strategies for the control of blood borne virus transmission among PWID in disadvantaged urban areas.

1. Introduction

High-risk injection behaviors, such as syringe sharing and syringe reuse, facilitate the spread of HIV, HCV, and other infections among people who inject drugs (PWID) (Normand et al., 1995; Villano et al., 1997). Research on the determinants of high-risk injection behavior has traditionally concentrated on factors operating at the individual level. However, more recent work suggests that these behaviors are shaped not only by individual-level factors, but also by the environment in which they occur (Bluthenthal et al., 2007; Cooper et al., 2011; Genereux et al., 2010; Hutchinson et al., 2000; Latkin et al., 2005; Rockwell et al., 1999; Schilling et al., 2004). Several authors have

written conceptual papers describing how HIV risk is influenced by contextual factors, but the paradigm most often cited is that proposed by Rhodes and colleagues in their writings on the risk environment (Galea et al., 2003; Poundstone et al., 2004; Rhodes et al., 2005). According to this paradigm, the risk environment is the space in which physical, social, political, and economic factors exogenous to the individual interact to shape the transmission of blood borne viruses (BBVs) among PWID.

One element of the risk environment that remains understudied in the context of high-risk injection behavior is neighborhood socioeconomic disadvantage. A review of the literature suggests that neighborhood disadvantage may influence high-risk injection behavior

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through a variety of pathways. For example, disadvantaged neighborhoods may exhibit higher levels of neighborhood social disorder than those that are relatively better off. Neighborhood social disorder may, in turn, impose psychological distress on PWID (Latkin and Curry, 2003), making them more likely to engage in unsafe injection behaviors (Latkin et al., 2005). Similarly, disadvantaged neighborhoods may also have larger populations of PWID, allowing injectors to form larger, denser injection networks. Both network size and network density have been shown to be associated with syringe sharing (De et al., 2007), potentially increasing the likelihood of high-risk injection behavior in poor areas. Although many hypotheses link neighborhood disadvantage to more unsafe injection practices, it is important to note that this exposure may also be protective. HIV prevention interventions like syringe exchange programs (SEPs) may be more common in disadvantaged neighborhoods where drug activity is traditionally higher. These interventions may promote safer injection behaviors in poor areas by increasing sterile syringe access and educating PWID on the risks of syringe sharing (Gibson et al., 2001).

To date, at least two studies have investigated associations between neighborhood disadvantage and high-risk injection behavior, each yielding different results. The first, conducted among PWID in the San Francisco Bay area, found that census tract-level measures of socioeconomic disadvantage were not associated with receptive syringe sharing (Bluthenthal et al., 2007). Conversely, the second found that neighborhood-level measures of poverty were associated with high-risk injection behavior among inner-city PWID in Montreal, Canada (Geneux et al., 2010). Interestingly, the associations detected in the Montreal-based study for neighborhood poverty and neighborhood educational attainment were in opposite directions. Both poverty and higher educational attainment were linked to more high-risk injection behavior. Together, these results offer conflicting perspectives as to whether neighborhood disadvantage influences injection practices, and if so, how.

In addition to emphasizing the role of contextual factors on individual-level behavior among PWID, the risk environment paradigm also emphasizes the interplay of these factors in shaping outcomes (Rhodes et al., 2005). With this in mind, it is helpful to examine how neighborhood socioeconomic disadvantage operates in the context of other area-level influences on high-risk injection behavior. Previous research has identified two area-level characteristics that warrant consideration: syringe exchange program (SEP) accessibility and drug-related police activity. Studies have shown that the proximity of injectors' residences to SEP sites is associated with decreased syringe sharing (Cooper et al., 2011; Gindi et al., 2009; Hutchinson et al., 2000; Rockwell et al., 1999; Williams and Metzger, 2010), while drug-related police activity has been linked to increased high-risk injection behavior (Bluthenthal et al., 1999a; Bluthenthal et al., 1999b).

To better understand the role of the neighborhood environment in the etiology of high-risk injection behavior in PWID, we examined associations between common measures of neighborhood socioeconomic disadvantage and high-risk injection behavior among a sample of PWID in New York City. In addition, we examined whether these associations were modified by SEP accessibility and drug-related police activity.

2. Methods

2.1. Subjects and setting

The current analyses use data from the Pharmacists as Resources Making Links to Community Services (PHARM-Link) study, which has been described elsewhere (Rivera et al., 2010). Briefly, the PHARM-Link study is a pharmacy-randomized intervention trial conducted among pharmacies participating in New York State's Expanded Syringe Access Program (ESAP) - a program permitting the sale of non-prescription syringes to PWID. The purpose of the PHARM-Link study was to evaluate the impact of pharmacy-delivered referrals to health and

social services on outcomes among pharmacy staff and PWID. ESAP-registered pharmacies in high drug activity neighborhoods in Brooklyn, Queens, Manhattan, and the Bronx were invited to participate. A total of 55 pharmacies were randomized to intervention and primary control arms. Intervention pharmacies offered PWID referrals to health and social services via print materials and a drug user-specific web resource guide, while primary control pharmacies offered only standard syringe sales services. PWID were recruited into PHARM-Link when visiting study pharmacies to purchase nonprescription syringes. During syringe transactions with PWID, pharmacy staff were trained to discreetly describe the PHARM-Link study and to offer a study appointment with research staff within one week of the pharmacy visit. PWID who were at least 18 years of age were eligible to participate. At the study appointment, research staff obtained informed consent and invited participants to complete a 45 min Audio Computer Assisted Self Interview (ACASI) that ascertained data on a variety of topics, including socio-demographic characteristics, drug use history, HIV risk behaviors, syringe access and disposal practices, and history of access to medical and social services. Participants were compensated with \$20 and a round-trip Metrocard for completion of the survey. Baseline data collection was conducted between March 2009 and October 2010. Participants who completed baseline surveys were invited to complete follow-up surveys at 3 months. The PHARM-Link study was approved by the institutional review boards at the New York Academy of Medicine and Columbia University. The current analyses are restricted to data collected at the baseline time point from participants who reported injection of illicit drugs in the three months prior to interview. Analyses include PWID recruited in both the intervention and primary control pharmacies.

2.2. Individual-Level measures

2.2.1. High-Risk injection behaviors

The dependent variables in this analysis were the following high-risk injection behaviors: unsterile syringe use, receptive syringe sharing, and the acquisition of syringes from unsafe sources (Table 1). Unsterile syringe use includes both receptive syringe sharing and injectors' reuse of their own syringes. This behavior was measured using the following item: "In the past three months, how often did you use a syringe that you were absolutely sure had not been used by anyone, not even yourself?" Participants were asked to respond to this item on a 6-point Likert scale ranging from "Never" to "Always." Responses were dichotomized so that participants who endorsed any option other than "Always" were considered to have engaged in unsterile syringe use. Similarly, receptive syringe sharing was measured using the following item: "In the past three months, how often did you use a syringe that you knew someone had used before you?" Participants were asked to respond to this item on a 6-point Likert scale ranging from "Never" to "Always." Responses were dichotomized so that participants who endorsed any option other than "Never" were considered to have engaged in receptive syringe sharing. Finally, to assess the acquisition of syringes from unsafe sources, participants were asked to report the frequency with which they obtained syringes from friends, relatives, syringe dealers, and shooting galleries in the past three months, using a 7-point Likert scale ranging from "Never" to "Everyday." Responses were dichotomized so that participants who reported any frequency except "Never" for obtaining syringes from any of these sources were categorized as having used an unsafe syringe source.

2.2.2. Individual-Level covariates

On the basis of previous research regarding injection risk behavior among PWID, the following individual-level covariates were evaluated as potential confounders of associations between neighborhood socioeconomic disadvantage and high-risk injection behavior: age (continuous), gender (male/female), race (black/Latino/white or other), education (high school graduate or GED/less than high school), income

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