



Research paper

The micro-social risk environment for injection drug use: An event specific analysis of dyadic, situational, and network predictors of injection risk behavior



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ABSTRACT

Background: This study explores the risk environment for drug use by examining injection risk behavior during specific injection episodes. By leveraging multiple observations of injection episodes of participants, the study attempts to move beyond global assessment of environmental variables to simultaneously model within (i.e., event level) as well as between (i.e., individual level) predictors of injection risk. Furthermore, gender is also explored as a potential moderator of the relationship between the association of specific partner characteristics (e.g., having an injection partner who is also a sexual partner) and injection risk behavior.

Methods: Data is used from the Sexual Acquisition of Transmission of HIV Cooperative Agreement Study (SATHCAP). Multilevel structural equation modeling is utilized to predict within and between variations in underlying injection risk behavior as measured using four indicators of injection risk.

Results: Results indicated that a number of partner level characteristics (i.e., being emotionally close with the partner, sexual partnership, being a first time partner) and one social situational (i.e., the number of non-injectors present at the injection episode) characteristic predicted event level injection risk behavior. However, the impact of partner characteristics also appears to be moderated by gender of the participants. More specifically, sharing a sexual partnership with an injection partner was more strongly associated with injection risk among females as compared to males and females indicated higher levels of risk when injecting with other females while the partner's gender showed no significant association with risk for male injectors.

Conclusion: These results suggest that people who inject drug do report varying levels of risk during different injection episodes and this variation can be explained by partner and situational characteristics. Improved understanding of the social processes surrounding injection episodes is required to further refine harm reduction approaches.

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Background

Despite gains in reducing the burden of HIV among people who inject drugs (PWID) in the United States (Strathdee & Stockman, 2010), the risk of acquiring HIV still remains elevated in this population. For example, between 2009 and 2012, injection drug use was involved with 12% of infections among males and 24% of new infections among females in the United States (CDC, 2013). Given that an estimated 1% of the US population is estimated to use injection drugs each year (USDHHS, 2013), this suggests that

PWIDs continue to contribute disproportionately to the new incidence of HIV in the United States. Furthermore, PWIDs also remain at high risk for hepatitis C virus (HCV) (Nelson et al., 2011).

HIV/HCV prevention research has increasingly focused on the “risk environment” for injection drug use such as neighborhoods, networks, and norms (Latkin, German, Vlahov, & Galea, 2013; Rhodes, 2009) in effort to explain the persistence of these health burdens. However, only a small number of studies have examined setting characteristics for *specific injection episodes* (i.e., event level data) and how these characteristics may impact injection risk behavior (Latkin et al., 2013).

Each injection “episode” takes place during a specific time, in a specific place, and, when not injecting alone, with specific people. The characteristics of these settings (both social and physical)

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likely impact the level of risk observed during each episode. Yet, despite the importance of the specific characteristics surrounding an injection event, studies that have examined setting characteristics often rely on global assessments of injection risk behavior (i.e., frequency of risk behavior during the past 6 months) or only examine behavior during a single injection episode. Inference of associations in studies using global assessments of injection risk behavior are limited given the potential for individual level confounding factors and the lack of direct connection between the behavior and the predictors. Even with event-level data, examining only a single event also limits inference because within person variation in risk behavior is not observed and therefore individual level characteristics may still confound observed associations (Leigh & Stall, 1993).

Previous research into social settings suggests that setting level outcomes are dependent on characteristics such as the availability of resources, the distribution of these resources, and social processes in the settings (Tseng & Seidman, 2007). During injection episodes, these resources may include injection equipment, the time available to inject, and the level of knowledge of hygienic injection practices. For example, previous research has indicated greater levels of syringe coverage are associated reduced injection risk behavior (Abdul-Quader et al., 2013) and that the time available to inject is associated with the ability of injectors to engage in harm reducing activities (Cooper, Moore, Gruskin, & Krieger, 2005). However, as noted, these variables are infrequently measured at the event level despite the fact that the availability of resources during specific episodes (e.g., how many sterile syringes are available immediately prior to injecting) likely drives the impact of these variables on risk behavior.

Furthermore, if multiple injectors are present, these resources may be distributed more or less equally among multiple injectors. For example, providing the drugs during a specific episode may place an individual at a privileged position of risk during the injection episode, such as the order of injection (Maher, 2002). The distribution of these resources may also be explained by the social processes that exist in this setting such as social networks of injectors, norms of sharing equipment, and disparities in power among injectors. For example, a growing number of studies that document how gender impacts injection risk behavior (Frajzyn-gier, Neaigus, Gyarmathy, Miller, & Friedman, 2007; Syvertsen et al., 2014) and the importance of gender inequities in understanding the risk environment for injection drug use (Strathdee et al., 2010). The current study specifically focuses on gender as a possible moderator of the association between dyad level characteristics and injection risk behavior given that previous studies have indicated that gender may moderate the relationship between risk behavior and setting or partner factors such as police presence (Cooper et al., 2005) or injecting with sexual partners (Harris & Rhodes, 2013).

Accordingly, the current study is intended to expand upon preliminary investigations of the micro-social risk environment for injection drug use and further explore situational, dyadic, and network characteristics associated with injection risk behavior by using even-specific data on up to four different injection episodes nested within each participant. In addition, the study incorporates latent variable measurement of injection risk behavior in effort to improve the measurement characteristics of this behavior (Janulis, 2014). Therefore, multilevel structural equation modeling is used in effort to examine the following research questions (1) what characteristics of injection partners and social/physical environment explain within person variation in injection risk behavior, and (2) what network and individual characteristics explain between person variation in injection risk behavior and (3) does gender explain variation in the association between dyadic characteristics and injection risk behavior?

Method

This US focused study uses a subset of data from the Sexual Acquisition and Transmission of HIV Cooperative Agreement Program (SATHCAP; Compton, Normand, & Lambert, 2009) obtained via the National Addiction and HIV Archive Program (NAHDAP, 2015). SATHCAP included three U.S. sites (i.e., Chicago, IL; Los Angeles, CA; and Raleigh Durham, NC), and one international site (i.e., St. Petersburg, Russia). However, only data from the three U.S. sites that is publicly available through the National Addiction and HIV Archive Program will be used in this study. The recruitment of participants for all SATHCAP sites utilized respondent driven sampling and full details on recruitment procedures can be found elsewhere (Iguchi et al., 2009).

Inclusion criteria

The total sample of SATHCAP participants at these three sites was 4688. However, the current study utilized a subsample of PWIDs from the larger sample collected in the SATHCAP study. Participant were included in the current study if they injected with at least one person during the last 6 months (“with” means, “people who injected drugs at the same place and time as you”). This inclusion criterion was necessary because individuals who have not injected in the same place and time as another individual did not provide data on specific injection episodes. This criterion included 835 total participants with 55 providing data on four injection episodes, 391 providing data on three injection episodes, 207 providing data on a two injection episodes, and 182 providing data on a single injection episode leading to a total. IDU participants had a mean age of 42.6 (SD = 10.8) and were majority male (67.5%). As for racial/ethnic identification, the majority identified as African American (53.5%), followed by white (34.7%), Hispanic/Latino (24.1%), and other (2.0%). After removing participants missing on one or more independent variables or all dependent variables, the final sample included 782 participants reporting on 1674 injection episodes.¹

Measures

The measures used in this study can be broadly organized into two groups: level 2 (i.e., individual) measures and level 1 (i.e., injection episode) measures. Level 2 measures include demographics, drug use, and personal network characteristics. These variables do not change across injection episodes. Level 1 measures included situational characteristics (i.e., characteristics of the injection episode), dyadic characteristics (i.e., characteristics that depend on the participant and the injection partners), and injection risk behaviors. These variables are injection episode specific and therefore can have variability within individual participants.

Level 2 (individual) measures

Level 2 variables indicated characteristics of the individual that were constant throughout all injection episodes. The following demographic variables were included in the study: age, gender, race, ethnicity, homelessness (i.e., identify as homeless during the previous year). Participants were be coded using their currently identified gender. Race was coded as White, African American, and Other given the small cell counts of non-African American or non-White identified participants. Two variables indicated the fre-

¹ Given the computationally demanding nature of the data analysis, it was infeasible to utilize more advanced treatment of missing data such as multiple imputation. However, missing variable dummy codes were introduced for categorical variables in effort to utilize as many cases as possible in the data analysis.

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