



A spatial analysis of the physical and social environmental correlates of discarded needles

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ABSTRACT

The role that the urban environment plays in influencing drug users' injection and needle disposal decisions is poorly understood. We identified potential attractors and deterrents of needle discarding, and then used a geographic information system (GIS) to quantify these factors for a neighborhood in Montréal, Canada. In multivariate logistic regression, discarded needles were found to have more associations with physical factors than with social factors. Visual exposure and proximity to a single-room occupancy hotel, a payphone, an adult service or a pawnshop were important physical environmental predictors. These findings are discussed in relation to developing public health and urban design-based harm reduction approaches to needle discarding in public space.

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1. Background

1.1. Discarded needles

Discarded needles and syringes (hereafter “discarded needles” or simply “discards”) are those used by injection drug users (IDUs) and then abandoned in public places. Discarded needles cause critical harm, both directly and indirectly. Discards are a sign of serious social breakdown and incivility (Innes, 2004). There is a widely held and understandable, yet false, belief that discards readily transmit blood-borne pathogens. Although laboratory testing has shown that blood-borne viruses survive in needles long enough to justify concerns about needle-stick infections (Thompson et al., 2003), very few infections have ever been documented for non-medical needle-sticks (Garcia-Algar and Vall, 1997; Libois et al., 2005), even in situations where needle-sticks were relatively frequent (CPS Infectious Diseases and Immunization Committee, 2008; Lawitts, 2002) or in cases when post-stick anti-viral therapy was not administered (O'Leary and Green, 2003; Russell and Nash, 2002).

Non-drug using populations view discards with fear and repulsion. Thus discards reduce the quality of life of the residents and merchants blood-borne who encounter them. Moreover, concerned citizens may direct their resentment into organized opposition to much-needed services for IDUs, such as the closing of life-saving needle exchange programs (NEPs) (Broadhead et al., 1999).

Traditional strategies for reducing discards have focused on restricting access to injecting equipment, making it illegal for IDUs to carry injecting equipment, and directing police to target IDUs, either formally (by enforcing anti-paraphernalia laws) or informally (stopping suspected IDUs and overtly patrolling outside NEPs). Yet limiting access to sterile equipment and prohibiting its possession have dire consequences on the health of IDUs, in terms of infection rates and injection-related injuries (Wodak and Cooney, 2006). Crackdowns by police tend to displace, rather than reduce drug use, increasing the number of discards and shifting them into previously unexposed neighborhoods (Wood et al., 2004).

These negative consequences of current practices in reducing discards are particularly unfortunate, given that a majority of IDUs report preferring to use safe disposal options over unsafe methods of discarding (Neale, 1998). In contrast, drop-boxes represent a relatively new and promising strategy for combating discarded needles. These public-access, always-open, anonymous and safe facilities for needle disposal are relatively well accepted by host communities (Springer et al., 1999) and they have been associated

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with high decreases in discards (up to 90% reduction), although their effectiveness may diminish with distance (de Montigny et al., 2010).

Regardless of the strategies used to reduce discards, being able to predict, where discards will occur would allow service providers to better target harm reduction efforts. Specifically, it would be useful to identify the environmental attractors of discarding. Knowing what these attractors are would also support interventions on the environment, moving or removing attractors or adding deterrents. Such interventions could provide additional tools for discouraging discards around sensitive areas, such as schools and children's play areas.

Little is known about the environmental aspects of discarding. Published literature on discarding behavior is limited and focuses on non-spatial aspects, such as who discards and how often discarding occurs (Cleland et al., 2007; Golub et al., 2005; Sherman et al., 2004). Anecdotal evidence suggests that certain spaces are more heavily affected than others, and that the spatial distribution of discards may be clustered even within a high drug use neighborhood. Evidence on where public injection, the source of discards, takes place, indicates that injection and disposal choices made by IDUs are influenced by identifiable features of their physical as well as social surroundings (Galea et al., 2005).

Drug users must navigate many obstacles to obtain and use drugs. These activities take place in space, mostly urban spaces (Rhodes, 2002). Thus the urban environment plays a key role in shaping IDUs' behavior, which is influenced by social, structural, and situational factors (Jose et al., 1996). Public injectors themselves have reported environmental considerations as part of their rationale for choosing a location for public injection, showing some consensus in their preferences (Green et al., 2003).

1.2. Study aims

In this research we sought to clarify the environmental contexts of discarding, at the scale where injection and disposal decisions were made, in order to help service-providers and public health officials locate safe needle-disposal programs and manage the negative externalities associated with the use of injection drugs. Specifically, we aimed to identify physical and social environmental factors associated with discarded needles, which could serve as a proxy for public injection.

1.3. Conceptualizing the ecology of public injecting and needle discarding

When injecting in public, IDUs prioritize: (1) avoiding detection, especially by police; (2) minimizing time between acquiring and injecting drugs; and (3) finding a relatively safe, clean and quiet place (Green et al., 2003). Thus characteristics of the physical environment determine what prospects an area offers for the acquisition, use and disposal of drugs and needles. Characteristics of the social environment determine how those opportunities are moderated by formal and informal social controls. Fig. 1 illustrates our approach to identify and organize environmental factors by their expected influence on public injecting and discarding decisions. The conceptual diagram is based on the hypotheses that: (1) IDUs will seek out certain types of places to inject and will discard the needle near where the injection occurs, and (2) places of public injection and discard are typically located in close proximity to where IDUs obtain drugs. Influences on the IDU behavior include the physical environment, which provides a range of public places within which the IDU behavior occurs, each with its own characteristics. They also include the social environment in that non-IDUs, such as residents,

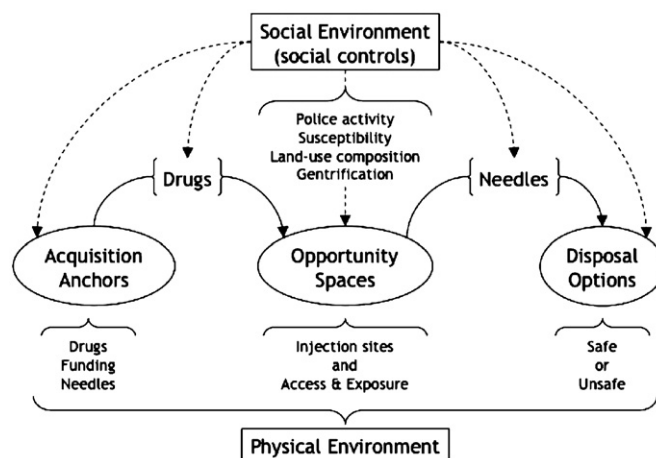


Fig. 1. Conceptual model of the ecology of public injecting and discarding

merchants and law enforcement officers, limit access to and control use of certain places more than others.

Within this framework, we conceived of three types of spaces associated with IDU behavior: spaces for (1) drug acquisition, (2) injection, and (3) needle disposal. These spatial constructs served to identify and select independent variables of the physical environment. *Acquisition anchors* encompass features of the built environment that represent starting places for the acquisition of drugs or injection equipment. *Opportunity spaces* encompass locations in which public injection could take place, and the characteristics of these spaces that could modify their suitability for public injection. *Disposal options* encompass facilities that provide the means to dispose of soiled needles, either safely or unsafely.

A fourth construct, that of *social controls* serves to identify and select variables describing the social environment (influence shown as dotted lines in Fig. 1). Social controls encompass indirect measures of social efficacy. Social actors can exercise formal control, such as the key activities of police and private security, as well as the informal control of intolerant residents. Control can be active (e.g., search and seizure by police) or passive (e.g., presence of a patrol car).

2. Methods

2.1. Setting

A 2001 estimate placed the Montréal IDU population between 4300 and 12,500 individuals (Archibald et al., 2001), with the drug of choice being cocaine, which was associated with frequent daily injections (Green et al., 2003). The study area (shown in Fig. 2), part of the Sainte-Marie neighborhood, is centered on the most active injection drug use area of the city (Leclerc et al., 2007). Sainte-Marie is known to be home to a long-standing population of IDUs, as well as being one of the city's centers for drug sales.

2.2. Research design

We used a spatial case-control approach to estimate the effects of the physical and social environments on the likelihood of a given location having been the site of one or more discards (a case) vs. having been the site of zero discards (a control). The unit of sampling and analysis was the point (xy coordinate) where discards were collected or where the control site was selected.

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