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Mapping U.S. long-haul truck drivers' multiplex networks and risk topography in inner-city neighborhoods

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ABSTRACT

This article illustrates how urban inner-city trucking milieux may influence STI/BBI/HIV acquisition and transmission risks for U.S. long-haul truckers, as well as their social and risk relationships. Using mixed methods, we collected ethnoepidemiological and biological data from long-haul truck drivers and their risk contacts in inner-city trucking milieux in Atlanta, Georgia, United States. Key findings indicate that within the risk-endemic environment of distressed inner-city areas, diverse trucking risk milieux can amplify STI/BBI/HIV risk for multiplex networks of truckers. Inner-city neighborhood location, short geographic distance among risk contacts, and trucker concurrency can potentially exacerbate transmission via bridging higher-risk individuals with lower-risk populations at disparate geographic and epidemiological locations.

1. Introduction

A multitude of spatial and relationship domains, such as physical and human geography and social networks, can play a pivotal role in facilitating or inhibiting influences on population health (U.S. Department of Health & Human Services, 2013; Rothenberg et al., 2005). The health risk and prophylactic behaviors of particularly vulnerable populations engaged in substance misuse and high-risk sexual activity in distressed urban locales are heavily influenced by characteristics of the space and context of their occurrence (Centers for Disease Control and Prevention, 2011).

Empirical evidence from diverse trucking settings indicates that some North American regional and long-haul truckers engage in risk-laden sexual encounters with women and men that are often combined with illicit substances (Apostolopoulos et al., 2012; Stratford et al., 2007). Although the number of truckers who engage in these behaviors might be proportionally small, their interstate perpetual mobility and engagement in risky sexual behaviors pose risks to others. Truckstop location (i.e., urban), type of sexual transaction (i.e., concurrent sex partnerships), type of sex-cruising setting (i.e., intersection of Internet venues with actual highway rest areas), drug use (i.e., illicit substances particularly combined with sex), geographic and social proximity of sex contacts (i.e., within the same inner-city area), and bridging (i.e., truckers having unprotected sex with casual partners of differential risk while on the road) can have deleterious consequences on truckers' sexually transmitted (STI) and bloodborne infection (BBI) and transmission risk patterns (Apostolopoulos et al., 2011b, 2012; Apostolopoulos and Sonmez, 2006).

In the context of drug misuse and STI/BBI/HIV risk, and grounded in syndemics theoretical frameworks (Singer, 2009), this paper intends to: (1) ascertain the risk endemicity of enclaves of U.S. inner cities where long-haul trucking milieux are often located; (2) delineate the spatial and social topography of U.S. inner-city trucking milieux; and (3) discuss how these risk-endemic contexts may render truckers vulnerable to substances and infection, thereby amplifying potential pathogen spread to lower-risk populations and geographies due to truckers' constant mobility. It is worth noting that, while we examine how some metropolitan inner-city locales can facilitate and even amplify STI/BBI/HIV risk for long-haul truckers, we do not assert that most trucking settings share the same risk-conducive characteristics (Apostolopoulos et al., 2012).

2. How geography and social networks can influence drug misuse and STI/BBI/HIV risk

Contextual and social domains can play a critical role in mediating or moderating influences on population health, while sexual, substance use, and prophylactic behaviors are influenced

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by the physical and social space in which they unfold (Roux, 2007). Scant attention has been paid to the ways that proximity to risk-laden environments can affect drug misuse and STI/BBI/HIV risk (Macintyre et al., 2002). In the case of long-haul truckers and their social and risk contacts, commercial sex environments (CSEs) public sex environments (PSEs), and relevant Internet sites comprise domains connected with their broad occupational milieux that provide opportunities for both sexual activity and exposure to potential risks (Apostolopoulos et al., 2011b). In recent years, rising STI/HIV prevalence, especially among homosexual and bisexual men, has been partially attributed to increases in unprotected sexual activity at CSEs and PSEs, as well as the emerging role of Internet sex-seeking (Frankis and Flowers, 2006). The Internet has evolved into a social space in its own right, providing opportunities for sexual encounters with persons from geographically and epidemiologically disparate areas (Mclelland, 2002).

In the 1990s, a paradigm shift occurred in STI/HIV epidemiology through the incorporation of network dynamics, which facilitated behaviors leading to exposure (Morris, 2004). Key determinants in STI/HIV spread include who partners with whom, how partnerships are maintained, and the larger networks partners and partnerships are embedded in and are affected by Laumann et al. (1994). Given that STIs/HIV are predominantly transmitted by behaviors involving intimate contact between infectious and susceptible individuals, the pattern of disease diffusion through populations follows the structure of social networks, as diseases travel along different structural routes (Wasserman and Galaskiewicz, 1994). Social relationships contextualize how susceptible and infectious individuals arrive at sexual contact, as well as individuals' pattern of STI/HIV exposure and transmission and individuals' risk or protective behaviors (Wasserman and Galaskiewicz, 1994). When compared with serial monogamous relationships, concurrent relationships that involve simultaneous contacts with two or more partners who are at high risk for infection are characterized by a higher risk for disease transmission (Morris, 2004). This structural feature of networks presents an important element of the effect they may exert on infection risk (Morris, 2004).

As evidence supports links between substance misuse, multi-partner sexual engagement, unprotected sex, and STIs (Centers for Disease Control and Prevention, 2003), scientists continue to grapple with intricate overlaps among sexual behavior, drug misuse, and STI/BBI/HIV risk patterns. Key explanations for unsafe sex may include psychological distress, need for cognitive escape, sensation seeking, sexual compulsivity, and inadequate social capital, all of which are exacerbated by substance use (Clatts et al., 2001; Mansergh et al., 2002; Galea et al., 2004). These explanations are directly relevant to truckers and their diverse contacts on the road (Apostolopoulos and Sonmez, 2007).

3. Trucking operations and work-related risks for drivers

Regional and long-haul truckers in North America are susceptible to multiple hazards, which are mainly attributable to their work environment (Apostolopoulos et al., 2011a). Trucking is replete with interconnected stressors for drivers which, not only exacerbate endemic risks associated with the transport sector, but also define driver health (Apostolopoulos et al., 2011a). Key stressors are excessively long workhours, overall strenuous work context, erratic driving schedules and disrupted sleep patterns, chronic social isolation, limited healthcare access, and intense work-life conflicts (Apostolopoulos et al., 2011a; Krueger et al., 2007). These stressors result in chronic and often acute health problems such as psychological distress, depression, hypertension, hyperlipidaemia, cardiometabolic disease, musculoskeletal and pulmonary disorders, and highway accidents and vehicle crashes (Apostolopoulos et al., 2010). Truckers' life expectancy is 16 years lower than the general U.S. male population (Ferro, 2011).

Embedded within a hypermasculine trucking subculture, these interacting strains may induce or exacerbate substance use, sexual risk-taking, and gambling among truckers (Apostolopoulos and Sonmez, 2007). Despite references to men cruising for sex with truckers along U.S. highways in the 1970s (Corzine and Kirby, 1977), the possible connection between truckers, substance use, and sexual risk-taking was not empirically established until a study describing a syphilis outbreak along North Carolina highways in the 1990s (Cook et al., 1999). Evidence from recent research at truckstops in Alabama, Arizona, Florida, Georgia, North Carolina, and New Mexico supports that some long-haul truckers engage in risk-laden sexual encounters with female sexworkers (FSWs), and other women and men, which are often combined with substances used for relaxation, recreation, or staying awake during long drives (Apostolopoulos and Sonmez, 2006; Mccree et al., 2010; Lichtenstein et al., 2008). Truckers at New Mexico truckstops were found positive for HCV (8.5%), anti-HBc (10.4%), chlamydia (1.3%), gonorrhea (0.2%), syphilis (0.2%), and HIV (0.2%), with self-reported marijuana (18.1%), methamphetamine (9.1%), and crack (4.1%) use (Valway et al., 2009).

4. Methods

4.1. Data collection

Grounded in a synergy of ecosocial and syndemics theoretical frameworks (Krieger, 2011; Singer, 2009), we conducted a three-phase ethnoepidemiological research study in Atlanta, Georgia, United States. The overall aim of the study was to delineate the potential role of trucker network dynamics in the acquisition and dissemination of STIs/BBIs.

First, formative research was conducted to reduce fieldwork barriers and ascertain potential pathways of truckers' STI/BBI risk (Sonmez et al., Under review). Using conventional ethnoepidemiological methodological approaches (Schensul et al., 1999; Singer et al., 2000; Sonmez et al., under review), four observers at various times between 10:00 am and 11:00 pm conducted non-participant observation, including social and spatial mapping, in and around the four largest inner-city Atlanta truckstops. Social mapping helped to assess the social drivers of risk and populations at risk by collecting information on socioeconomic conditions, risk behaviors, and factors influencing a broad gamut of risks. These activities were also instrumental in identifying key segments of truckers' multiplex (social and risk) networks. Spatial mapping allowed us to delve into the drivers' spatial characteristics of risk, locations, and characterization of locales where risk transactions of members of trucker networks unfold. Spatial mapping helped us understand the geographic distribution of risk settings, establish the physical, social, and economic characteristics of each type of setting, and generate a baseline to examine possible changes in the distribution of settings that may occur as drug- and sex-related risks evolve. Interrater reliability was established by generating consensus between observers on interpretations of raw data and generation of themes. As a result of these procedures, we created physical maps which included key settings, locations, and categories of populations, as well as their location in the physical topography.

Second, four separate focus-group discussions were conducted with 10 long-haul truckers, five FSWs, six drug suppliers, and seven gatekeepers. These individuals constituted the most important population segments vis-à-vis trucker risk. Focus groups themes and questions were pilot tested with one individual from each group. Using systematic and snowball sampling, these individuals were selected based on their intimate knowledge of risk-laden activities involving truck drivers. They were recruited from two of