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Research paper

Spatial accessibility of drug treatment facilities and the effects on locus of control, drug use, and service use among heroin-injecting Mexican American men☆

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ABSTRACT

Background: This study explores the spatial accessibility of outpatient drug treatment facilities and the potential relationship with drug use-related outcomes among Mexican American heroin users.
Methods: Secondary data on 219 current and former heroin-injecting Mexican American men aged 45 and older were drawn from a research study in Houston, Texas. We used geographic information systems (GIS) to derive two spatial accessibility measures: distance from one's place of residence to the closest drug treatment facility (in minutes); and the number of facilities within a 10-minute driving distance from one's place of residence. Exploratory logistic regression analyses examined the association between the spatial accessibility of drug treatment facilities and several drug use-related outcomes: internal locus of control (LOC); perceived chances and worries of injecting in the next six months; treatment utilization; and location of last heroin purchase.
Results: Participants with greater spatial access to treatment programs were more likely to report a higher chance of injecting in the near future. However, while current heroin users were more worried about injecting in the next six months, greater spatial access to treatment programs seemed to have a buffering effect. Finally, those who lived closer to a treatment programs were more likely to have last purchased heroin inside the neighborhood versus outside the neighborhood. Spatial accessibility was not associated with internal LOC or treatment utilization.
Conclusion: The findings showed that the presence of outpatient treatment facilities—particularly services in Spanish—may influence perceived risk of future heroin use and purchasing behaviors among Mexican American men. Implications for future spatially-informed drug use research and the planning of culturally and linguistically responsive drug treatment programs are discussed.

Introduction

Racial and ethnic minority groups—especially Hispanics—continue to face significant disparities in access to drug use treatment and other related services. Compared to non-Hispanic Whites, Hispanics tend to utilize fewer services, be less satisfied with the treatment they do receive, be more likely to prematurely terminate treatment, and exhibit poorer treatment outcomes (Alegria et al., 2006; Alvarez, Jason, Olson, Ferrari, & Davis, 2007; Hser, Huang, Teruya, & Anglin, 2004; Substance Abuse and Mental Health Services Administration, 2009a). While access to care has been generally studied based on wait time to enter treatment or as a service barrier to care, limited research has explored the geographic accessibility of treatment for Hispanic communities with great need for services (Guerrero, Kao, & Perron, 2013; Guerrero, Pan, Curtis, & Lizano, 2011).

The environmental context of illicit drug use is a complex phenomenon that requires an ecological or multilevel perspective (Galea, Nandi, & Vlahov, 2004). With the advent of increasingly accessible Geographic Information Systems (GIS) and other technologies, researchers have a broad range of spatial tools to analyze

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individual health and behavior in the context of their surrounding environments (Borrell, 2011). The influence of geography and other environmental factors on drug use, addiction, and treatment is still a relatively new, but emerging, field of inquiry (McLafferty, 2008). As recently as 2006, the Association of American Geographers and the National Institute on Drug Abuse (NIDA) held a joint symposium to explore the linkages between geography and drug addiction. The report coming out of this symposium recommended several key areas for future research, including "the locational analyses of drug addiction treatment and service delivery facilities" and "the use of Geographic Information Systems to better understand and respond to drug addiction" (Thomas, Richardson, & Cheung, 2008, p. vi).

Guided by these recommendations, we conducted an exploratory study to look at the spatial accessibility of outpatient drug treatment facilities and its potential relationship with internal locus of control, drug use, and treatment utilization among Mexican American current and former heroin users. The term "spatial accessibility" refers to the aspect of access that focuses on the geographic location of services (Guagliardo, 2004; Higgs, 2005, 2009). Two broad research questions guided this exploratory study: (1) What is the impact of spatial accessibility on drug addiction and treatment utilization among this population? and (2) Does spatial accessibility have a differential impact on current users, compared to former users and those currently in methadone treatment? To address these questions, this study used secondary data from a study of Mexican American current and former heroin users living in Houston, Texas. Findings from this exploratory study could inform drug policy in the funding and design of drug treatment programs in the community.

Spatial accessibility, drug use, and treatment utilization

Access to services is a multidimensional issue, reflecting the degree of "fit" between individuals and the service delivery system (Penchansky & Thomas, 1981). Spatial accessibility focuses on the geographic location of services and its potential effects on an individual's ability or willingness to utilize services (Guagliardo, 2004; Higgs, 2005, 2009). Spatial access is based on the concept of distance decay, which assumes that access or utilization decreases as the distance from the service increases, and is commonly operationalized as distance to/from a service or the quantity or density of services within a certain area. Previous research on spatial accessibility has largely focused on the issue of "potential" accessibility (or the availability of services for individuals that might be in need), as opposed to "realized" accessibility (or the actual utilization of services by individuals) (Higgs, 2009). Despite increased attention, the potential relationship between the spatial organization of services, utilization, and outcomes is relatively unexplored.

There is growing evidence regarding the spatial nature of drug treatment facilities (Perron, Gillespie, Alexander-Eitzman, & Delva, 2010), including the relationship between drug treatment facilities and minority communities (Guerrero et al., 2013). However, specific research on the spatial accessibility to drug treatment facilities and its effects on drug addiction and treatment utilization are limited. For example, Beardsley, Wish, Fitzelle, O'Grady, and Arria (2003) found that patients who traveled less than one mile to participate in substance abuse treatment programs in Baltimore, Maryland, USA were more likely to complete the program than those who traveled more than one mile. They also found that participants who lived more than four miles away from a program had shorter lengths of stay in treatment. Similarly, Fortney, Booth, Blow, Bunn, and Cook (1995) found that US veterans were less likely to participate in aftercare treatment (for alcoholism) if they lived further away (in miles) from the treatment program.

In contrast, the spatial accessibility of drug treatment programs may also be associated with poorer outcomes, such as increased drug use and decreased treatment adherence. For example, Archibald (2008) found that regions with greater density of services providers were associate with greater prevalence of substance abuse while another study by Whetten et al. (2006) showed that among HIV-positive persons, greater distance from a clinic was associated with higher participation in substance abuse and mental health programs (although not with retention and engagement). Finally, Stahler et al. (2008) found that a high density of 12-step, self-help groups (Narcotics Anonymous and/or Alcoholics Anonymous) was associated with a decreased likelihood of patients diagnosed with comorbid mental health and substance abuse disorders in continuing treatment.

Even less research exists with respect to the geography of treatment programs and its impact on minority populations, specifically Hispanics. Recent studies (Guerrero et al., 2011, 2013) have explored the use of GIS as a tool to identify specific Hispanic communities with less access to Spanish-serving treatment facilities in Los Angeles County, California, United States. For example, Guerrero and colleagues (Guerrero et al., 2013) used spatial autocorrelation analysis to identify five "hot spots" or communities, which had high concentrations of Hispanics (74–86%) and were significantly farther from Spanish-serving facilities than the rest of the county.

Conceptual framework

Bronfenbrenner's *Ecological Systems Theory* places individuals in the context of their surrounding environment, in which the interactions between multiple systems can influence individual health or well-being, as well as behaviors (Bronfenbrenner, 1974, 1979). The accessibility of services is not only a function of individual characteristics; the capacity or willingness to utilize services is often influenced by one's environment. In the drug use context, a framework proposed by Jacobson (2004) emphasizes the importance of considering ecological factors in addition to personal characteristics when studying treatment outcomes. He suggests that neighborhood drug availability and community resources are important factors in treatment outcomes and relapse, and that neighborhood disadvantage can influence individual attitudes toward treatment through perceptions of reduced personal efficacy. In addition, the neighborhood in which a treatment facility is located may have an influence on the facility's clients; however, this influence can be either positive or negative. Finally, the distance and related travel burden from home to treatment are components of Jacobson's framework for place's role in treatment attrition.

One potential mechanism could be the impact of neighborhood characteristics (e.g. the lack of resources) on an individual's drug-related locus of control (LOC), which focuses on whether an individual believes that outcomes in life are related to his or her "own behavior or attributes versus the degree to which he feels the reward is controlled by forces outside of himself and may occur independently of his own actions" (Rotter, 1966, p. 1). Individuals with a more internal LOC orientation believe in their own personal agency and those with a more external LOC orientation feel more powerlessness over their lives. In general, higher internal LOC is associated with more positive outcomes for drug use and misuse (De Moja, 1997; Hall, 2001; Haynes & Ayliffe, 1991; Murphy & Bentall, 1992; Oswald, Walker, Krajewski, & Reilly, 1994). As it relates to the spatial accessibility of drug treatment facilities, the lack of resources and services in one's neighborhood may be related to one's perceptions of control or efficacy (Boardman & Robert, 2000; Christie-Mizell & Erickson, 2007; Ross, Mirowsky, & Pribesh, 2001).