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Neighborhoods and HIV: A Social Ecological Approach to Prevention and Care

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Abstract

Neighborhood factors have been linked to HIV risk behaviors, HIV counseling and testing, and HIV medical care. However, the social–psychological mechanisms that connect neighborhood factors to HIV-related behaviors have not been fully determined. In this paper we review the research on neighborhood factors and HIV-related behaviors, approaches to measuring neighborhoods, and mechanism that may help to explain how the physical and social environment within neighborhoods may lead to HIV related behaviors. We then discuss organizational, geographic, and social network approaches to intervene in neighborhoods to reduce HIV transmission and facilitate HIV medical care with the goal of reducing morbidity and mortality and increasing social and psychological well-being.

Keywords

HIV; Neighborhoods; Intervention; Prevention; Theory; IDU; MSM

Researchers and practitioners have produced a wealth of information on individual-level factors associated with HIV risk behaviors, testing, and medical care. In parallel, studies on neighborhood factors and health have burgeoned. There is a wealth of studies that find HIV risk behaviors and HIV rates are linked with neighborhood characteristics. Studies have also linked HIV testing and HIV medical care to neighborhood factors. These neighborhood effects may be amenable to intervention; however, the mechanisms that connect neighborhood factors to HIV-related behaviors have not been fully determined. While it has been established that HIV related behaviors are geographically clustered, there is substantial debate on the best way to intervene in neighborhoods to reduce HIV transmission and facilitate HIV medical care with the goal of reducing morbidity and mortality.

In this paper we review the research on neighborhood factors and HIV risk behavior. We first examine the literature on neighborhoods and HIV-related behaviors. Then we examine approaches to measuring neighborhoods. Next we discuss theories on mechanisms that help to explain how the physical and social environment within neighborhoods may foster HIV transmission and impede HIV care. Finally, we consider how this literature informs potential

intervention approaches to HIV prevention and care, as well as training needed to equip investigators and communities with skills necessary to study and change geographically based HIV risk behaviors.

The field of neighborhood factors and HIV has burgeoned over the last two decades. Much of this growth can be attributed to technological and statistical advances. Geographic information systems (GIS) software allows for the easy mapping of specific locations, such as a residential address, health care facility, needle exchange site, as well as the mapping of broader geographic areas such as census blocks, neighborhoods, and zip codes (Rushton, 2003; Vine, Degan, & Hanchette, 1997). There are now a multitude of data sets of geographic areas such as census data (e.g., crowding, unemployment, income, age distribution, and rental properties), 911 calls, police arrests (include type of crime and age of the arrestee), liquor store density, and other zoning and urban planning datasets that can be linked to HIV related behaviors at both the individual and neighborhood level (Freudenberg, Fahs, Galea, & Greenberg, 2006). In addition to GIS software, there are numerous multilevel statistical analyses approaches for simultaneously modeling individual and neighborhood factors and software that are readily accessible to researchers.

Neighborhoods and modes of transmission

Neighborhood disadvantage has been strongly linked to injection drug and heterosexual risk behaviors and transmission patterns. Both main effects and interactions with individual-level factors have been reported (Bauermeister, Zimmerman, & Caldwell, 2011; Braine et al., 2008; Burns & Snow, 2012; Friedman et al., 2007a; Fuller et al., 2005; Généreux, Bruneau, & Daniel, 2010; Johns, Bauermeister, & Zimmerman, 2010; Kerrigan, Witt, Glass, Chung, & Ellen, 2006; Latkin, Williams, Wang, & Curry, 2005; C. A. Latkin, Curry, Hua, & Davey, 2007; Maas et al., 2007; Parrado & Flippen, 2010; Schroeder et al., 2001; Zamani et al., 2010). Neighborhood factors have also been linked to HIV mortality (Arnold, Hsu, Pipkin, McFarland, & Rutherford, 2009; Joy et al., 2008), and testing (Mashburn, Peterson, Bakeman, Miller, & Clark, 2004). HIV risk behavior clustering by neighborhood may exacerbate the potential of geographically bound HIV transmission, particularly in areas with heightened HIV prevalence.

HIV transmission among men who have sex with men (MSM) also may have dynamics associated with neighborhood factors (Egan et al., 2011; Frye et al., 2010; Kelly, Carpiano, Easterbrook, & Parsons, 2012; Wiewel, Hanna, Begier, & Torian, 2011), but these are more likely to differ by city and geographic region as compared to injection drug and heterosexual transmission. Some cities have neighborhoods that are perceived to be supportive of MSM or having a strong MSM place identity. These areas may have targeted prevention activities but they may also have high risk venues and higher rates of HIV, which may lead to greater HIV transmission risk as compared to other geographic areas.

Toxic Neighborhoods

Neighborhoods that have high rates of HIV linked to injection drug user (IDU) and heterosexual transmission often suffer from a range of correlated afflictions which have been conceptualized as “toxic” (Furr-Holden, Milam, Reynolds, Macpherson, & Lejuez, 2012). These conditions include high levels of violence, poor housing stock, low levels of employment, poor schools, high dropout rates, and high levels of drug dealing and use. MSM HIV transmission is also not immune to the same poor neighborhood conditions that may lead to IDU and heterosexual transmission.

In many urban neighborhoods factors such as level of unemployment, abandoned buildings, level of poverty, and level of violent crime are often highly correlated, which makes it

difficult to isolate independent mechanisms that promote HIV transmission. The theoretical notion of overlapping epidemics or syndemics (Singer et al., 2006) can also be viewed as a neighborhood-level phenomenon; that is, neighborhoods are the syndemics. Given the high correlation among many neighborhood indicators, it is important to utilize theoretical approaches to help us disentangle these associations and conduct empirical analyses of the links between neighborhood factors and HIV. Moreover, most often these studies are from neighborhoods in only one jurisdiction. Consequently, we do not know whether the same factors have the same influence in other places. In order to adequately understand and intervene on neighborhood factors linked to HIV it is important to measure key neighborhood characteristics.

Measuring neighborhoods

In order to adequately understand and intervene in neighborhoods it is critical to accurately measure key neighborhood factors. Community and environmental psychology has a long history of developing and validating scales of neighborhoods and communities (These measures have often focused on assessing dimensions of sense of community and community resources) (Long & Perkins, 2003; Peterson et al., 2008; Townley & Kloos, 2009). Boundaries of neighborhoods have psychological dimensions as well as physical dimensions, which may be determined subjectively as well as objectively. There are three major approaches to measuring neighborhood characteristics: self-reports, observations, and geographically based datasets (Weiss, Ompad, Galea, & Vlahov, 2007).

Self-reported measures

A variety of researchers have examined neighborhood characteristics using the most evident strategy: by asking residents to describe their neighborhood. One benefit of this approach is that it can allow residents to define and characterize their own sense of neighborhood boundaries as well as the experienced frequency of specific events or occurrences (Basta, Richmond, & Wiebe, 2010). They can also describe the extent to which they believe events or neighborhood conditions are problematic or stressful. These same benefits, however, may also lead to implicit bias. Residents' experiences of their neighborhoods are shaped by their own personal characteristics, as well as their patterns of daily life and socialization (Latkin, German, Hua, & Curry, 2009; Takahashi, Wiebe, & Rodriguez, 2001). Thus, some neighborhood residents may witness greater levels of disorder, benefit less from community cohesion, and experience more stress from these aspects than other residents, while others' fears may exacerbate their perceptions of disorder and crime levels (Sampson & Raudenbush, 1999). Others may be unaware of neighborhood qualities that have a major impact on HIV, such as nearby syringe access, late night commercial sex venues, sex partner meeting locations, condom access, or drugs available on a particular corner. Several studies have found that self-reported measures of neighborhood factors, especially social disorder, are associated with both sexual and drug related HIV risk behaviors (Kerrigan, Witt, Glass, Chung, & Ellen, 2006; Latkin, Williams, Wang, & Curry, 2005; Latkin, Curry, Hua, & Davey, 2007; Rudolph, Linton, Dyer, & Latkin, 2012; Theall, Sterk, & Elifson, 2009).

Observer measures

Several groups of investigators have used observational methods to rate neighborhoods. Researchers have used direct observations of neighborhoods or videographed neighborhoods and then coded them (Schaefer-McDaniel, Caughy, O'Campo, & Gearey, 2010; Shareck, Dassa, & Frohlich, 2012). Some researchers have begun coding Google map images of neighborhoods and other online tools (Badland, Opit, Witten, Kearns, & Mavoia, 2010; Clarke, Ailshire, Melendez, Bader, & Morenoff, 2010; Rundle, Bader, Richards, Neckerman, & Teitler, 2011). Perkins and Taylor (1992; 1996) were one of the first

investigators to compare objective and subjective measures of neighborhoods. Sampson and Raudenbush (1999) demonstrated how these data could be used to estimate two distinct “latent” constructs, physical disorder and social disorder. These rates provide assessments that are independent of the perceptions of those who live in the neighborhoods but may be time consuming and miss aspects of the neighborhoods that have an important impact on HIV and other health behaviors. For example, most observational measures do not record the inside of households, which may have factors such as peeling paint, poor heating and ventilation, and crowding. There also may be factors which are not static and hence are difficult to assess through brief observations but nevertheless contribute to high levels of stress such as rats or drug markets which tend to move locations over time due to policing practices.

Geographically based datasets

There is a wide array of public and commercial geographic databases. The census data is a very rich source of neighborhood data and can provide insight into the social and environmental context of individuals. Numerous studies have used census and other public data sets to examine how such neighborhood factors may be linked to HIV risk behaviors (Arnold, Hsu, Pipkin, McFarland, & Rutherford, 2009; Gindi et al., 2011a; Weiss, Ompad, Galea, & Vlahov, 2007; Williams & Latkin, 2007). City health and planning departments and other governmental organizations often collect data that is either geographically linked or can be manipulated to be compatible to GIS software. In addition, most GIS software providers sell maps with vast amounts of geographic data. However, one challenge with linking geographic databases is that they are not all based on the same geographic areas. Some may be census blocks, while others are neighborhoods or zip codes. Given the wide range of possible neighborhood variables to measure it is important to focus these measures based on theoretical considerations.

Theories on neighborhood influence on HIV and related health behaviors—

Neighborhoods can be conceptualized as having neighborhood level social characteristics such as levels of social capital, collective efficacy, social disorganization, and stress, in addition to their physical features and geographic access to resources (Galea & Vlahov, 2005). Neighborhoods may also reflect aggregate individual level attributes of community residents. On an individual level, HIV risk behaviors have been associated with depression (Fendrich, Avci, Johnson, & Mackesy-Amiti, 2013; Klein, Elifson, & Sterk, 2008; Lennon, Huedo-Medina, Gerwien, & Johnson, 2012; Mandell, Kim, Latkin, & Suh, 1999; Stein, Solomon, Herman, Anderson, & Miller, 2003), substance abuse (Booth, Des Jarlais, & Friedman, 2009; Celentano, Latimore, & Mehta, 2008; Miller, 2003), low education (Clark, Kissinger, Bedimo, Dunn, & Albertin, 1997; Miller & Neaigus, 2002; Mimiaga et al., 2009; Strathdee et al., 1998), and homelessness (Aidala, Cross, Stall, Harre, & Sumartojo, 2005; Kidder, Wolitski, Pals, & Campsmith, 2008). These individual level factors have all been linked to neighborhood level factors. Given the interrelation among these psychosocial conditions, it is useful to consider what social organizations and systems within neighborhoods may alleviate these conditions to help reduce HIV transmission and facilitate HIV testing and care. In the following section we review key theoretical constructs that may help to explain the relationship between neighborhood factors and HIV-related behaviors.

Risk environment

Neighborhoods are characterized by physical and social environments and their interactions. A recent focus in HIV prevention has been on the risk environment, which has been defined “as the space – whether social or physical – in which a variety of factors interact to increase the chances of harm occurring” (T. Rhodes, 2009 pg 193). This construct overlaps with the concept of behavioral setting, emphasizing how physical environments influence behaviors.

The notion of behavioral setting has a rich tradition in psychology stemming from the work of Barker (1968). The concept of risk environments differs from behavioral settings with greater emphasis on multiple levels and less emphasis on micro-social settings. The literature on behavioral settings has emphasized that there are a set of expectations, roles, and behaviors that are strongly linked to settings. One type of behavioral setting is a bar. Bars have been found to be key locations for meeting new partners, transactional sex, and locations in which alcohol may facilitate sexual risk (Groves, Hirshfield, Remien, Humberstone, & Chiasson, 2011; Kalichman, Simbayi, Cain, & Jooste, 2007; Sherman, Lilleston, & Reuben, 2011; Watt et al., 2012). Bars have also been identified as an important loci for HIV prevention interventions (Sandoy, Siziya, & Fylkesnes, 2008), including the early classic community opinion leader studies by Kelly and colleagues (1991). One intervention approach has been to train bartenders in skills to refuse to serve inebriated customers. However, this approach has met with mixed success (Warpenius, Holmila, & Mustonen, 2010). Although the study of behavioral settings is an important chapter in the history of psychology, it never burgeoned into a large area of study. It is likely that this is due in part to the time commitment needed to observe and document behavioral settings as well as the descriptive nature of these studies. Despite the fact that it has been documented that settings such as bars, shooting galleries, and sex exchange venues are linked to HIV risk behaviors (Drumright & Frost, 2010; Reisner et al., 2009; Rietmeijer, Wolitski, Fishbein, Corby, & Cohn, 1998; Strathdee et al., 2001) few studies have developed typologies or other strategies for assessing the setting-specific characteristics that may influence HIV transmission and appropriate interventions based on these characteristics.

Neighborhood disorder

Many impoverished urban inner city neighborhoods in the US suffer from physical signs of decay such as abandoned buildings, litter, and graffiti. Neighborhood social disorder theory links physical signs of decay and neglect within a neighborhood to concentrated social and health consequences (Chappell, Monk-Turner, & Payne, 2011; Markowitz, Bellair, Liska, & Liu, 2001). For those who live in circumstances of persistent disorder, these physical signs may be visible reminders of a dissatisfying living situation. They may also further exacerbate feelings of entrapment and fear among those whose economic or social circumstances will not allow residential mobility (Wilson, 1987). In these ways, perceptions of physical disorder can contribute to psychological distress (Curry, Latkin, & Davey-Rothwell, 2008; Ewart & Suchday, 2002; Steptoe & Feldman, 2001), which in turn is strongly linked to HIV risk behavior. Additionally, neighborhood disorder is associated with high crime, drug markets, and sex exchange venues, all of which can foster circumstances of risk and further shape perceptions of one's environment (Sampson, Raudenbush, & Earls, 1997). In a series of studies, investigators discovered that a neighborhood's level of physical disorder, as rated by outside observers, is linked to fear of crime (Perkins, Meeks, & Taylor, 1992; Perkins & Taylor, 1996). Researchers have also linked fear of crime to neighborhood level social disorder such as loitering, public drunkenness, litter, vandalism, and the number of vacant houses (LaGrange, Ferraro, & Supancic, 1992; Lewis & Maxfield, 1980; Perkins & Taylor, 1996). It has been theorized that in some disadvantaged neighborhoods with restricted resources and opportunities, there exist high levels of social disorganization, and in such neighborhoods, social control mechanisms are unavailable or insufficient to control deleterious behavior (Lewis & Salem, 1981; Skogan, 1990). Although the issue of crime and fear of crime has been the focus of much of the discourse on social disorganization, there are several cross-sectional studies that have examined the relationship between social disorder and HIV risk behaviors (Latkin, Williams, Wang, & Curry, 2005; Latkin, Curry, Hua, & Davey, 2007). These cross-sectional studies find a consistent association between social disorder and HIV risk behaviors among inner-city substance using populations.

Collective efficacy

Collective efficacy is another theoretical perspective that is based on neighborhood factors (Sampson, Raudenbush, & Earls, 1997). It refers to the shared willingness of neighbors to maintain a level of social control that is implicitly and jointly agreed upon. It requires shared expectations, engagement, and trust among community residents, such that neighbors can come to rely upon each other to respond to specific grievances. For example, can neighbors expect that other neighbors would object to corner drug dealing? or to kids cutting school? or to infrastructure problems such as potholes or insufficient lighting? The two key hypothesized domains of collective efficacy are informal social control, which assesses the ability of neighborhoods to induce public order and obtain resources from the community, and social cohesion, which involves neighbors knowing, helping, and trusting each other. Collective efficacy tends to be lower in neighborhoods of high poverty and low home ownership (Sampson & Morenoff, 2004), reflecting some of the structural origins of trust and community engagement. However, it is also true that collective efficacy has been shown to mediate associations between concentrated disadvantage and negative outcomes (Sampson, Raudenbush, & Earls, 1997). Several studies have found that social cohesion is associated with lower HIV risk behaviors, and collective efficacy interventions have been utilized as an approach for structural interventions for violence control and for HIV prevention (Carlson, Brennan, & Earls, 2012).

Perceived neighborhood cohesion has been associated with condom use (Kerrigan, Witt, Glass, Chung, & Ellen, 2006; Lang et al., 2011). However, interventions to enhance collective efficacy may be challenging as neighborhoods with low collective efficacy may be difficult to organize. Other macro-level factors such as low resources due to unemployment may impact the ability of neighborhoods to organize community-based HIV prevention and care initiatives (Cornish & Campbell, 2009).

Social capital

A large body of research has examined the relationship between social capital and HIV-related behaviors (Campbell, Williams, & Gilgen, 2002; Crosby, Holtgrave, DiClemente, Wingood, & Gayle, 2003; Holtgrave & Crosby, 2003; Pronyk et al., 2008; Takahashi & Magalong, 2008). Theories of social capital emphasize access to resources and norms of behavior that are located external to any one individual (Kawachi, 1999). Social capital has been conceptualized as networks through which resources flow (Son & Lin, 2008). Within a neighborhood, social capital may exist on an individual or collective level. On an individual level, any one neighbor can draw on other neighbors for specific resources, such as borrowing a ladder or how to call the city about a trash problem. On a collective level, neighbors can draw on the power they have as a group to gain access to resources that may be more challenging for an individual to acquire. This may translate into political power or other involvement in community oriented local governance. Social capital may also be conceptualized as organizations, which are often geographically based, such as schools, libraries, and community-based organizations, that may function cohesively to achieve goals. Social capital has included neighborhood level factors in some assessments. In the context of HIV, social capital has been conceptualized as a mechanism for community response to social marginalization. A range of studies have found that low social capital is linked to substance use (Reynoso-Vallejo, 2011; Rogers, Ramaswamy, Cheng, Richter, & Kelly, 2012; Winstanley et al., 2008; Wray-Lake et al., 2012), but mixed findings on the associations of HIV serostatus and social capital have also been reported (Campbell, Williams, & Gilgen, 2002; Pronyk et al., 2008; Takahashi & Magalong, 2008). The mechanisms involved in these associations remain unclear (Friedman et al., 2007a; Reynoso-Vallejo, 2011). Interventions have successfully strengthened social capital among communities with high rates of HIV (Campbell & Mzaidume, 2001; Fullilove, Green, &

Fullilove, 2000; Pronyk et al., 2006). A more psychological perspective on risk is boredom, which has been linked to HIV risk behaviors (German & Latkin, 2012), and may be connected to a lack of organizational involvement and opportunities for engagement with others. Moreover, research suggests that a lack of neighborhood activities is linked to greater adolescent sexual behavior (Akers, Muhammad, & Corbie-Smith, 2011).

Stress

It is well documented that neighborhoods sharply differ on level and type of stressors (Morello-Frosch, Zuk, Jerrett, Shamasunder, & Kyle, 2011; Wallis, Winch, & O'Campo, 2010). Stress predicts depressive symptoms, which have been also linked to sexual and drug related HIV risk behaviors (Latkin, Williams, Wang, & Curry, 2005; Latkin, Curry, Hua, & Davey, 2007). Neighborhoods with high levels of poverty, which is linked to HIV rates, are more likely to have stressors of violence, gangs, poor housing stock, lack of greenery, pollution, noise, and crowding, as compared to more affluent neighborhoods (Evans III, 1994). Another potential neighborhood stressor is poor treatment by police, which has been reported by drug users and non users in impoverished neighborhoods (Cooper, Moore, Gruskin, & Krieger, 2004). Several studies have also found that perceived stress is associated with anxiety and depression among people living with HIV/AIDS (Kang, Mellins, Dolezal, Elkington, & Abrams, 2011) and also with lower levels of Highly Active Antiretroviral Therapy (HAART) adherence (Blashill, Perry, & Safren, 2011). Among MSM stress due to homophobia has been well documented, yet there is little literature on how neighborhood factors may buffer or exasperate homophobia.

Neighborhood resilience

Although the construct of resilience has traditionally focused on individual level and family factors, it recently has been applied to neighborhoods and communities (Cairns, Curtis, & Bamba, 2012; Maggi, Roberts, MacLennan, & D'Angiulli, 2011; Okvat & Zautra, 2011; Pearson, Pearce, & Kingham, 2012). Important neighborhood resilience research questions include delineating the social and physical resilience factors in disadvantaged neighborhoods that may help to prevent the spread of HIV. There also may be neighborhood level resilience factors that facilitate material and emotional support for people who are living with HIV, sexual minorities, drug users, and other at risk populations.

Opportunities for high risk behavior

Availability of illicit substances, alcohol, and commercial sex differ markedly by neighborhood (Parrado & Flippen, 2010; Scribner, Theall, Simonsen, & Robinson, 2010) and open air drug markets tend to be concentrated within inner-city neighborhoods (Draus, Roddy, & Greenwald, 2012). The availability of drugs and sex may have a direct impact on HIV transmission, whereas alcohol outlet density may indirectly impact HIV. Higher density of alcohol outlets has been associated with greater alcohol consumption (Scribner, Cohen, & Fisher, 2000; Scribner et al., 2008; Treno, Grube, & Martin, 2003), a powerful determinant of HIV risk behavior. Greater density of alcohol outlets, which may be meeting places for sexual partners, may also lead to segmentation of patrons and sexual networks (Gruenewald, 2007). This network segmentation may lead to changes in network density and other structural network properties that may facilitate or impede HIV transmission (Mukwembi, 2011). Availability may not only influence behaviors through access, it is likely that in areas with increased availability of alcohol, illicit drugs, and sexual exchange, community norms and role models emerge that promote behaviors and descriptive norms regarding the acceptability of HIV-related risk.

Social networks

Another way to conceptualize neighborhoods is based on the social impact of the connections between people who live in neighborhoods. Social network analyses allows for the examination of key individuals that may influence health behaviors. Since HIV transmission is almost always due to a social behavior, social network analyses can examine relationships that lead to HIV transmission and those that may alter transmission dynamics by promoting risk reduction among individuals or altering group level social norms (C. A. Latkin et al., 2009; Wang, Brown, Shen, & Tucker, 2011). Social networks may also provide resources that reduce the need to engage in risk behaviors to acquire resources. Social support from network members may reduce depression and enhance adherence to HIV medications (Knowlton, Curry, Hua, & Wissow, 2009; Knowlton et al., 2011). Network members may also provide resources that increase access to HIV medical care and to voluntary risk reduction counseling and HIV testing (VCT). Networks may also have deleterious influences on sexual and substance use behaviors and mental health (Latkin & Knowlton, 2005).

Social networks and geospatial factors

Neighborhoods and networks are often interlocking. Many network members are located within the same neighborhood and residential propinquity leads to the formation and maintenance of social networks. Several social network perspectives suggest that geographic factors are linked to network disease transmission risks. Core theory hypothesizes that social networks of high transmitters are in geographically bounded areas such that these network configurations perpetuate disease transmissions (Zenilman, Elish, Fresia, & Glass, 1999). In a study of IDUs and their networks, approximately half of drug and sex network members resided within their neighborhood and only 6% of sexual partners and 3% of drug partners resided more than 5 miles from the participants' residential location (Tobin, Kuramoto, Davey-Rothwell, & Latkin, 2011). A study by Zenilman and colleagues (1999) found that in core areas the median distance between male gonorrhea patients and their partners was 339 meters, whereas the median distance for those who lived outside of the core was 1,956 meters. Gindi and colleagues (2011b) found that people in areas of high HIV prevalence were more likely to choose sex partners within the same neighborhood. In addition to delineating the difference between core and non-core networks, these findings indicate that in urban areas of the US partners tend to live in the same geographic areas.

One perspective on HIV and geographic area is that of "community level viral load" (Das et al., 2010). Rather than viewing HIV transmission as a result of individual level behaviors, this perspective views a geographic region as a reservoir of HIV and posits that since viral load is a strong predictor of transmissibility of HIV, the community level viral load may predict seroconversion rates within a geographic region. Turnover within social networks may also influence HIV transmission dynamics (De, Cox, Boivin, Platt, & Jolly, 2007; Hu et al., 2002; Morris & Kretzschmar, 1995). High rates of incarceration and reentry within highly impoverished neighborhoods, may also lead to greater turnover within risk networks and hence greater opportunities for HIV to enter certain social networks (Adimora & Schoenbach, 2005).

Diffusion of innovations

Diffusion of innovations, a theory which refers to the process through which new ideas are transmitted within a population (Rogers, 1995), is usually viewed as a social network based approach to behavior change (Li, Weeks, Borgatti, Clair, & Dickson-Gomez, 2012; Weeks et al., 2009). Networks can be within and comprised of organizations and can be geographically based in neighborhoods. Diffusion of behavior change within neighborhoods may be best viewed as diffusion by networks, organizations, and places. Depending on the

social organization of neighborhoods it may be best to focus on one, two or three of these interrelated constructs. Utilizing networks to diffuse HIV risk reduction is well-documented as an HIV prevention strategy but it usually has not been conceived of as a geographically based intervention; yet, training a critical number of network members within a geographic area may lead to a critical mass that could lead to sustained behavior change.

Social norms

The behavioral settings literature suggests that certain settings have distinct social norms (Barker, 1968; Brown, Ellard, Mooney-Somers, Hildebrand, & Langdon, 2012; Friedman et al., 2007b; Galea, Ahern, & Vlahov, 2003; Karasek, Ahern, & Galea, 2012). Less is known about norms from a neighborhood perspective. It is likely that certain neighborhood characteristics may cue health behaviors, such as the presence of substance abuse and advertisements for alcohol. Although most network literature has focused on the potential influence of close ties, there is also evidence to suggest the social influence of individuals who are not closely linked (Cialdini, 2005). The social influence of others who are not close may help to explain how individuals within a neighborhood may influence each other's behaviors (af Hjelmsäter, Granhag, & Stromwall, 2009). Moreover, propinquity often leads to friendships, which may strengthen the influence of neighbors on each other. Social norms have been used in HIV prevention and substance use interventions (Neighbors et al., 2011; Teunissen et al., 2012; Trickett, 2002). An important future area of research is examining how neighborhood factors may mediate, moderate, and maintain social norms and how to structure norm based interventions in neighborhoods.

Policy and policing

Although laws usually do not vary by neighborhoods, the enforcement of laws may vary widely by neighborhood (Cooper, Bossak, Tempalski, Des Jarlais, & Friedman, 2009; Cooper et al., 2012). There is ample evidence that police tactics often interfere with harm reduction activities such as needle exchange (Beletsky, Grau, White, Bowman, & Heimer, 2011; Heimer, Bluthenthal, Singer, & Khoshnood, 1996). Less is known about how policing tactics such as "stop-and-frisk" impedes individuals from carrying HIV prevention materials such as condoms and syringes due to fear that it may be used against them in court cases (Center for Constitutional Rights, July 2012). Moreover, arrest data which is commonly used in measures of neighborhood factors should not be viewed as an accurate reflection of illegal activity because it is also determined by the policing practices in that geographic area.

Zoning

Neighborhood resources extend far beyond social resources. Urban planning and zoning decisions dictate allowable land use within cities, which in turn can shape the resource and service infrastructure within neighborhoods (Ashe, Jernigan, Kline, & Galaz, 2003; Schilling & Linton, 2005; Substance Abuse and Mental Health Services Administration (SAMHSA), 1995). Residential zoning has been designed in most cases to protect the health and well-being of residents and create stability within neighborhoods by clustering compatible land usage and building types. Yet, zoning decisions can have a strong public health impact (Ashe, Jernigan, Kline, & Galaz, 2003; Corburn, 2004). Zoning can dictate the extent to which residents in any one neighborhood are able to walk to a grocery store or pharmacy, how far they need to travel to reach a hospital, how many alcohol or fast food outlets are nearby, how many people can live in a dwelling, residential density, affordable housing options, proximity of industrial and commercial land use, and the extent of lighting and green space in an area. Importantly, these same policies also impact the availability of social services within a neighborhood and can result in over-concentration of services in areas with lower political capital. There are many examples of residential opposition to substance abuse treatment, mental health facilities, needle exchange sites, and halfway

houses within neighborhoods (Smith & Hanham, 1981; Substance Abuse and Mental Health Services Administration (SAMHSA), 1995; Takahashi, 1997; Tempalski, Friedman, Keem, Cooper, & Friedman, 2007). These barriers are further compounded by zoning policies that facilitate community resistance by limiting possible locations for such uses to only specific areas (Weber, 2005), often in higher density and more commercial districts. Despite a variety of federal non-discrimination and fair-housing laws, the result is often a geographically segregated service system, with many drug and alcohol treatment facilities, transitional housing programs, and other supportive services located in or near areas of high crime and drug availability. Furthermore, there is a geographic dimension to HIV prevention and care organizations. For example, HIV testing clinics often serve a neighborhood, but some individuals may choose to be tested in a setting that they perceive to be more anonymous. Moreover, if there are few testing centers within a city then it is likely that individuals from different neighborhoods will need to travel to utilize them.

Challenges to studying neighborhood factors and HIV

With hundreds of variables in many geographic databases it is easy to find associations that may be based on chance alone. Moreover, the meaning of these associations is not always apparent. For example, if there's an association between proportion of female-headed households and sexually transmitted infection (STI) rates, how are we to interpret these associations? Abandoned buildings, per se, do not 'cause' HIV acquisition. However, abandoned buildings may be settings where HIV risk behaviors occur, they may be stressors or reduce collective efficacy, or they may be an indicator of neighborhood social economic status. Abandoned buildings may lead to more policing which may lead to less frequent carrying of syringes and consequently more syringe sharing among IDUs. Moreover, although it is unlikely that social drift, with those who are at high risk moving to impoverished neighborhoods, explains the association between neighborhood factors and HIV, it is plausible that individuals who cannot move out of economically disadvantaged neighborhoods may contribute to behaviors and norms that foster HIV transmission.

Correlations among neighborhood factors that make it difficult to delineate causal pathways that lead to HIV-related behaviors, for example, geographic clustering of syringe sharing could be due to localized community norms, concentrated policing, or distance from syringe access points such as syringe exchange locations or pharmacies selling over-the-counter syringes. Cooper and colleagues (2012) found that syringe sharing was less likely in areas with access to syringes and more likely in areas with increased local arrests. Similarly, concentrated overdose mortality has been attributed both to deteriorated neighborhood environments (Hembree et al., 2005) and to higher arrest rates within precincts (Bohnert et al., 2011). Given the complexities of how neighborhood factors may impact HIV behaviors, it is important to not only have geographic data on behaviors and policies but also have information on the history of the neighborhoods to help explain geographically patterned behaviors.

Rural versus urban and suburban neighborhoods

Most studies on HIV risk have focused on urban neighborhood factors. There are pragmatic reasons for focusing on urban areas as neighborhoods may be easier to define within urban areas and usually there are more neighborhoods per geographic area, which allows for more units of analysis. Yet some rural areas have high rates of HIV (Hall, Li, & McKenna, 2005; Reif, Whetten, Ostermann, & Raper, 2006). Relative little is known about the geographic dynamics that facilitate HIV transmission in these areas, and less is known about neighborhood influences on HIV within suburban areas. Some research has investigated the built environment of suburbs, with a strong focus on factors like walkability and proximity of residential and commercial spaces (Frank, Kerr, Rosenberg, & King, 2010; Sturm &

Cohen, 2004; Wood et al., 2008). However, the relevance of these and other neighborhood qualities has not been examined in the context of HIV or related behaviors such as drug or alcohol use.

Exposure ‘dose’ in neighborhoods

Most studies of neighborhoods and risk have assessed the association between geographic residential location and health behaviors. Yet not all individuals spend the same amount of time in their neighborhoods (Takahashi, Wiebe, & Rodriguez, 2001). Hence, neighborhoods may have a different impact on the behaviors of those who spend most of their time immersed versus those whose time is primarily spent elsewhere (Leventhal & Dupéré, 2011; Wodtke, Harding, & Elwert, 2011). The amount of time spent in residential neighborhoods may be a function of age and employment status with those who are employed spending less free time in their residential neighborhood. Curry et al. (2008) found that time spent in neighborhoods was associated with depression among drug users, and Frye et al. (2010) reported that that in Florida the level of alcohol consumption was associated with duration of residence among MSM who had moved to the region.

Homelessness and neighborhoods

Homelessness has been consistently found to be a risk factor for HIV acquisition, lack of HIV medical care, and low adherence to HIV medications (Aidala, Cross, Stall, Harre, & Sumartojo, 2005; Aidala, Lee, Abramson, Messeri, & Siegler, 2007; Galea & Vlahov, 2002; Wolitski, Kidder, & Fenton, 2007). Homelessness is sometimes conceptualized as not living in a neighborhood, because homeless individuals may not have a fixed residential address; however, the neighborhood or neighborhoods where they frequent may have a greater impact on their health and well-being as compared to individuals who are housed in the same neighborhood. Homeless individuals may have greater exposure to the conditions on the streets than those housed individuals in the neighborhood. Moreover, the level of homelessness within a neighborhood may be an important factor in HIV transmission due to mixing patterns and risk behaviors. It is also likely that the impact of homelessness differs by neighborhood. For example, residing in a commercial area is likely to be different than staying in a residential area. A potentially important area of research is examining the social geographies of homeless individuals and how it may contribute to risk behaviors.

Segregation

Many neighborhoods are economically and racially segregated. Segregation has been linked to a range of health outcomes (Brondolo, Love, Pencille, Schoenthaler, & Ogedegbe, 2011; White & Borrell, 2011), HIV testing (Ford et al., 2009), and risk networks (Friedman, Cooper, & Osborne, 2009). As racial segregation is often strongly linked to economic segregation, it becomes difficult to disentangle and understand the precise mechanisms underlying neighborhood-related health disparities (Acevedo-Garcia, Lochner, Osypuk, & Subramanian, 2003). One strategy has been to identify and compare proximate neighborhoods with similar socio-economic conditions and racial composition (LaVeist, Pollack, Thorpe Jr., Fesahazion, & Gaskin, 2011). Neighborhoods may also be segregated based on sexual orientation. In cities that have neighborhoods with a large MSM population, these areas may be excellent targets for HIV prevention and care activities but they also may facilitate transmission within the areas due to higher prevalence of HIV as compared to surrounding areas. As neighborhoods are often segregated by social and economic factors it is critical that researchers examine how these factors influence physical and mental health and how to tailor neighborhood interventions based upon these compositional differences.

Neighborhood dynamic factors

Neighborhood research suggests the importance of the social and physical context. Yet often neighborhood factors are modeled as static. Usually, neighborhood level variables, such as census data and police reports are modeled as level two variables along with individual level variables such as HIV risk behaviors. There has been less modeling of how changes in neighborhood factors may influence behaviors -- with the notable exception of the work of Wallace and colleagues (1988) in demonstrating how the closing of firehouses in poor neighborhoods in the Bronx led to greater HIV transmission. Evans-Polce and colleagues (In Press) found that among a sample of drug users and their network members, perceptions of the future potential violence in their neighborhood predicted mental health even after adjusting for current social disorganization. Future studies need to longitudinally examine the influences of neighborhoods as well as how neighborhood level change such as revitalization, urban renewal programs, and rates of foreclosure, may alter HIV prevention and care programs and risk environments. Although researchers may not understand all of the complexities of geographic based pathways that lead to HIV related behaviors, there are many HIV prevention and care interventions that can address neighborhood factors.

Interventions

Interventions to address psychological well being, achievement, and human development have been integrally tied to psychology. Since the beginning of empirical psychology there has been a push for interventions to enhance well-being that goes beyond the individual. Kurt Lewin (1946), in describing the role of research stated, "The second cause of dissatisfaction is the growing realization that mere diagnosis--and surveys are a type of diagnosis---does not suffice. In intergroup relations as in other fields of social management the diagnosis has to be complemented by experimental comparative studies of the effectiveness of various techniques of change" (pg 37).

Community and social psychology

Kurt Lewin's (1946) emphasis on action research called for research designed to address problems within communities. James Kelly (2007; 2008; 2010) has emphasized an ecological approach to community psychology with developing settings that assist individuals to address developmental and social challenges. Community psychology has also emphasized both the importance of social context, methods of measuring it, and developing interventions that are above the individual level and acknowledge that health behaviors are complex and historically and culturally situated. More recently, community based participatory research (CBPR) has emphasized the role of the community in identifying problems and solutions and developing sustainable approaches to implementing programs and interventions (Berkley-Patton et al., 2010; Corbie-Smith et al., 2011; S. D. Rhodes et al., 2012; M. V. Williams, Palar, & Derose, 2011). CBPR has burgeoned as a field and now has its own journal and conferences.

Settings based interventions

Schools—Schools are critical settings to promote health behaviors within communities, yet given the large number of schools, there have been relatively few school-based HIV prevention interventions, especially condom distribution. It has been documented that provision of condoms in high schools does not increase sexual behaviors, and that rigorous evaluations of school-based sexually transmitted infection (STI) and HIV prevention programs demonstrated significant levels of risk reduction (Basen-Engquist et al., 2001; Kirby & Brown, 1996; Kirby et al., 2004). The dearth of these programs is due in part to political opposition.

Churches—Churches are critical social institutions in many neighborhoods with high rates of HIV. A recent review of church based HIV prevention interventions examined 163 unique citations but found only 11 studies with sufficient details in the US that focused on faith-based institutions and/or congregations (M. V. Williams, Palar, & Derose, 2011). The majority of these studies utilized a community based participatory research (CBPR) approach. Most of these programs partnered with outside organizations such as community based organizations (CBOs) or universities. Although all churches may not support HIV prevention programs for certain populations, given the high number of churches in many urban areas it is likely that some churches will support HIV prevention and care activities. Current studies suggest that churches can be utilized for HIV prevention and care programs (Alder et al., 2007; Francis & Liverpool, 2009; Wingood, Simpson-Robinson, Braxton, & Raiford, 2011). However, greater research is needed to identify structural and organizational factors within churches that lead to effective and sustainable programs. As churches are key organizations in many impoverished neighborhoods, they are also called upon to address a number of health issues as well as social issues and may be overwhelmed by requests to develop HIV prevention and care programs.

Housing projects and other settings—Sikkema and colleagues (2000; 2005) have utilized housing projects as the venue for HIV prevention interventions and others have focused on apartments for seniors who may be at risk for HIV (Schensul, Levy, & Disch, 2003). These settings have the advantage of targeting interventions to geographic areas with high rates of HIV and demarking settings that are of manageable size and may have shared environmental or social dynamics. Although these geographic areas hold promise, understanding the network dynamics for transmission and for social influence may help to target and tailor such interventions. In addition to housing projects, there have been smaller setting based interventions, including bars and beautician shops (Kelly et al., 1991).

Social network interventions—Social network interventions have been successfully utilized for HIV prevention in a variety of settings. One social network approach of training community popular opinion leaders (CPOL) has often focused on risk reduction among gay men, based on the studies of Kelly (Kelly et al., 1991; Kelly et al., 1992; NIMH Collaborative HIV/STD Prevention Trial Group, 2010). Another social network approach has been to train individuals to promote risk reduction within their personal networks. This approach has been successfully utilized with IDUs and heterosexual populations (C. A. Latkin, Mandell, Vlahov, Oziemkowska, & Celentano, 1996; Tobin, Kuramoto, Davey-Rothwell, & Latkin, 2011). Although social networks are often neighborhood based, network interventions seldom directly consider neighborhood factors.

Neighborhood and Community based interventions—Neighborhood approaches to enhance collective efficacy have included the organization of city blocks and training of block leaders for injury prevention (Schwarz, Grisso, Miles, Holmes, & Sutton, 1993), environmental health concerns (Hopper & Nielsen, 1991), and neighborhood-oriented peer outreach models for violence prevention (Webster, Whitehill, Vernick, & Curriero, 2012). These types of interventions have largely not been applied to HIV prevention; yet if many of the social dynamics are similar, such approaches should be considered for neighborhood HIV prevention efforts.

While there have been several well documented successful community-based multimodal prevention interventions for substance abuse, there have been relatively few such approaches in the US for HIV prevention (Biglan, James, LaChance, Zoref, & Joffe, 1988; Fuller et al., 2007; Pentz et al., 1989). Community mobilization has been an effective HIV prevention strategy in a variety of settings primarily outside of the US (Campbell, Nair, &

Maimane, 2007; De Jesus, 2007; Rhodes et al., 2012; Trickett, 2002). The lack of community-level interventions in the US may be due in part to the high cost of community-level interventions and issues of how to implement and evaluate community based interventions. Moreover, as the HIV epidemic in the US is not a generalized epidemic except in impoverished urban neighborhoods, community interventions may not be perceived as cost effective or have sufficient political support.

There have been a few large-scale community-based HIV prevention programs in the US. Community based approaches have been used to link drug users to services through pharmacies (Fuller et al., 2007; Rudolph et al., 2010). One community based approach was the CDC five cities AIDS Community Demonstration Projects (Community-level HIV intervention in 5 cities: Final outcome data from the CDC AIDS community demonstration projects.1999; O'Reilly & Higgins, 1991). The NIDA program for HIV prevention targeting IDUs was a combined public health HIV prevention and research project (Stephens, Kwiatkowski, & Booth, 2000). The CDC and NIDA projects highlight the dilemmas of how to adequately implement, evaluate and sustain large scale community based interventions.

Training of psychology students for studying and addressing neighborhoods and HIV—Traditionally, an important domain of training psychology students is in theories and methods of individual-level behavior change. Addressing neighborhood level HIV prevention and care requires training beyond the individual level approach. Adequately training graduate students in psychosocial approaches to neighborhood and community based approaches to HIV prevention and care involves a diverse array of inter-disciplinary skills. In addition to a foundation in community psychology, key skills include GIS and spatial statistics, multilevel modeling, social network analyses, and methods for implementing and evaluating interventions. CBPR contains key elements of such training, with strong emphasis on community engagement and partnership. In addition to training in standard randomized clinical trials (RCT) methodologies, there is also a need for alternatives to RCT methods and assessment techniques, including field ethnography, adaptive designs, and propensity scores. We need to develop settings and field stations that provide opportunities for students and junior faculty to work with and learn about populations at greatest risk for HIV. It is important to acknowledge that addressing neighborhood concentration of HIV-related behaviors requires familiarity with and comfort working within a variety of geographic settings, such as inner-city environments, sex- or drug-markets, and gay-identified neighborhoods. As many institutions of higher education do not have a presence in urban impoverished areas, training programs should consider partnering with existing social and community-based organizations as well as health departments and social service agencies. Moreover, it is critical to train students in cultural competence in working with ethnic and sexual minorities as well as training in the science of substance abuse and in working with people who use drugs.

Conclusions

Neighborhoods are a critical unit of analysis for a wide range of community-based interventions, whether focused directly or indirectly on HIV. Only through ongoing community analyses of social organizations, patterns of interactions, perceived identity, and geographic configuration is it possible to identify the most appropriate geographic and social boundaries for interventions and best strategies for achieving the desired outcomes. For example, changing zoning to reduce the number of alcohol outlets and community approaches to violence prevention are often neighborhood originated, yet may also require sustained advocacy and support from broader constituents. Many social organizations are not neighborhood based or may be linked to several contiguous geographic areas. Schools albeit neighborhood-based are often managed and directed at a district level.

In the mobilization of neighborhoods it is important to ask what are the best organizations to target for neighborhood HIV prevention and care interventions; what organizational analyses are needed to determine this as well as the strengths and needs of the communities; and which organizations can reach at risk individuals, sustain health promotion activities, and introduce and sustain social norms that promote HIV prevention and care?

Neighborhoods provide an important heuristic for geographically-based social organization. There are major differences in life experiences and opportunities as well as risks of acquiring HIV based on neighborhoods. These neighborhood level differences are often reflected in social economic status, stressors, drug and alcohol availability, social capital, social norms, collective efficacy, and place identity. Modeling individual behaviors on a geographic level is challenging, as it requires detailed information about community members on a sufficient scale to draw inferences that can be compared across neighborhoods. We need to both develop greater understanding of how neighborhood differences lead to HIV transmission and suboptimal care as well as develop appropriate and sustainable interventions.

References

- Acevedo-Garcia D, Lochner KA, Osypuk TL, Subramanian SV. Future directions in residential segregation and health research: A multilevel approach. *American Journal of Public Health*. 2003; 93(2):215–221. [PubMed: 12554572]
- Adimora AA, Schoenbach VJ. Social context, sexual networks, and racial disparities in rates of sexually transmitted infections. *The Journal of Infectious Diseases*. 2005; 191(Suppl 1):S115–22.10.1086/425280 [PubMed: 15627221]
- af Hjelmsäter ER, Granhag PA, Stromwall LA. Was the stranger alone? on how different sources of social influence affect children’s memory reports. *Social Influence*. 2009; 4(2):155–169.
- Aidala A, Cross JE, Stall R, Harre D, Sumartojo E. Housing status and HIV risk behaviors: Implications for prevention and policy. *AIDS and Behavior*. 2005; 9(3):251–265.10.1007/s10461-005-9000-7 [PubMed: 16088369]
- Aidala A, Lee G, Abramson DM, Messeri P, Siegler A. Housing need, housing assistance, and connection to HIV medical care. *AIDS and Behavior*. 2007; 11(6 Suppl):101–115.10.1007/s10461-007-9276-x [PubMed: 17768674]
- Akers AY, Muhammad MR, Corbie-Smith G. “When you got nothing to do, you do somebody”: A community’s perceptions of neighborhood effects on adolescent sexual behaviors. *Social Science and Medicine*. 2011; 72(1):91–99. [PubMed: 21129833]
- Alder SC, Simonsen SE, Duncan M, Shaver J, Dewitt J, Crookston B. Perspectives on efforts to address HIV/AIDS of religious clergy serving African American and Hispanic communities in Utah. *The Open AIDS Journal*. 2007; 1:1–4.10.2174/1874613600701010001 [PubMed: 18923690]
- Arnold M, Hsu L, Pipkin S, McFarland W, Rutherford GW. Race, place and AIDS: The role of socioeconomic context on racial disparities in treatment and survival in San Francisco. *Social Science and Medicine*. 2009; 69(1):121–128. [PubMed: 19443092]
- Ashe M, Jernigan D, Kline R, Galaz R. Land use planning and the control of alcohol, tobacco, firearms, and fast food restaurants. *American Journal of Public Health*. 2003; 93(9):1404–1408. [PubMed: 12948952]
- Badland HM, Opat S, Witten K, Kearns RA, Mavoa S. Can virtual streetscape audits reliably replace physical streetscape audits? *Journal of Urban Health*. 2010; 87(6):1007–1016.10.1007/s11524-010-9505-x [PubMed: 21104331]
- Barker, RG. *Ecological psychology: Concepts and methods for studying the environment of human behavior*. Stanford, Ca: Stanford University Press; 1968.
- Basen-Engquist K, Coyle KK, Parcel GS, Kirby D, Banspach SW, Carvajal SC, Baumler E. Schoolwide effects of a multicomponent HIV, STD, and pregnancy prevention program for high school students. *Health Education & Behavior*. 2001; 28(2):166–185. [PubMed: 11265827]

- Basta LA, Richmond TS, Wiebe DJ. Neighborhoods, daily activities, and measuring health risks experienced in urban environments. *Social Science & Medicine* (1982). 2010; 71(11):1943–1950.10.1016/j.socscimed.2010.09.008 [PubMed: 20980088]
- Bauermeister JA, Zimmerman MA, Caldwell CH. Neighborhood disadvantage and changes in condom use among African American adolescents. *Journal of Urban Health*. 2011; 88(1):66–83. [PubMed: 21161414]
- Beletsky L, Grau LE, White E, Bowman S, Heimer R. The roles of law, client race and program visibility in shaping police interference with the operation of US syringe exchange programs. *Addiction*. 2011; 106(2):357–365.10.1111/j.1360-0443.2010.03149.x [PubMed: 21054615]
- Berkley-Patton J, Bove-Thompson C, Bradley-Ewing A, Hawes S, Moore E, Williams E, Goggin K. Taking it to the pews: A CBPR-guided HIV awareness and screening project with black churches. *AIDS Education and Prevention*. 2010; 22(3):218–237. [PubMed: 20528130]
- Biglan A, James LE, LaChance P, Zoref L, Joffe J. Videotaped materials in a school-based smoking prevention program. *Preventive Medicine*. 1988; 17(5):559–584. [PubMed: 3237657]
- Blashill AJ, Perry N, Safren SA. Mental health: A focus on stress, coping, and mental illness as it relates to treatment retention, adherence, and other health outcomes. *Current HIV/AIDS Reports*. 2011; 8(4):215–222. [PubMed: 21822626]
- Bohnert ASB, Nandi A, Tracy M, Cerdá M, Tardiff KJ, Vlahov D, Galea S. Policing and risk of overdose mortality in urban neighborhoods. *Drug and Alcohol Dependence*. 2011; 113(1):62–68. [PubMed: 20727684]
- Booth RE, Des Jarlais DC, Friedman SR. Reflections on 25 years of HIV and aids research among drug abusers. *Journal of Drug Issues*. 2009; 39(1):209–222.
- Braine N, Acker C, Goldblatt C, Yi H, Friedman S, DesJarlais DC. Neighborhood history as a factor shaping syringe distribution networks among drug users at a U.S. syringe exchange. *Social Networks*. 2008; 30(3):235–246. [PubMed: 19578475]
- Brondolo E, Love EE, Pencille M, Schoenthaler A, Ogedegbe G. Racism and hypertension: A review of the empirical evidence and implications for clinical practice. *American Journal of Hypertension*. 2011; 24(5):518–529.10.1038/ajh.2011.9 [PubMed: 21331054]
- Brown G, Ellard J, Mooney-Somers J, Hildebrand J, Langdon T. HIV risk among Australian men travelling overseas: Networks and context matter. *Culture, Health and Sexuality*. 2012; 14(6):677–690.
- Burns PA, Snow RC. The built environment & the impact of neighborhood characteristics on youth sexual risk behavior in Cape Town, South Africa. *Health and Place*. 2012
- Cairns JM, Curtis SE, Bamba C. Defying deprivation: A cross-sectional analysis of area level health resilience in England. *Health and Place*. 2012; 18(4):928–933. [PubMed: 22440779]
- Campbell C, Mzaidume Z. Grassroots participation, peer education, and HIV prevention by sex workers in South Africa. *American Journal of Public Health*. 2001; 91(12):1978–1986. [PubMed: 11726380]
- Campbell C, Nair Y, Maimane S. Building contexts that support effective community responses to HIV/AIDS: A South African case study. *American Journal of Community Psychology*. 2007; 39(3–4):347–363.10.1007/s10464-007-9116-1 [PubMed: 17447133]
- Campbell C, Williams B, Gilgen D. Is social capital a useful conceptual tool for exploring community level influences on HIV infection? an exploratory case study from South Africa. *AIDS Care - Psychological and Socio-Medical Aspects of AIDS/HIV*. 2002; 14(1):41–54.
- Carlson M, Brennan RT, Earls F. Enhancing adolescent self-efficacy and collective efficacy through public engagement around HIV/AIDS competence: A multilevel, cluster randomized-controlled trial. *Social Science and Medicine*. 2012; 75(6):1078–1087. [PubMed: 22703885]
- Celentano DD, Latimore AD, Mehta SH. Variations in sexual risks in drug users: Emerging themes in a behavioral context. *Current HIV/AIDS Reports*. 2008; 5(4):212–218. [PubMed: 18838061]
- Center for Constitutional Rights. Stop and frisk: The human impact. New York: NY: Jul. 2012
- Chappell AT, Monk-Turner E, Payne BK. Broken windows or window breakers: The influence of physical and social disorder on quality of life. *Justice Quarterly*. 2011; 28(3):522–540.
- Cialdini RB. Basic social influence is underestimated. *Psychological Inquiry*. 2005; 16(4):158–161.

- Clark RA, Kissinger P, Bedimo AL, Dunn P, Albertin H. Determination of factors associated with condom use among women infected with human immunodeficiency virus. *International Journal of STD & AIDS*. 1997; 8(4):229–233. [PubMed: 9147155]
- Clarke P, Ailshire J, Melendez R, Bader M, Morenoff J. Using google earth to conduct a neighborhood audit: Reliability of a virtual audit instrument. *Health and Place*. 2010; 16(6):1224–1229. [PubMed: 20797897]
- Community-level HIV intervention in 5 cities: Final outcome data from the CDC AIDS community demonstration projects. *American Journal of Public Health*. 1999; 89(3):336–345. [PubMed: 10076482]
- Cooper HLF, Bossak B, Tempalski B, Des Jarlais DC, Friedman SR. Geographic approaches to quantifying the risk environment: Drug-related law enforcement and access to syringe exchange programmes. *International Journal of Drug Policy*. 2009; 20(3):217–226. [PubMed: 18963907]
- Cooper H, Des Jarlais D, Ross Z, Tempalski B, Bossak BH, Friedman SR. Spatial access to sterile syringes and the odds of injecting with an unsterile syringe among injectors: A longitudinal multilevel study. *Journal of Urban Health*. 2012.10.1007/s11524-012-9673-y
- Cooper H, Moore L, Gruskin S, Krieger N. Characterizing perceived police violence: Implications for public health. *American Journal of Public Health*. 2004; 94(7):1109–1118. [PubMed: 15226128]
- Cooper HL, Des Jarlais DC, Tempalski B, Bossak BH, Ross Z, Friedman SR. Drug-related arrest rates and spatial access to syringe exchange programs in New York City health districts: Combined effects on the risk of injection-related infections among injectors. *Health & Place*. 2012; 18(2): 218–228. [PubMed: 22047790]
- Corbie-Smith G, Adimora AA, Youmans S, Muhammad M, Blumenthal C, Ellison A, Lloyd SW. Project GRACE: A staged approach to development of a community-academic partnership to address HIV in rural African American communities. *Health Promotion Practice*. 2011; 12(2): 293–302. [PubMed: 20685913]
- Corburn J. Confronting the challenges in reconnecting urban planning and public health. *American Journal of Public Health*. 2004; 94(4):541–546. [PubMed: 15053998]
- Cornish F, Campbell C. The social conditions for successful peer education: A comparison of two HIV prevention programs run by sex workers in India and South Africa. *American Journal of Community Psychology*. 2009; 44(1–2):123–135.10.1007/s10464-009-9254-8 [PubMed: 19521765]
- Crosby RA, Holtgrave DR, DiClemente RJ, Wingood GM, Gayle JA. Social capital as a predictor of adolescents' sexual risk behavior: A state-level exploratory study. *AIDS and Behavior*. 2003; 7(3): 245–252. [PubMed: 14586187]
- Curry A, Latkin C, Davey-Rothwell M. Pathways to depression: The impact of neighborhood violent crime on inner-city residents in Baltimore, Maryland, USA. *Social Science & Medicine* (1982). 2008; 67(1):23–30.10.1016/j.socscimed.2008.03.007 [PubMed: 18396366]
- Das M, Chu PL, Santos GM, Scheer S, Vittinghoff E, McFarland W, Colfax GN. Decreases in community viral load are accompanied by reductions in new HIV infections in San Francisco. *PLoS One*. 2010; 5(6)
- De Jesus M. HIV/AIDS and immigrant Cape Verdean women: Contextualized perspectives of Cape Verdean community advocates. *American Journal of Community Psychology*. 2007; 39(1–2):121–131.10.1007/s10464-007-9091-6 [PubMed: 17340187]
- De P, Cox J, Boivin J, Platt RW, Jolly AM. The importance of social networks in their association to drug equipment sharing among injection drug users: A review. *Addiction*. 2007; 102(11):1730–1739. [PubMed: 17935581]
- Draus P, Roddy J, Greenwald M. Heroin mismatch in the motor city: Addiction, segregation, and the geography of opportunity. *Journal of Ethnicity in Substance Abuse*. 2012; 11(2):149–173. [PubMed: 22679895]
- Drumright LN, Frost SD. Rapid social network assessment for predicting HIV and STI risk among men attending bars and clubs in San Diego, California. *Sexually Transmitted Infections*. 2010; 86(Suppl 3):iii17–23. [PubMed: 20966457]
- Egan JE, Frye V, Kurtz SP, Latkin C, Chen M, Tobin K, Koblin BA. Migration neighborhoods and networks: Approaches to understanding how urban environmental conditions affect syndemic

- adverse health outcomes among gay bisexual and other men who have sex with men. *AIDS and Behavior*. 2011; 15:S35–S50. [PubMed: 21369730]
- Evans R III. Prevalence, morbidity, and mortality of asthma in the inner city. *Pediatric Asthma, Allergy and Immunology*. 1994; 8(3):171–177.
- Evans-Polce R, Hulbert A, Latkin C. The association of multiple neighborhood perceptions with depression among a highly impoverished urban sample. *The Journal of Community Psychology*. (In Press).
- Ewart CK, Suchday S. Discovering how urban poverty and violence affect health: Development and validation of a neighborhood stress index. *Health Psychology*. 2002; 21(3):254–262. [PubMed: 12027031]
- Fendrich M, Avci O, Johnson TP, Mackesy-Amity ME. Depression, substance use and HIV risk in a probability sample of men who have sex with men. *Addictive Behaviors*. 2013; 38(3):1715–1718. [PubMed: 23254224]
- Ford CL, Daniel M, Earp JA, Kaufman JS, Golin CE, Miller WC. Perceived everyday racism, residential segregation, and HIV testing among patients at a sexually transmitted disease clinic. *American Journal of Public Health*. 2009; 99(Suppl 1):S137–143. [PubMed: 19218186]
- Francis SA, Liverpool J. A review of faith-based HIV prevention programs. *Journal of Religion and Health*. 2009; 48(1):6–15. [PubMed: 19229620]
- Frank L, Kerr J, Rosenberg D, King A. Healthy aging and where you live: Community design relationships with physical activity and body weight in older Americans. *Journal of Physical Activity & Health*. 2010; 7(Suppl 1):S82–90. [PubMed: 20440017]
- Freudenberg N, Fahs M, Galea S, Greenberg A. The impact of New York City's 1975 fiscal crisis on the tuberculosis, HIV, and homicide syndemic. *American Journal of Public Health*. 2006; 96(3):424–434. [PubMed: 16449588]
- Friedman SR, Mateu-Gelabert P, Curtis R, Maslow C, Bolyard M, Sandoval M, Flom PL. Social capital or networks, negotiations, and norms? A neighborhood case study. *American Journal of Preventive Medicine*. 2007a; 32(6):S160–S170. [PubMed: 17543707]
- Friedman SR, Cooper HL, Osborne AH. Structural and social contexts of HIV risk among African Americans. *American Journal of Public Health*. 2009; 99(6):1002–1008.10.2105/AJPH.2008.140327 [PubMed: 19372519]
- Friedman SR, Mateu-Gelabert P, Curtis R, Maslow C, Bolyard M, Sandoval M, Flom PL. Social capital or networks, negotiations, and norms? A neighborhood case study. *American Journal of Preventive Medicine*. 2007b; 32(6, Supplement):S160–S170.10.1016/j.amepre.2007.02.005 [PubMed: 17543707]
- Frye V, Koblin B, Chin J, Beard J, Blaney S, Halkitis P, Galea S. Neighborhood-level correlates of consistent condom use among men who have sex with men: A multi-level analysis. *AIDS and Behavior*. 2010; 14(4):974–985. [PubMed: 18712593]
- Fuller CM, Borrell LN, Latkin CA, Galea S, Ompad DC, Strathdee SA, Vlahov D. Effects of race, neighborhood, and social network on age at initiation of injection drug use. *American Journal of Public Health*. 2005; 95(4):689–695. [PubMed: 15798131]
- Fuller CM, Galea S, Caceres W, Blaney S, Sisco S, Vlahov D. Multilevel community-based intervention to increase access to sterile syringes among injection drug users through pharmacy sales in New York City. *American Journal of Public Health*. 2007; 97(1):117–124.10.2105/AJPH.2005.069591 [PubMed: 17138929]
- Fullilove RE, Green L, Fullilove MT. The family to family program: A structural intervention with implications for the prevention of HIV/AIDS and other community epidemics. *AIDS*. 2000; 14(Suppl 1):S63–7. [PubMed: 10981477]
- Furr-Holden CD, Milam AJ, Reynolds EK, Macpherson L, Lejuez CW. Disordered neighborhood environments and risk-taking propensity in late childhood through adolescence. *The Journal of Adolescent Health*. 2012; 50(1):100–102.10.1016/j.jadohealth.2011.04.008 [PubMed: 22188842]
- Galea S, Ahern J, Vlahov D. Contextual determinants of drug use risk behavior: A theoretic framework. *Journal of Urban Health*. 2003; 80(4):iii50–iii58. [PubMed: 14713671]

- Galea S, Vlahov D. Social determinants and the health of drug users: Socioeconomic status, homelessness, and incarceration. *Public Health Reports*. 2002; 117(SUPPL 1):S135–S145. [PubMed: 12435837]
- Galea S, Vlahov D. Urban health: Evidence, challenges, and directions. *Annual Review of Public Health*. 2005; 26:341–365.
- Généreux M, Bruneau J, Daniel M. Association between neighbourhood socioeconomic characteristics and high-risk injection behaviour amongst injection drug users living in inner and other city areas in Montréal, Canada. *International Journal of Drug Policy*. 2010; 21(1):49–55. [PubMed: 19250813]
- German D, Latkin CA. Boredom, depressive symptoms, and HIV risk behaviors among urban injection drug users. *AIDS and Behavior*. 2012.10.1007/s10461-012-0247-5
- Gindi RM, Sifakis F, Sherman SG, Towe VL, Flynn C, Zenilman JM. The geography of heterosexual partnerships in Baltimore City adults. *Sexually Transmitted Diseases*. 2011a; 38(4):260–266. [PubMed: 20966827]
- Gindi RM, Sifakis F, Sherman SG, Towe VL, Flynn C, Zenilman JM. The geography of heterosexual partnerships in Baltimore City adults. *Sexually Transmitted Diseases*. 2011b; 38(4):260–266.10.1097/OLQ.0b013e3181f7d7f4 [PubMed: 20966827]
- Grov C, Hirshfield S, Remien RH, Humberstone M, Chiasson MA. Exploring the venue's role in risky sexual behavior among gay and bisexual men: An event-level analysis from a national online survey in the U.S. *Archives of Sexual Behavior*. 2011.10.1007/s10508-011-9854-x
- Gruenewald PJ. The spatial ecology of alcohol problems: Niche theory and assortative drinking. *Addiction*. 2007; 102(6):870–878.10.1111/j.1360-0443.2007.01856.x [PubMed: 17523980]
- Hall HI, Li J, McKenna MT. HIV in predominantly rural areas of the United States. *The Journal of Rural Health : Official Journal of the American Rural Health Association and the National Rural Health Care Association*. 2005; 21(3):245–253. [PubMed: 16092299]
- Heimer R, Bluthenthal RN, Singer M, Khoshnood K. Structural impediments to operational syringe-exchange programs. *AIDS & Public Policy Journal*. 1996; 11(4):169–184. [PubMed: 10915251]
- Hembree C, Galea S, Ahern J, Tracy M, Markham Piper T, Miller J, Tardiff KJ. The urban built environment and overdose mortality in New York City neighborhoods. *Health & Place*. 2005; 11(2):147–156.10.1016/j.healthplace.2004.02.005 [PubMed: 15629682]
- Holtgrave DR, Crosby RA. Social capital, poverty, and income inequality as predictors of gonorrhoea, syphilis, chlamydia and AIDS case rates in the United States. *Sexually Transmitted Infections*. 2003; 79(1):62–64. [PubMed: 12576618]
- Hopper JR, Nielsen JM. Recycling as altruistic behavior: Normative and behavioral strategies to expand participation in a community recycling program. *Environment & Behavior*. 1991; 23(2): 195–220.
- Hu DJ, Subbarao S, Vanichseni S, Mock PA, Van Griensven F, Nelson R, Mastro TD. Higher viral loads and other risk factors associated with HIV-1 seroconversion during a period of high incidence among injection drug users in Bangkok. *Journal of Acquired Immune Deficiency Syndromes*. 2002; 30(2):240–247. [PubMed: 12045687]
- Johns MM, Bauermeister JA, Zimmerman MA. Individual and neighborhood correlates of HIV testing among African American youth transitioning from adolescence into young adulthood. *AIDS Education and Prevention*. 2010; 22(6):509–522. [PubMed: 21204627]
- Joy R, Druyts EF, Brandson EK, Lima VD, Rustad CA, Zhang W, Hogg RS. Impact of neighborhood-level socioeconomic status on HIV disease progression in a universal health care setting. *Journal of Acquired Immune Deficiency Syndromes*. 2008; 47(4):500–505. [PubMed: 18197117]
- Kalichman SC, Simbayi LC, Cain D, Jooste S. Alcohol expectancies and risky drinking among men and women at high-risk for HIV infection in Cape Town South Africa. *Addictive Behaviors*. 2007; 32(10):2304–2310.10.1016/j.addbeh.2007.01.026 [PubMed: 17317025]
- Kang E, Mellins CA, Dolezal C, Elkington KS, Abrams EJ. Disadvantaged neighborhood influences on depression and anxiety in youth with perinatally acquired human immunodeficiency virus: How life stressors matter. *Journal of Community Psychology*. 2011; 39(8):956–971. [PubMed: 23472046]

- Karasek D, Ahern J, Galea S. Social norms, collective efficacy, and smoking cessation in urban neighborhoods. *American Journal of Public Health*. 2012; 102(2):343–351.10.2105/AJPH.2011.300364 [PubMed: 22390449]
- Kawachi I. Social capital and community effects on population and individual health. *Annals of the New York Academy of Sciences*. 1999; 896:120–130. [PubMed: 10681893]
- Kelly BC, Carpiano RM, Easterbrook A, Parsons JT. Sex and the community: The implications of neighbourhoods and social networks for sexual risk behaviours among urban gay men. *Sociology of Health and Illness*. 2012
- Kelly JA, St Lawrence JS, Diaz YE, Stevenson LY, Hauth AC, Brasfield TL, Andrew ME. HIV risk behavior reduction following intervention with key opinion leaders of population: An experimental analysis. *American Journal of Public Health*. 1991; 81(2):168–171. [PubMed: 1990853]
- Kelly JA, St Lawrence JS, Stevenson LY, Hauth AC, Kalichman SC, Diaz YE, Morgan MG. Community AIDS/HIV risk reduction: The effects of endorsements by popular people in three cities. *American Journal of Public Health*. 1992; 82(11):1483–1489. [PubMed: 1443297]
- Kelly JG. The system concept and systemic change: Implications for community psychology. *American Journal of Community Psychology*. 2007; 39(3–4):415–418. [PubMed: 17406971]
- Kelly JG. More thoughts: On the spirit of community psychology. *American Journal of Community Psychology*. 2010; 45(3–4):272–284. [PubMed: 20352360]
- Kelly JG, Chang J. Pluralistic inquiry for the history of community psychology. *Journal of Community Psychology*. 2008; 36(5):675–691.
- Kerrigan D, Witt S, Glass B, Chung S-Ellen J. Perceived neighborhood social cohesion and condom use among adolescents vulnerable to HIV/STI. *AIDS and Behavior*. 2006; 10(6):723–729. [PubMed: 16845598]
- Kirby D, Baumler E, Coyle KK, Basen-Engquist K, Parcel GS, Harrist R, Banspach SW. The “safer choices” intervention: Its impact on the sexual behaviors of different subgroups of high school students. *The Journal of Adolescent Health*. 2004; 35(6):442–452. [PubMed: 15581523]
- Kirby D, Brown NL. Condom availability programs in U.S. schools. *Family Planning Perspectives*. 1996; 28(5):196–202. [PubMed: 8886762]
- Klein H, Elifson KW, Sterk CE. Depression and HIV risk behavior practices among at risk women. *Women & Health*. 2008; 48(2):167–188.10.1080/03630240802313605 [PubMed: 19042215]
- Knowlton AR, Curry A, Hua W, Wissow L. Depression and social context: Primary supporter relationship factors associated with depressive symptoms among a disadvantaged population with HIV/AIDS. *Journal of Community Psychology*. 2009; 37(4):526–541.
- Knowlton AR, Yang C, Bohnert A, Wissow L, Chander G, Arnsten JA. Informal care and reciprocity of support are associated with HAART adherence among men in Baltimore, MD, USA. *AIDS and Behavior*. 2011; 15(7):1429–36.10.1007/s10461-010-9749-1 [PubMed: 20632081]
- LaGrange RL, Ferraro KF, Supancic M. Perceived risk and fear of crime: Role of social and physical incivilities. *Journal of Research in Crime and Delinquency*. 1992; 29(3):311–334.
- Lang DL, Sales JM, Salazar LF, DiClemente RJ, Crosby RA, Brown LK, Donenberg GR. Determinants of multimethod contraceptive use in a sample of adolescent women diagnosed with psychological disorders. *Infectious Diseases in Obstetrics and Gynecology*. 2011; 2011
- Latkin, C.; Knowlton, AR. Social network approaches to HIV prevention: Implications to community impact and sustainability. In: Trickett, EJ.; Pequegnat, W., editors. *Community interventions and AIDS*. New York: Oxford University Press; 2005. p. 105-129.
- Latkin CA, Curry AD, Hua W, Davey MA. Direct and indirect associations of neighborhood disorder with drug use and high-risk sexual partners. *American Journal of Preventive Medicine*. 2007; 32(6):S234–S241. [PubMed: 17543716]
- Latkin CA, Donnell D, Celentano DD, Aramrattna A, Liu TY, Vongchak T, Metzger D. Relationships between social norms, social network characteristics, and HIV risk behaviors in Thailand and the United States. *Health Psychology*. 2009; 28(3):323–329.10.1037/a0014707 [PubMed: 19450038]
- Latkin CA, German D, Hua W, Curry AD. Individual-level influences on perceptions of neighborhood disorder: A multilevel analysis. *Journal of Community Psychology*. 2009; 37(1):122–133.10.1002/jcop.20284 [PubMed: 20027234]

- Latkin CA, Mandell W, Vlahov D, Oziemkowska M, Celentano DD. The long- term outcome of a personal network-oriented HIV prevention intervention for injection drug users: The SAFE study. *American Journal of Community Psychology*. 1996; 24(3):341–364. [PubMed: 8864208]
- Latkin CA, Williams CT, Wang J, Curry AD. Neighborhood social disorder as a determinant of drug injection behaviors: A structural equation modeling approach. *Health Psychology*. 2005; 24(1): 96–100. [PubMed: 15631567]
- LaVeist T, Pollack K, Thorpe R Jr, Fesahazion R, Gaskin D. Place, not race: Disparities dissipate in southwest Baltimore when blacks and whites live under similar conditions. *Health Affairs*. 2011; 30(10):1880–1887. [PubMed: 21976330]
- Lennon CA, Huedo-Medina TB, Gerwien DP, Johnson BT. A role for depression in sexual risk reduction for women? A meta-analysis of HIV prevention trials with depression outcomes. *Social Science and Medicine*. 2012; 75(4):688–698. [PubMed: 22444458]
- Leventhal T, Dupéré V. Moving to opportunity: Does long-term exposure to ‘low-poverty’ neighborhoods make a difference for adolescents? *Social Science and Medicine*. 2011; 73(5): 737–743. [PubMed: 21821323]
- Lewin K. Action research and minority problems. *Journal of Social Issues*. 1946; 2:34–46.
- Lewis DA, Maxfield MG. Fear in the neighborhoods: An investigation of the impact of crime. *Journal of Research in Crime and Delinquency*. 1980; 17(2):160–189.
- Lewis DA, Salem G. Community crime prevention: An analysis of a developing strategy. *Crime and Delinquency*. 1981; 27(3):405–421.
- Li J, Weeks MR, Borgatti SP, Clair S, Dickson-Gomez J. A social network approach to demonstrate the diffusion and change process of intervention from peer health advocates to the drug using community. *Substance use and Misuse*. 2012; 47(5):474–490. [PubMed: 22428816]
- Long DA, Perkins DD. Confirmatory factor analysis of the sense of community index and development of a brief SCI. *Journal of Community Psychology*. 2003; 31(3):279–296.
- Maas B, Fairbairn N, Kerr T, Li K, Montaner JSG, Wood E. Neighborhood and HIV infection among IDU: Place of residence independently predicts HIV infection among a cohort of injection drug users. *Health and Place*. 2007; 13(2):432–439. [PubMed: 16798055]
- Maggi S, Roberts W, MacLennan D, D’Angiulli A. Community resilience, quality childcare, and preschoolers’ mental health: A three-city comparison. *Social Science and Medicine*. 2011; 73(7): 1080–1087. [PubMed: 21835523]
- Mandell W, Kim J, Latkin C, Suh T. Depressive symptoms, drug network, and their synergistic effect on needle-sharing behavior among street injection drug users. *The American Journal of Drug and Alcohol Abuse*. 1999; 25(1):117–127. [PubMed: 10078981]
- Markowitz FE, Bellair PE, Liska AE, Liu J. Extending social disorganization theory: Modeling the relationships between cohesion, disorder, and fear. *Criminology*. 2001; 39(2):293–318.
- Mashburn AJ, Peterson JL, Bakeman R, Miller RL, Clark LF. Influences on HIV testing among young African-American men who have sex with men and the moderating effect of the geographic setting. *Journal of Community Psychology*. 2004; 32(1):45–60.10.1002/jcop.10080
- Miller M. The dynamics of substance use and sex networks in HIV transmission. *Journal of Urban Health*. 2003; 80(4 Suppl 3):iii88–96. [PubMed: 14713675]
- Miller M, Neaigus A. An economy of risk: Resource acquisition strategies of inner city women who use drugs. *International Journal of Drug Policy*. 2002; 13(5):409–418.
- Mimiaga MJ, Reisner SL, Cranston K, Isenberg D, Bright D, Daffin G, Mayer KH. Sexual mixing patterns and partner characteristics of black MSM in Massachusetts at increased risk for HIV infection and transmission. *Journal of Urban Health : Bulletin of the New York Academy of Medicine*. 2009; 86(4):602–623.10.1007/s11524-009-9363-6 [PubMed: 19466554]
- Morello-Frosch R, Zuk M, Jerrett M, Shamasunder B, Kyle AD. Understanding the cumulative impacts of inequalities in environmental health: Implications for policy. *Health Affairs*. 2011; 30(5):879–887. [PubMed: 21555471]
- Morris M, Kretzschmar M. Concurrent partnerships and transmission dynamics in networks. *Social Networks*. 1995; 17(3–4):299–318.10.1016/0378-8733(95)00268-S

- Mukwembi S. Effects of density of infected population to the spreading of HIV epidemic in communities. *Physica A: Statistical Mechanics and its Applications*. 2011; 390(21–22):3915–3921.
- Neighbors C, Jensen M, Tidwell J, Walter T, Fossos N, Lewis MA. Social- norms interventions for light and nondrinking students. *Group Processes and Intergroup Relations*. 2011; 14(5):651–669.
- NIMH Collaborative HIV/STD Prevention Trial Group. Results of the NIMH collaborative HIV/sexually transmitted disease prevention trial of a community popular opinion leader intervention. *Journal of Acquired Immune Deficiency Syndromes (1999)*. 2010; 54(2):204–214. [PubMed: 20354444]
- Okvat HA, Zautra AJ. Community gardening: A parsimonious path to individual, community, and environmental resilience. *American Journal of Community Psychology*. 2011; 47(3–4):374–387. [PubMed: 21222153]
- O'Reilly KR, Higgins DL. AIDS community demonstration projects for HIV prevention among hard-to-reach groups. *Public Health Reports (Washington, D.C.: 1974)*. 1991; 106(6):714–720.
- Parrado EA, Flippen C. Community attachment, neighborhood context, and sex worker use among Hispanic migrants in Durham, North Carolina, USA. *Social Science & Medicine (1982)*. 2010; 70(7):1059–1069.10.1016/j.socscimed.2009.12.017 [PubMed: 20122769]
- Pearson AL, Pearce J, Kingham S. Deprived yet healthy: Neighbourhood-level resilience in New Zealand. *Social Science and Medicine*. 2012
- Pentz MA, Dwyer JH, MacKinnon DP, Flay BR, Hansen WB, Wang EYI, Johnson CA. A multicomunity trial for primary prevention of adolescent drug abuse. effects on drug use prevalence. *Journal of the American Medical Association*. 1989; 261(22):3259–3266. [PubMed: 2785610]
- Perkins DD, Meeks JW, Taylor RB. The physical environment of street blocks and resident perceptions of crime and disorder: Implications for theory and measurement. *Journal of Environmental Psychology*. 1992; 12(1):21–34.
- Perkins DD, Taylor RB. Ecological assessments of community disorder: Their relationship to fear of crime and theoretical implications. *American Journal of Community Psychology*. 1996; 24(1):63–107. [PubMed: 8712188]
- Peterson NA, Speer PW, Hughey J, Armstead TL, Schneider JE, Sheffer MA. Community organizations and sense of community: Further development in theory and measurement. *Journal of Community Psychology*. 2008; 36(6):798–813.
- Pronyk PM, Hargreaves JR, Kim JC, Morison LA, Phetla G, Watts C, Porter JD. Effect of a structural intervention for the prevention of intimate-partner violence and HIV in rural South Africa: A cluster randomised trial. *Lancet*. 2006; 368(9551):1973–1983.10.1016/S0140-6736(06)69744-4 [PubMed: 17141704]
- Pronyk PM, Harpham T, Morison LA, Hargreaves JR, Kim JC, Phetla G, Porter JD. Is social capital associated with HIV risk in rural South Africa? *Social Science & Medicine (1982)*. 2008; 66(9):1999–2010.10.1016/j.socscimed.2008.01.023 [PubMed: 18299168]
- Reif S, Whetten K, Ostermann J, Raper JL. Characteristics of HIV-infected adults in the deep south and their utilization of mental health services: A rural vs. urban comparison. *AIDS Care*. 2006; 18(Suppl 1):S10–7.10.1080/09540120600838738 [PubMed: 16938670]
- Reisner SL, Mimiaga MJ, Case P, Johnson CV, Safren SA, Mayer KH. Predictors of identifying as a barebacker among high-risk New England HIV seronegative men who have sex with men. *Journal of Urban Health*. 2009; 86(2):250–262. [PubMed: 19051039]
- Reynoso-Vallejo H. Social capital influence in illicit drug use among racial/ethnic groups in the United States. *Journal of Ethnicity in Substance Abuse*. 2011; 10(2):91–111. [PubMed: 21678144]
- Rhodes SD, Kelley C, Simán F, Cashman R, Alonzo J, McGuire J, Reboussin B. Using community-based participatory research (CBPR) to develop a community-level HIV prevention intervention for Latinas: A local response to a global challenge. *Women's Health Issues*. 2012; 22(3):e293–e301. [PubMed: 22483581]
- Rhodes T. Risk environments and drug harms: A social science for harm reduction approach. *The International Journal on Drug Policy*. 2009; 20(3):193–201.10.1016/j.drugpo.2008.10.003 [PubMed: 19147339]

- Rietmeijer CA, Wolitski RJ, Fishbein M, Corby NH, Cohn DL. Sex hustling, injection drug use, and non-gay identification by men who have sex with men: Associations with high-risk sexual behaviors and condom use. *Sexually Transmitted Diseases*. 1998; 25(7):353–360. [PubMed: 9713915]
- Rogers, EM. Diffusion of innovations. 4. New York: The Free Press; 1995.
- Rogers JD, Ramaswamy M, Cheng CI, Richter K, Kelly PJ. Perceptions of neighborhood social environment and drug dependence among incarcerated women and men: A cross-sectional analysis. *Substance Abuse Treatment, Prevention, and Policy*. 2012; 7 39-597X-7-39. 10.1186/1747-597X-7-39
- Rudolph AE, Linton S, Dyer TP, Latkin C. Individual, network, and neighborhood correlates of exchange sex among female non-injection drug users in Baltimore, MD (2005–2007). *AIDS and Behavior*. 2012; 16(10):3055–3064. [PubMed: 22811007]
- Rudolph AE, Standish K, Amesty S, Crawford ND, Stern RJ, Badillo WE, Fuller CM. A community-based approach to linking injection drug users with needed services through pharmacies: An evaluation of a pilot intervention in New York City. *AIDS Education and Prevention*. 2010; 22(3):238–251. [PubMed: 20528131]
- Rundle AG, Bader MD, Richards CA, Neckerman KM, Teitler JO. Using google street view to audit neighborhood environments. *American Journal of Preventive Medicine*. 2011; 40(1):94–100. 10.1016/j.amepre.2010.09.034 [PubMed: 21146773]
- Rushton G. Public health, GIS, and spatial analytic tools. *Annual Review of Public Health*. 2003; 24:43–56. 10.1146/annurev.publhealth.24.012902.140843
- Sampson, RJ.; Morenoff, JD. Spatial (dis)advantage and homicide in Chicago neighborhoods. In: Goodchild, M.; Janelle, D., editors. *Spatially integrated social science*. New York: Oxford University Press; 2004. p. 145-170.
- Sampson RJ, Raudenbush SW. Systematic social observation of public spaces: A new look at disorder in urban neighborhoods. *American Journal of Sociology*. 1999; 105(3):603–651.
- Sampson RJ, Raudenbush SW, Earls F. Neighborhoods and violent crime: A multilevel study of collective efficacy. *Science*. 1997; 277(5328):918–924. [PubMed: 9252316]
- Sandoy IF, Siziya S, Fylkesnes K. Lost opportunities in HIV prevention: Programmes miss places where exposures are highest. *BMC Public Health*. 2008; 8:31. 10.1186/1471-2458-8-31 [PubMed: 18218124]
- Schaefer-McDaniel N, Caughy MO, O'Campo P, Gearey W. Examining methodological details of neighbourhood observations and the relationship to health: A literature review. *Social Science & Medicine* (1982). 2010; 70(2):277–292. 10.1016/j.socscimed.2009.10.018 [PubMed: 19883966]
- Schensul JJ, Levy JA, Disch WB. Individual, contextual, and social network factors affecting exposure to HIV/AIDS risk among older residents living in low-income senior housing complexes. *Journal of Acquired Immune Deficiency Syndromes*. 2003; 33:S138–S152. [PubMed: 12853863]
- Schilling J, Linton LS. The public health roots of zoning: In search of active living's legal genealogy. *American Journal of Preventive Medicine*. 2005; 28(2 Suppl 2):96–104. 10.1016/j.amepre.2004.10.028 [PubMed: 15694517]
- Schroeder JR, Latkin CA, Hoover DR, Curry AD, Knowlton AR, Celentano DD. Illicit drug use in one's social network and in one's neighborhood predicts individual heroin and cocaine use. *Annals of Epidemiology*. 2001; 11(6):389–394. [PubMed: 11454498]
- Schwarz DF, Grisso JA, Miles C, Holmes JH, Sutton RL. An injury prevention program in an urban African-American community. *American Journal of Public Health*. 1993; 83(5):675–680. [PubMed: 8484447]
- Scribner R, Cohen DA, Fisher W. Evidence of a structural effect for alcohol outlet density: A multilevel analysis. *Alcoholism, Clinical and Experimental Research*. 2000; 24(2):188–195.
- Scribner R, Mason K, Theall K, Simonsen N, Schneider SK, Towvim LG, DeJong W. The contextual role of alcohol outlet density in college drinking. *Journal of Studies on Alcohol and Drugs*. 2008; 69(1):112–120. [PubMed: 18080071]
- Scribner R, Theall KP, Simonsen N, Robinson W. HIV risk and the alcohol environment: Advancing an ecological epidemiology for HIV/AIDS. *Alcohol Research and Health*. 2010; 33(3):179–183. [PubMed: 23584059]

- Shareck M, Dassa C, Frohlich KL. Improving the measurement of neighbourhood characteristics through systematic observation: Inequalities in smoking as a case study. *Health & Place*. 2012; 18(3):671–682.10.1016/j.healthplace.2011.11.008 [PubMed: 22297153]
- Sherman SG, Lilleston P, Reuben J. More than a dance: The production of sexual health risk in the exotic dance clubs in Baltimore, USA. *Social Science & Medicine (1982)*. 2011; 73(3):475–481.10.1016/j.socscimed.2011.05.036 [PubMed: 21724311]
- Sikkema KJ, Anderson ES, Kelly JA, Winett RA, Gore-Felton C, Roffman RA, Brondino MJ. Outcomes of a randomized, controlled community-level HIV prevention intervention for adolescents in low-income housing developments. *AIDS*. 2005; 19(14):1509–1516. [PubMed: 16135905]
- Sikkema KJ, Kelly JA, Winett RA, Solomon LJ, Cargill VA, Roffman RA, Mercer MB. Outcomes of a randomized community-level HIV prevention intervention for women living in 18 low-income housing developments. *American Journal of Public Health*. 2000; 90(1):57–63. [PubMed: 10630138]
- Singer MC, Erickson PI, Badiane L, Diaz R, Ortiz D, Abraham T, Nicolaysen AM. Syndemics, sex and the city: Understanding sexually transmitted diseases in social and cultural context. *Social Science & Medicine (1982)*. 2006; 63(8):2010–2021.10.1016/j.socscimed.2006.05.012 [PubMed: 16782250]
- Skogan, WG. *Disorder and decline: Crime and the spiral of decay in American neighborhoods*. Berkely and Los Angeles: University of California Press; 1990.
- Smith C, Hanham RQ. Any place but here! mental health facilities as noxious neighbours. *Professional Geographer*. 1981; 33(3):326–334.
- Son J, Lin N. Social capital and civic action: A network-based approach. *Social Science Research*. 2008; 37(1):330–349.
- Stein MD, Solomon DA, Herman DS, Anderson BJ, Miller I. Depression severity and drug injection HIV risk behaviors. *The American Journal of Psychiatry*. 2003; 160(9):1659–1662. [PubMed: 12944342]
- Stephens RC, Kwiatkowski CF, Booth RE. The impact of the NIDA cooperative agreement programs on HIV risk among crack and injection drug users. *Advances in Medical Sociology*. 2000; 7:241–259.
- Steptoe A, Feldman PJ. Neighborhood problems as sources of chronic stress: Development of a measure of neighborhood problems, and associations with socioeconomic status and health. *Annals of Behavioral Medicine : A Publication of the Society of Behavioral Medicine*. 2001; 23(3):177–185. [PubMed: 11495218]
- Strathdee SA, Galai N, Safaiean M, Celentano DD, Vlahov D, Johnson L, Nelson KE. Sex differences in risk factors for HIV seroconversion among injection drug users: A 10-year perspective. *Archives of Internal Medicine*. 2001; 161(10):1281–1288. [PubMed: 11371255]
- Strathdee SA, Hogg RS, Martindale SL, Cornelisse PG, Craib KJ, Montaner JS, Schechter MT. Determinants of sexual risk-taking among young HIV-negative gay and bisexual men. *Journal of Acquired Immune Deficiency Syndromes and Human Retrovirology : Official Publication of the International Retrovirology Association*. 1998; 19(1):61–66. [PubMed: 9732071]
- Sturm R, Cohen DA. Suburban sprawl and physical and mental health. *Public Health*. 2004; 118(7): 488–496.10.1016/j.puhe.2004.02.007 [PubMed: 15351221]
- Substance Abuse and Mental Health Services Administration (SAMHSA). *Siting drug and alcohol treatment programs: Legal challenges to the NIMBY syndrome*. technical assistance publication (TAP series 14. Rockville, MD: U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES; 1995.
- Takahashi LM. The socio-spatial stigmatization of homelessness and HIV/AIDS: Toward an explanation of the NIMBY syndrome. *Social Science & Medicine (1982)*. 1997; 45(6):903–914. [PubMed: 9255923]
- Takahashi LM, Magalong MG. Disruptive social capital: (Un)healthy socio-spatial interactions among Filipino men living with HIV/AIDS. *Health & Place*. 2008; 14(2):182–197.10.1016/j.healthplace.2007.06.002 [PubMed: 17658287]

- Takahashi LM, Wiebe D, Rodriguez R. Navigating the time-space context of HIV and AIDS: Daily routines and access to care. *Social Science & Medicine* (1982). 2001; 53(7):845–863. [PubMed: 11522133]
- Tempalski B, Friedman R, Keem M, Cooper H, Friedman SR. NIMBY localism and national inequitable exclusion alliances: The case of syringe exchange programs in the United States. *Geoforum; Journal of Physical, Human, and Regional Geosciences*. 2007; 38(6):1250–1263.10.1016/j.geoforum.2007.03.012
- Teunissen HA, Spijkerman R, Prinstein MJ, Cohen GL, Engels RCME, Scholte RHJ. Adolescents' conformity to their peers' pro-alcohol and anti-alcohol norms: The power of popularity. *Alcoholism: Clinical and Experimental Research*. 2012; 36(7):1257–1267.
- Theall KP, Sterk CE, Elifson KW. Perceived neighborhood fear and drug use among young adults. *American Journal of Health Behavior*. 2009; 33(4):353–365. [PubMed: 19182981]
- Tobin KE, Kuramoto SJ, Davey-Rothwell MA, Latkin CA. The STEP into action study: A peer-based, personal risk network-focused HIV prevention intervention with injection drug users in Baltimore, Maryland. *Addiction*. 2011; 106(2):366–375. [PubMed: 21054614]
- Townley G, Kloos B. Development of a measure of sense of community for individuals with serious mental illness residing in community settings. *Journal of Community Psychology*. 2009; 37(3): 362–380. [PubMed: 19305637]
- Treno AJ, Grube JW, Martin SE. Alcohol availability as a predictor of youth drinking and driving: A hierarchical analysis of survey and archival data. *Alcoholism, Clinical and Experimental Research*. 2003; 27(5):835–840.10.1097/01.ALC.0000067979.85714.22
- Trickett EJ. Context, culture, and collaboration in AIDS interventions: Ecological ideas for enhancing community impact. *Journal of Primary Prevention*. 2002; 23(2):157–174.
- Vine MF, Degnan D, Hanchette C. Geographic information systems: Their use in environmental epidemiologic research. *Environmental Health Perspectives*. 1997; 105(6):598–605. [PubMed: 9288494]
- Wallace R. A synergism of plagues: “Planned shrinkage,” contagious housing destruction, and AIDS in the Bronx. *Environmental Research*. 1988; 47(1):1–33. [PubMed: 3168963]
- Wallis AB, Winch PJ, O'Campo PJ. “This is not a well place”: Neighborhood and stress in pigtown. *Health Care for Women International*. 2010; 31(2):113–130. [PubMed: 20390641]
- Wang K, Brown K, Shen S, Tucker J. Social network-based interventions to promote condom use: A systematic review. *AIDS and Behavior*. 2011; 15(7):1298–1308. [PubMed: 21811843]
- Warpenius K, Holmila M, Mustonen H. Effects of a community intervention to reduce the serving of alcohol to intoxicated patrons. *Addiction*. 2010; 105(6):1032–1040. [PubMed: 20219058]
- Watt MH, Aunon FM, Skinner D, Sikkema KJ, Kalichman SC, Pieterse D. “Because he has bought for her, he wants to sleep with her”: Alcohol as a currency for sexual exchange in South African drinking venues. *Social Science & Medicine* (1982). 2012; 74(7):1005–1012.10.1016/j.socscimed.2011.12.022 [PubMed: 22326304]
- Weber EM. Bridging the barriers: Public health strategies for expanding drug treatment in communities. *Rutgers Law Review*. 2005; 57(2):631–646.
- Webster DW, Whitehill JM, Vernick JS, Curriero FC. Effects of Baltimore's safe streets program on gun violence: A replication of Chicago's CeaseFire program. *Journal of Urban Health : Bulletin of the New York Academy of Medicine*. 2012.10.1007/s11524-012-9731-5
- Weeks MR, Li J, Dickson-Gomez J, Convey M, Martinez M, Radda K, Clair S. Outcomes of a peer HIV prevention program with injection drug and crack users: The risk avoidance partnership. *Substance use & Misuse*. 2009; 44(2):253–281.10.1080/10826080802347677 [PubMed: 19142824]
- Weiss L, Ompad D, Galea S, Vlahov D. Defining neighborhood boundaries for urban health research. *American Journal of Preventive Medicine*. 2007; 32(6):S154–S159. [PubMed: 17543706]
- White K, Borrell LN. Racial/ethnic residential segregation: Framing the context of health risk and health disparities. *Health & Place*. 2011; 17(2):438–448.10.1016/j.healthplace.2010.12.002 [PubMed: 21236721]

- Wiewel EW, Hanna DB, Begier EM, Torian LV. High HIV prevalence and diagnosis rates in New York City black men. *Journal of Community Health*. 2011; 36(1):141–149.10.1007/s10900-010-9291-0 [PubMed: 20574776]
- Williams CT, Latkin CA. Neighborhood socioeconomic status, personal network attributes, and use of heroin and cocaine. *American Journal of Preventive Medicine*. 2007; 32(6):S203–S210. [PubMed: 17543712]
- Williams MV, Palar K, Derosé KP. Congregation-based programs to address HIV/AIDS: Elements of successful implementation. *Journal of Urban Health*. 2011; 88(3):517–532. [PubMed: 21331749]
- Wilson, WJ. *The truly disadvantaged: The inner city, the underclass, and public policy*. Illinois: University of Chicago Press; 1987.
- Wingood GM, Simpson-Robinson L, Braxton ND, Raiford JL. Design of a faith-based HIV intervention: Successful collaboration between a university and a church. *Health Promotion Practice*. 2011;10.1177/1524839910372039
- Winstanley EL, Steinwachs DM, Ensminger ME, Latkin CA, Stitzer ML, Olsen Y. The association of self-reported neighborhood disorganization and social capital with adolescent alcohol and drug use, dependence, and access to treatment. *Drug and Alcohol Dependence*. 2008; 92(1–3):173–182.10.1016/j.drugalcdep.2007.07.012 [PubMed: 17913396]
- Wodtke GT, Harding DJ, Elwert F. Neighborhood effects in temporal perspective: The impact of long-term exposure to concentrated disadvantage on high school graduation. *American Sociological Review*. 2011; 76(5):713–736. [PubMed: 22879678]
- Wolitski RJ, Kidder DP, Fenton KA. HIV, homelessness, and public health: Critical issues and a call for increased action. *AIDS and Behavior*. 2007; 11(6 Suppl):167–171.10.1007/s10461-007-9277-9 [PubMed: 17676279]
- Wood L, Shannon T, Bulsara M, Pikora T, McCormack G, Giles-Corti B. The anatomy of the safe and social suburb: An exploratory study of the built environment, social capital and residents' perceptions of safety. *Health & Place*. 2008; 14(1):15–31.10.1016/j.healthplace.2007.04.004 [PubMed: 17576088]
- Wray-Lake L, Maggs JL, Johnston LD, Bachman JG, O'Malley PM, Schulenberg JE. Associations between community attachments and adolescent substance use in nationally representative samples. *The Journal of Adolescent Health*. 2012; 51(4):325–331.10.1016/j.jadohealth.2011.12.030 [PubMed: 22999832]
- Zamani S, Vazirian M, Nassirimanesh B, Razzaghi EM, Ono-Kihara M, Ravari SM, Kihara M. Needle and syringe sharing practices among injecting drug users in Tehran: A comparison of two neighborhoods, one with and one without a needle and syringe program. *AIDS and Behavior*. 2010; 14(4):885–890. [PubMed: 18483849]
- Zenilman JM, Elish N, Fresia A, Glass G. The geography of sexual partnerships in Baltimore: Applications of core theory dynamics using a geographic information system. *Sexually Transmitted Diseases*. 1999; 26(2):75–81. [PubMed: 10029979]