Non-residential neighborhood exposures suppress neighborhood effects on self-rated health

Sanae Inagami*, Deborah A. Cohen, Brian K. Finch

VA Greater Los Angeles Health Care System, Los Angeles, CA, USA

Available online 5 July 2007

Abstract

In prior research, neighborhood effects have often been weak or inconsistent in predicting specific causes of mortality and morbidity. To determine whether residential neighborhood effects are suppressed by exposure to other environments, we examined the effect on adult self-rated health of non-residential environments that figure in individuals' daily routines. We linked the 2000 US Census data with the Los Angeles Family and Neighborhood Study (L.A.FANS) database, which consists of 3323 adults sampled from neighborhoods in LA County. Characteristics of census tracts where respondents lived, worked, shopped, sought medical care, worshipped and spent "other" time were obtained from the 2000 US Census. Weighted multilevel linear and clustered generalized ordered logistic regressions were used to estimate associations between self-rated health and non-residential neighborhood exposures after adjustment for individual-level factors and exposure to residential neighborhoods.

We found that residence in disadvantaged neighborhoods was associated with worse self-rated health. In a dose–response fashion, the greater the exposure to less disadvantaged non-residential neighborhoods in the course of routine activities, the greater the magnitude in improved self-rated health. Models including non-residential neighborhood exposure increase the magnitude and significance of the association between residential neighborhoods and health. In conclusion, individuals' exposure to non-residential neighborhoods confounds and suppresses the association of residential neighborhoods with health and could explain why previous studies may not have found robust associations between residential neighborhood predictors and health.
Published by Elsevier Ltd.

Keywords: Self-rated health; Multi-level modeling; Neighborhood; Disadvantage; Mobility; USA

Introduction

In the past decade, researchers, using multilevel models, have begun to examine residential neighborhood-level predictors (social and structural mechanisms) that might explain the geographic distribution of disease (Cohen et al., 2000; Robert, 1999; Yen & Syme, 1999). The most common area characteristics investigated have been aggregate measures of the socioeconomic characteristics of individuals who reside in these neighborhoods (Diez-Roux, 2001; Morris & Carstairs, 1991). Residential neighborhood socioeconomic characteristics (SES) is felt to be either a progenitor or a proxy of neighborhood environmental and psychosocial factors that may be associated with the development of various health outcomes.

*Corresponding author.

E-mail addresses: sinagami@ucla.edu (S. Inagami), deborah_cohen@rand.org (D.A. Cohen), bfinch@mail.sdsu.edu (B.K. Finch).

Contextual studies have noted consistency in these studies documenting "independent" effects of neighborhood socioeconomic environment after controlling for individual-level factors on various health outcomes (Diez-Roux, 2001; Pickett & Pearl, 2001). But if we restrict these studies only to multilevel models that have adjusted for more than one individual level measure of socioeconomic status, though the overall effect suggests independent effects of neighborhood SES on various health outcomes (depression, Ross, 2000; heart disease, Diez-Roux et al., 2003; drug use, Boardman, Finch, Ellison, Williams, & Jackson, 2001; insulin resistance, Diez-Roux, Jacobs, & Kiefe, 2002; cardiovascular risk factors, Davey Smith, Hart, Watt, Hole, & Hawthorne, 1998; Duncan, Jones, & Moon, 1999; Lee & Cubbin, 2002; child mental health, Xue, Leventhal, Brooks-Gunn, & Earls, 2005; self-rated health, Patel, Eschbach, Rudkin, Peek, & Markides, 2003; mortality, Davey Smith et al., 1998), neighborhood socioeconomic predictors are frequently weak (Aneshensel & Sucoff, 1996; Borrell, Diez-Roux, Rose, & Clark, 2004; Cagney & Browning, 2004; Diez-Roux et al., 1999; Reijneveld, 1998; Robert, 1998; Robert & Reither, 2004; Van Lenthe & Mackenbach, 2002), and sometimes inconsistent across gender (Diez-Roux et al., 1997, 2002; Robert & Reither, 2004; Van Lenthe & Mackenbach, 2002) and race/ethnicity (Borrell et al., 2004; Diez-Roux et al., 1997; Lee & Cubbin, 2002) and across different study samples in the US (Aneshensel & Sucoff, 1996; Boardman et al., 2001; Borrell et al., 2004; Cagney & Browning, 2004; Diez-Roux et al., 1997, 1999, 2002; Kleinschmidt, Hills & Elliott, 1995; Lee & Cubbin, 2002; Patel et al., 2003; Reagan & Salsberry, 2005; Robert, 1998; Robert & Reither, 2004; Xue et al., 2005) and Europe (Davey Smith et al., 1998; Duncan et al., 1999; Ecob & Jones, 1998; Reijneveld, 1998; Van Lenthe & Mackenbach, 2002). It is easy to view these mixed results and query the role of residential neighborhoods in health (Diez-Roux, 2001, 2003; Kawachi & Berkman, 2003; Pickett & Pearl, 2001). But these results may also reflect an underlying variability within populations that are differentially affected by the contextual qualities of the residential neighborhood.

An individual's neighborhood of residence may be especially salient for those who are spatially segregated and socially isolated, as they tend to rely largely on the local environment for many aspects of their daily living (e.g., shopping, medical care). For others, the influence of the residential neighborhood may be less salient (Rankin & Quane, 2000) as modern telecommunications and transportation options allow an increasing number of social interactions to take place outside the residential neighborhood (Taub, Surgeon, Lindholm, Otti, & Bridges, 1977) and as a growing number of residents do not know their neighbors (Sampson, Raudenbush, & Earls, 1997; Wellman 1999).

Exposure to neighborhoods outside the residence may have both direct and indirect pathways in its association with health. Just as residential neighborhood SES has been associated with health, other neighborhoods where people spend their days may also have direct effects on health. Those same factors associated with SES (which are found in residential neighborhoods) in other neighborhoods outside of the residence may directly influence an individual's health outcome. But exposure to other neighborhoods may also affect self-rated health indirectly. Exposure to other neighborhoods implies that exposure to the residential neighborhood is reduced. Adjusting for the time spent in the residential neighborhood may adjust for individual variability of residential neighborhood exposure and "clarify" the true association of residential neighborhood on health. Exposure to multiple environments may also modify the influence of the residential neighborhood health benefits or risks on the individual.

Beginning the search for neighborhood contextual effects in residential areas where health outcomes have been shown to cluster makes inherent sense, but continued focus on only residential "context" may be limited. Geographic research on human activity-travel patterns, by incorporating both time and space in its models (Kwan, 2002), understands that the "action space/activity space" of individuals, or the geography of the individual's daily activity over time, is not limited to the residential neighborhood (Buliung & Kanaroglou, 2006; Friedrichs, Dangschat, Droth, & Kiehl, 1982; Gliebe & Koppelman, 2005; Law, 1999; Naess, 2006). Compared to administrative residential boundaries, this "activity space" may better represent an individual's "interaction space" (Guagliardo, 2004; Nemet & Bailey, 2000) or the environmental and social exposures that are associated in influencing health outcomes. But neither epidemiology nor geography studies have examined the contextual influence of an individual's "activity space" on health outcomes.