Health & Place 42 (2016) 30–36

Contents lists available at ScienceDirect

Health & Place

journal homepage: www.elsevier.com/locate/healthplace

Associations of neighborhood socioeconomic and racial/ethnic characteristics with changes in survey-based neighborhood quality, 2000–2011

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ARTICLE INFO

Article history:
Received 17 August 2015
Received in revised form
27 June 2016
Accepted 5 August 2016

Keywords:
Neighborhoods
Longitudinal
Physical environment
Social environment

ABSTRACT

We investigated the relationships between neighborhood socio-demographic characteristics (socioeconomic status [SES], percentage of Black residents, and percentage of Hispanic residents) and survey-based measures of the social environment (social cohesion, safety) and the physical environment (healthy food environment, walking environment) in six sites from 2000 through 2011. Neighborhood environments were patterned by area SES and racial/ethnic composition, such that higher SES and lower percentage minority neighborhoods had better physical and social environments. Increasing disparities over time were observed for some neighborhood environments. Further research should explore the role of neighborhood environments in maintaining or increasing social disparities in health.

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1. Introduction

Measures of neighborhood quality – including characteristics of both the physical environment and the social environment – have been associated with health outcomes ranging from behaviors to incident disease to mortality (Diez Roux and Mair, 2010). A number of studies have also shown that neighborhood physical environments (e.g. access to food and physical activity resources) and social environments (e.g. perceived safety, social ties and trust) are patterned by the socioeconomic or racial/ethnic composition of the area. For example, low SES and minority neighborhoods tend to have fewer supermarkets and more fast food restaurants (Morland et al., 2002; Block et al., 2004; Zenk et al., 2005; Moore and Diez Roux, 2006; Powell et al., 2007; Larson et al., 2009) and fewer resources for physical activity (Powell et al., 2006; Franzini et al., 2010; Duncan et al., 2012). Research on the social environment is less abundant, but neighborhood poverty has been associated with lower levels of safety (Neckerman et al., 2009; Sallis et al., 2011) and with less social cohesion (Franzini et al., 2005). Research from sociology also suggests that higher racial segregation may be associated with lower neighborhood social cohesion (Sampson, 2003; Sampson et al., 1997; Hobson-Prater and Leech, 2012).

In the U.S., neighborhood environments are strongly patterned by the socio-demographic composition of residents (Diez Roux and Mair, 2010; Osypuk and Acevedo-Garcia, 2010; Massey, 1993). This patterning likely results from a variety of interrelated causes including differences in political advocacy and buying power, which can influence the location of beneficial and hazardous resources and services that shape the physical and social environment of a neighborhood over time (Corburn, 2009; Hwang and Sampson, 2014). As a consequence, persons of different socioeconomic position and race/ethnicity may be exposed to very

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http://dx.doi.org/10.1016/j.healthplace.2016.08.001
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different neighborhood environments, with possible consequences for heath disparities (Williams and Collins, 2001). Thus, neighborhood quality may also be an important factor in understanding persistent social gradients in health in the U.S.

Growing research is using commercial or GIS-based data sources, particularly for measures of the physical environment; but these data sources are less useful for capturing the social environment, and in general capture distinct aspects of neighborhood environments compared with survey-based questions of resident perceptions. However, existing research using survey-based data on the relationship between neighborhood socio-demographic characteristics and neighborhood quality is largely limited to cross-sectional investigations in single urban areas. Drawing conclusions about broad trends in neighborhood quality over time has been hampered by the use of variable methodologies and heterogeneous measures.

Our goal was to utilize one of the most extensive longitudinal datasets on neighborhood quality to explore how physical and social environments have changed over time and how changes are patterned by neighborhood socioeconomic status (SES) and racial/ethnic composition. We hypothesized that high SES and low minority neighborhoods would have better physical and social environments than their low SES and high minority counterparts. Given the large and growing evidence that neighborhood environments affect a variety of health outcomes, documenting trends in neighborhood quality by sociodemographic characteristics may contribute to our understanding of the mechanisms that perpetuate social disparities in health (Diez Roux and Mair, 2010; Williams and Collins, 2001).

2. Methods

2.1. Study population

Data on neighborhood quality came from two studies. The first study, the Multi-Ethnic Study of Atherosclerosis (MESA) Neighborhood Study, recruited 6,191 MESA participants (aged 45–84 at baseline, from six field sites [Forsyth County, NC; New York City, NY; Baltimore, MD; St Paul, MN; Chicago, IL; and Los Angeles, CA]). MESA Neighborhood participants completed a questionnaire about their neighborhood environments at three times (2000–2002, 2003–2005, and 2010–2011) during MESA follow-up visits (Bild et al., 2002).

The second study, the Community Surveys (CS), collected survey data via phone from adult residents who lived in the MESA study areas but were not MESA participants. Respondents were sampled via random digit dialing and list-based sampling (Mujahid et al., 2007). CS 1 was completed in 2004 by 5,988 participants from the Maryland, New York, and North Carolina study sites. CS 2 included 5,409 participants in the California and New York sites in 2006–2008. CS 3 was fielded in 2011–2012, with 4,212 participants from a subsample of tracts in all six MESA sites. CS 1 and 2 included all tracts with MESA participants in the selected MESA sites. CS 3 selected sampled tracts across all six sites. Sampled tracts were chosen following a statistical algorithm developed with the goals of oversampling tracts with large changes in neighborhood characteristics or changes estimated with good precision while maintaining balance across sites. The studies were approved by the Institutional Review Boards at each site and all participants gave informed consent (Bild et al., 2002).

2.2. Neighborhood data

Four survey scales, two related to the physical environment (healthy food environment and walking environment) and two related to the social environment (social cohesion and safety) were selected for investigation because of their relevance to health (Echeverría et al., 2008; Mujahid et al., 2008; Auchincloss et al., 2009; Mair et al., 2009; Mujahid et al., 2010) and because they had been assessed using identical questions in the MESA and CS questionnaires at multiple time points. Each Community Survey included all four survey scales of interest; MESA participants responded to each scale twice (social cohesion in 2000–2002; safety, healthy food, and walking environment in 2003–2005; and all four scales in 2010–2011). By combining datasets, each site had data from the three MESA data collection time periods and at least one Community Survey, ensuring adequate temporal representation in each site (and census tracts within sites) for the estimation of trends. Scales were based on previous work and have acceptable internal consistency, ecometric properties, and reliability (Mujahid et al., 2007). Participants in all surveys were asked to refer to the area about one mile around their home when responding to the questions. All survey scales used a 5-point Likert scale with response options from 'strongly agree' to 'strongly disagree.'.

Each participant's ratings for each question in the scale were averaged to produce a summary score, such that higher scores indicate a better neighborhood environment. Summary scores ranged from 1 to 5, and were not calculated for participants who did not answer one or more of the questions within a scale.

Neighborhood sociodemographic characteristics of interest included neighborhood SES and racial/ethnic composition (percentage of non-Hispanic Black residents and percentage of Hispanic residents), using census tracts to define neighborhoods. Census tract characteristics were obtained from the U.S. Census in 2000 (USC, 2001) and from the American Community Survey (ACS) for 2005–2009 (Bureau USC, 2011) and from 2007 to 2011 (Bureau USC, 2012). Tract characteristics were linked to individuals based on their address at the time they completed a neighborhood survey. Data from the 2000 Census were applied to 2000–2004; data from ACS 2005–2009 were linked to survey years 2005–2007, and data from ACS 2007–2011 were linked to survey years 2008–2011.

Tract SES was measured using a summary score obtained from principal factor analysis with orthogonal rotation of 16 tract-level variables related to income, wealth, education, occupation, poverty, employment, and housing. The first factor explains 49.2% of the total variance, and represents education, occupation, housing value, and income; this factor score was used to summarize tract-level SES, such that a higher score represents increasing socioeconomic advantage.

2.3. Additional covariates

Individual-level characteristics of respondents were considered potential confounders of the relationship between neighborhood sociodemographic characteristics and neighborhood quality, as both sorting of individuals into neighborhoods and perception of neighborhood quality varies by individual-level characteristics (Mujahid et al., 2007). Individual-level covariates included in all models were age (centered at 55), gender, race/ethnicity, education level (as a continuous variable representing years of education based on mid-point of educational attainment categories), income level in six categories (including a missing category, since 7.2% of observations were missing income), and data source (MESA participant or Community Survey participant). Time was measured continuously as the number of years since 2000 (baseline).

2.4. Statistical methods

All observations of neighborhood quality from the MESA Neighborhood Study and Community Surveys 1–3 from participants who lived in census tracts included in the baseline MESA

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