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Change in neighborhood environments and depressive symptoms in New York City: The Multi-Ethnic Study of Atherosclerosis

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ABSTRACT

Physical and social features of neighborhoods, such as esthetic environments and social cohesion, change over time. The extent to which changes in neighborhood conditions are associated with changes in mental health outcomes has not been well-established. Using data from the MultiEthnic Study of Atherosclerosis, this study investigated the degree to which neighborhood social cohesion, stress, violence, safety and/or the esthetic environment changed between 2002 and 2007 in 103 New York City Census tracts and the associations of these changes with changes in depressive symptoms. Neighborhoods became less stressful, more socially cohesive, safer, and less violent. White, wealthy, highly educated individuals tended to live in neighborhoods with greater decreasing violence and stress and increasing social cohesion. Individuals living in neighborhoods with adverse changes were more likely to have increased CES-D scores, although due to limited sample size associations were imprecisely estimated ($P > 0.05$). Changes in specific features of the neighborhood environment may be associated with changes in level of depressive symptoms among residents.

1. Introduction

Neighborhood environments are not static. Features of neighborhoods may change in response to federal and local government initiatives, community action, and changes in neighborhood composition (Kennedy and Leonard, 2001). Positive changes to a neighborhood can come about through revitalization and reinvestment (Kennedy and Leonard, 2001). Other processes of neighborhood change, such as blight and post-industrial decline, can have adverse consequences (Radloff, 1977; Friedman et al., 1988; Mubayi et al., 2011). The process of gentrification, defined as the displacement of lower income residents of a neighborhood by higher income households, can have both positive and negative consequences, including the deconcentration of poverty, the expulsion of long-time residents, and increasing conflicts between old and new residents. All these processes can change the socioeconomic conditions and other physical and social characteristics of neighborhoods (Kennedy and Leonard, 2001), impacting both new and existing residents. In urban environments such as New York City, the issue of gentrification in particular has been widely studied by urban sociologists (Hackworth, 2002), although the health consequences for residents remain largely unexplored. There has been extensive improvement in economic conditions in New York City over the past ten years, with new development tied to the desires of the new, managerial classes at the expense of prior residents (Brash, 2011). These secular changes in the physical and social environment allow us to examine associations between changes in New York City neighborhoods and the health of stable, long-term residents.

While there is a substantial literature examining the associations between neighborhood environments and a wide range of health outcomes (Diez Roux, 2007; Diez Roux and Mair, 2010), the extent to which changes in neighborhood conditions relate to changes in health outcomes amongst long-term residents has been much less studied, in part due to limited data to allow characterization of

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changes in neighborhoods over time. A rapidly gentrifying neighborhood environment may lower neighborhood social cohesion (Uitermark et al., 2007), which in turn is linked to health outcomes such as depression and mortality (Kawachi and Kennedy, 1997; Mair et al., 2008). On the other hand, neighborhood gentrification may bring with it a reduction of violence and other deviant behaviors. It may also result in improvements in neighborhood resources available to all residents. Of the few studies that have investigated the health consequences of changing neighborhood conditions, most have examined changes in socioeconomic features (Van Wilsem et al., 2006) rather than changes in specific neighborhood features such as violence, the walking environment (Humpel et al., 2004), or physical aesthetic quality.

Recent years have seen a renewed interest in understanding the effects of neighborhood conditions on psychological distress in the form of depression and depressive symptoms (Silver et al., 2002), particularly in terms of how contextual characteristics of neighborhoods (e.g., percent of individuals living in poverty in the neighborhood) may be related to mental health outcomes above and beyond the compositional effects of individuals living in specific neighborhoods (e.g., the individual-level effect of living in poverty) (Mair et al., 2008). Evidence is accumulating that neighborhood stressors and social support are associated with depression (Mair et al., 2008). Both neighborhood stressors and social connections/support within a neighborhood may affect residents' vulnerability to stress and depressive symptoms (Kubzansky et al., 2005; Ross, 2000). A changing neighborhood environment may be associated with depression, as it may increase or decrease neighborhood stressors or change the social environment (e.g., social cohesion and social support).

This study uses data from the Multi-Ethnic Study of Atherosclerosis (MESA) to describe changes in neighborhood social cohesion, stress, violence, safety, and the aesthetic environment between 2002 and 2007 in 103 Census tracts in New York City and relate these changes to concomitant changes in depressive symptoms among residents. Two previous studies examined the associations of neighborhood environments and depressive symptoms in the Multi-Ethnic Study of Atherosclerosis (MESA) (Mair et al., 2009, 2010). They showed that baseline neighborhood aesthetic environment, violence, and social cohesion were cross-sectionally associated with baseline depressive symptoms, but that associations between baseline levels of neighborhood characteristics and change in depressive symptoms over time were weak (Mair et al., 2009). However, the longitudinal analyses did not investigate whether changes in neighborhood circumstances were related to changes in depressive symptoms. In the present study, we describe first the neighborhood changes in 103 New York City Census tracts over a 2.5–4 year period and the extent to which these changes were associated with neighborhood racial/ethnic and socioeconomic composition. We then examine whether any of the observed neighborhood changes were associated with change in depressive symptoms over the follow-up period. We hypothesized that individuals living in neighborhoods with increasing levels of social cohesion and safety, decreasing violence and stress, and improving aesthetic environments would have improved reports of depressive symptoms compared to those living in neighborhoods with decreasing social cohesion and safety, increasing violence and stress, and worsening aesthetic environments. Despite the fact that there is a growing literature examining the associations between neighborhood environmental characteristics and depression/depressive symptoms (Mair et al., 2008), we know of no published studies that have measured changes in specific features of neighborhood environments and their associations with depressive symptoms. Investigating the extent to which neighborhood environments change, and whether these changes are associated with changes in depressive symptoms, may help to strengthen causal models of environmental factors and mental illness as well as to suggest the potential effectiveness of a neighborhood-based intervention on reducing depression.

2. Methods

2.1. Study samples

This analysis relies on two data sources: (Kennedy and Leonard, 2001) Two of the four waves of the Multi Ethnic Study of Atherosclerosis (MESA) (Exam 1 and Exam 4) and (Radloff, 1977) Two MESA ancillary Community Surveys (Community Survey 1 and Community Survey 2), which measured the neighborhood environments in which study participants reside from a separate sample of local residents. Individual-level data on depressive symptoms and covariates came from MESA, a ten-year longitudinal study of men and women aged 45–84 who were free of clinically evident cardiovascular disease at enrollment (Bild et al., 2002). Participants were enrolled at six study field centers between August 2000 and July 2002. The sample for this analysis was restricted to MESA participants from New York City, as this is the only MESA location with available neighborhood environment data in both Community Survey 1 and Community Survey 2. The New York City MESA participants ($n=1102$ at Exam 1) were enrolled through several population-based approaches, including random digit dialing, lists of area residents, residents enrolled in a union health plan, and, to ensure enough elderly participants, Health Care Financing Administration (HCFA) lists (Diez Roux et al., 2005).The data used in this study came from the MESA baseline examination data (Exam 1) (collected during 2000–2002) and Exam 4 (2005–2007).

Data on neighborhood conditions came from Community Survey 1 (CS1) (data collected from January to August 2004) and Community Survey 2 (CS2) (data collected from August 2006 to February 2008). Community Survey respondents were used as informants of neighborhood conditions in Census tracts where MESA participants reside. Data were collected through phone surveys of separate samples of persons who resided in the same geographic areas as MESA participants. Community Survey 1 was conducted at three sites as part of the MESA Ancillary Study on Neighborhoods and Cardiovascular Risk, while CS2 was collected at two sites in conjunction with the MESA Stress ancillary study. Participants were selected through random-digit-dialing with medians of eight (CS1) and 20 (CS2) survey respondents per tract (range: 1–62 participants (CS1), 5–45 participants (CS2)). The participation rate in CS1 was 46.5% and in CS2 was 35.7% (Mujahid et al., 2007). Participants in CS1 and CS2 were more likely to be white, college graduates, and have annual incomes greater than $50,000 as compared to others in their Census tracts. A total of 103 Census tracts in New York City were included in both CS1 and CS2. All neighborhood variables were linked to MESA participants by Census tract, a method that has been used in previous studies (Mujahid et al., 2007; Raudenbush and Sampson, 1999).

MESA Exams 1 and 4 were linked to CS1 and CS2 respectively. 596 MESA participants lived in the 103 Census tracts included in both Community Surveys at Exams 1 and 4 of MESA, and 566 of these participants did not move between surveys. Inclusion criteria also included complete data on outcome measurements and key covariates at both Exams 1 and 4, leaving a final sample size of 548 MESA participants. These 548 participants did not significantly differ from the full sample of 1102 MESA New York City participants at Exam 1 in terms of age, gender, or race/ethnicity.

There were between one and 22 MESA participants living in a given Census tract (median 4 individuals per tract).

2.2. Measures

Depressive symptoms. Depressive symptoms were assessed for MESA participants at Exams 1 and 4 using the 20-item Center for Epidemiologic Studies Depression (CES-D) Scale, a widely-used scale with good validity and reliability (Radloff, 1977). Each scale item is scored from 0–3, with a higher score representing greater