



## Neighborhood age structure and cognitive function in a nationally-representative sample of older adults in the U.S.



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### ABSTRACT

Recent evidence suggests that living in a neighborhood with a greater percentage of older adults is associated with better individual health, including lower depression, better self-rated health, and a decreased risk of overall mortality. However, much of the work to date suffers from four limitations. First, none of the U.S.-based studies examine the association at the national level. Second, no studies have examined three important hypothesized mechanisms - neighborhood socioeconomic status and neighborhood social and physical characteristics - which are significantly correlated with both neighborhood age structure and health. Third, no U.S. study has longitudinally examined cognitive health trajectories. We build on this literature by examining nine years of nationally-representative data from the Health and Retirement Study (2002–2010) on men and women aged 51 and over linked with Census data to examine the relationship between the percentage of adults 65 and older in a neighborhood and individual cognitive health trajectories. Our results indicate that living in a neighborhood with a greater percentage of older adults is related to better individual cognition at baseline but we did not find any significant association with cognitive decline. We also explored potential mediators including neighborhood socioeconomic status, perceived neighborhood cohesion and perceived neighborhood physical disorder. We did not find evidence that neighborhood socioeconomic status explains this relationship; however, there is suggestive evidence that perceived cohesion and disorder may explain some of the association between age structure and cognition. Although more work is needed to identify the precise mechanisms, this work may suggest a potential contextual target for public health interventions to prevent cognitive impairment.

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### 1. Background

Nearly 15 percent of Americans over age 70 - approximately 3.8 million people - are currently living with dementia (Hurd et al., 2013). Short of a major medical breakthrough, the number of new dementia cases will only increase with time as the Baby Boomers age. Dementia is also one of the most costly diseases with total costs estimated between 159 and 215 billion dollars, and a projected increase of nearly 80% by 2040 (Hurd et al., 2013). Because individual interventions, in general, have not proven successful to date (Institute of Medicine (2008), interventions that target factors

in the social environment that may be linked to cognitive decline - and ultimately dementia - may provide new opportunities for public health-based interventions.

One potential social mechanism relates to characteristics of one's local geographic environment, with recent research suggesting that neighborhood factors are associated with physical and mental health outcomes, particularly at older ages (for a review see Yen et al., 2009). Neighborhood compositional and contextual factors covering such diverse domains as the economic environment, physical environment, demographics, perceived neighborhood characteristics (both positive and negative), and the social environment have been linked to a variety of health outcomes including mortality, disease prevalence, mental health, and health behaviors (Yen et al., 2009) and, more recently, cognition (Clarke et al., 2012, 2015; Kovalchik et al., 2015). The significance of the local environment for health may be particularly salient for older

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adults since they may have greater exposure to their neighborhoods due to limited physical mobility, driving restrictions, and potentially fewer work-related or other motives for frequent travel outside of their neighborhoods (Balfour and Kaplan, 2002; Cagney et al., 2005).

One neighborhood factor that has been largely ignored in the literature is that of neighborhood age structure, although age and age composition are ready markers for any number of social and institutional settings in which we engage. The handful of studies that have examined the age structure of neighborhoods – typically measured as the percent of older adults – are provocative and suggest that there may in fact be protective effects for older adults living in neighborhoods with a larger percentage of older adults (Browning et al., 2006; Clarke et al., 2012; Hybels et al., 2006; Kubzansky et al., 2005; Subramanian et al., 2006, 2008; Vogelsang and Raymo, 2014).

### 1.1. Potential mechanisms linking neighborhood age structure and health

Why should neighborhoods with a greater percentage of older adults be linked to better health? Theoretically, there are several possible explanations, including local socioeconomic conditions, spatial features of neighborhoods and services, and community structure and social capital (Cagney, 2006). Differences in the socioeconomic conditions in neighborhoods with more as compared to fewer older adults, for instance, could explain differences in neighborhood age structure and health, particularly if neighborhoods with a greater percentage of older adults are more advantaged. There is already a large body of work suggesting that neighborhood socioeconomic status (NSES) is linked to a variety of health outcomes, including cognition (Al Hazzouri et al., 2011; Basta et al., 2008; Clarke et al., 2012, 2015; Shih et al., 2011; Wee et al., 2012; Wu et al., 2015). In addition, there is some evidence that older adults may live in areas with better NSES. Poverty, for instance, is negatively correlated and affluence positively correlated with the percent of adults 65 and over in the neighborhood (Cagney, 2006). This suggests that socioeconomic factors may be an important mechanism explaining the relationship between neighborhood age structure and health. The age structure of neighborhoods may also affect the local availability of health services and facilities (e.g. urgent care and doctors' offices) and access to social services directly targeting older adults (Glass and Balfour, 2003). While some of this access may be an indirect consequence of the socioeconomic status of neighborhoods, some services may be more directly related to the age structure of neighborhoods. Policymakers, private companies, or nonprofit organizations may locate key services based on the potential demand for services which are often linked to demographic characteristics of individuals in a neighborhood, such as age.

The safety and physical characteristics of neighborhoods are also related to health (Cohen et al., 2003; Kim, 2010; Krause, 1996; Lawton and Nahemow, 1980; Wu et al., 2015). They also may well be associated with the age structure of neighborhoods such as the level of crime, noise pollution, graffiti and other physical aspects of neighborhoods. Finally, social factors such as social capital and access to social connections may be different for older adults residing in neighborhoods with more seniors and this may in turn influence health. It is well established that social contacts at the individual level are linked to better health, especially for older adults (Berkman et al., 2000; House et al., 1988; Seeman et al., 2010) and that social cohesion in particular is linked to better mental health (Stafford et al., 2011). A greater neighborhood presence of older adults could also influence health through social network formation, information sharing, neighborhood continuity and

stability, and increased density of local networks and levels of collective efficacy (i.e., the ability of the community to come together for the common good) (Cagney, 2006). Older adults living alone may especially benefit from the availability of local social capital (Thompson and Krause, 1998). Older adults residing in neighborhoods with fewer other adults in their age group may feel isolated, with the neighborhood unable to promote the same level of social engagement. There is already some evidence that the well-established “widowhood effect” on mortality is lessened for individuals who live among a high concentration of widowed adults (Subramanian et al., 2008) and the authors speculate that this is because neighborhood structural contexts provide opportunities for interacting with others. This may suggest that having local contact with others of a similar age and in similar circumstances could be beneficial for the health of older adults. This may be particularly beneficial to cognitive health as social network access and integration are associated with a lower incidence of dementia (Fratiglioni et al., 2000; Seeman et al., 2001, 2010).

### 1.2. Prior research

To our knowledge, only a handful of studies have examined the relationship between neighborhood age structure and health, and these studies primarily find that a higher percent of older adults is associated with better health. For instance, a greater percent of adults 65 and over in one's census tract (i.e., a statistical subdivision of a county in the U.S., generally comprised of a population between 1200 and 8000 people) is cross-sectionally associated with better self-rated health for a sample of men and women 65 and older who lived in New Haven, Connecticut (Subramanian et al., 2006), is protective against mortality for residents of Chicago ages 60 and over during the 1995 heat wave (Browning et al., 2006), and is cross-sectionally associated with better cognitive function in a Chicago study of adults 50 and over, but only for those individuals with moderate tenure in the neighborhood. It is negatively correlated for those with very long term residence (Clarke et al., 2012). While there is some evidence that it is also protective of mental health among men and women aged 65 years or older (Kubzansky et al., 2005), Hybels et al. (2006) find no association between age structure and depressive symptoms among that same age range. Only one study finds an adverse association of living in communities with more older adults – for adults 60 and over in Japan, living among a greater percentage of older adults was related to more difficulties with activities of daily living compare to living in areas with fewer older adults (Vogelsang and Raymo, 2014).

Three of these papers examine mechanisms linking neighborhood age structure to health. Two of them focus specifically on the characteristics of the local service environment. Kubzansky et al. (2005) and Subramanian et al. (2006) both used detailed information from the local *Yellow Pages* to assess a variety of services that could theoretically affect health outcomes, including health services (e.g., hospitals, audiologists), financial services (e.g., banks), social organizations (e.g., churches), recreational facilities, groceries and food outlets, and places of social interaction (e.g., beauty parlors, cafes), and potentially “undesirable” amenities including liquor outlets and pawnbrokers. None of these measures had predictive power for explaining the relationship between age structure and individual-level depressive symptoms or self-rated health and they were not related to these outcomes in individual models. While these papers also examine aspects of neighborhood income and socioeconomic status and its relationship to health, they do not examine the neighborhood factors in the same models as age structure thus limiting our ability to examine the mediating effects of these factors for the relationship between age structure and cognition. Clarke et al. (2012) does examine neighborhood age

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