



Healthy urban living: Residential environment and health of older adults in Shanghai



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ABSTRACT

A healthy residential environment, especially for older adults, has emerged as an important issue on political and planning agenda in China. This paper aims to investigate the direct and indirect impact of residential environment on the health of older adults in Shanghai, taking into account health-related behaviours, subjective well-being and socio-demographic factors in one comprehensive conceptual model. Our results show that the residential environment is associated with older adults' health directly, and also indirectly through a series of significant behavioural (physical and social activities) and perceptual (subjective well-being) factors. After combining the direct and indirect association, the results show that good housing and neighbourhood quality and a safe social environment contribute to better subjective, physical and mental health conditions of older adults. In addition, access to cultural facilities is positively related to older adults' mental and physical health and subjective well-being, while a higher proportion of older adults in a neighbourhood appears to promote physical and social activities but not health.

1. Introduction

Despite economic prosperity achieved since market-oriented reforms from 1970s, Chinese cities are facing increasing social and environmental problems (e.g. socio-economic inequality and environmental deterioration) (Bian, 2002; He et al., 2012). To address the environmental problems, shaping a healthy and liveable urban environment has been placed high on the agenda of China's central government (National New-Type Urbanization Plan 2014–2020, 2014). Rapid population ageing is also becoming a serious social challenge for Chinese megacities. Older adults' health is especially vulnerable to the negative impacts of residential environment (Dujardin et al., 2014). This research therefore in particular focuses on the impact of residential environment on the health of older adults.

Research in public health, urban planning and environmental psychology has shown that health, in both its physical and mental dimensions, is associated with various facets of the physical and social environment (Barahmand et al., 2013; Cagney, 2006; de Vries et al., 2003; Ellen et al., 2001; Renalds et al., 2010; Ross and Mirowsky, 2008; Thomas et al., 2007). For instance, high housing quality, green spaces, good accessibility to cultural and leisure facilities, social cohesion and safety are positively related to a person's physical and

mental health. Studies also suggest that health-related behaviours such as physical activities (e.g. walking, exercise and leisure) and social activities are important intermediate factors in the effects of the residential environment on health (Carlson et al., 2012; Frank and Engelke, 2001; Soltani and Hoseini, 2014). Physical spaces and facilities and the social environment provide people with opportunities to participate in physical activities and socialise with each other, which in turn affect their physical and mental health. Other perceptual factors such as subjective well-being (SWB) (Diener and Ryan, 2009) and individual socio-demographic factors are also associated with the residential environment and health.

However, empirical studies so far have focused primarily on partial and discipline-specific issues such as particular kinds of residential environment, health conditions, activities, perceptions and socio-demographic factors. Hardly any empirical effort has been made to integrate these insights into a more comprehensive understanding of the relationships between residential environment and health (Carlson et al., 2012; Northridge et al., 2003). Moreover, most studies to date have only investigated the direct association between residential environment, health and other relevant factors. There is scant empirical evidence on the indirect relationships between residential environmental and health variables (Franzini et al., 2005; Kruger et al., 2007).

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This makes it difficult to fully understand the indirect and total effects of the residential environment on health (Carlson et al., 2012; Renalds et al., 2010).

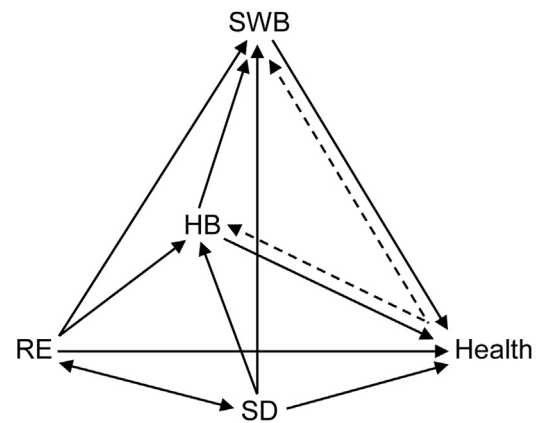
The limitations mentioned above also apply to the studies on environment-health relationships for older adults. As age advances, older adults are more likely to experience health-related changes and challenges, such as declining immunity, muscle strength, mobility and cognition, and increasing incidence of chronic illness (Day, 2008). These functional as well as mental declines make older adults more sensitive and susceptible to the negative characteristics of the residential environment than other age groups (Dujardin et al., 2014). Studies have shown that the health of older adults is particularly associated with their physical and social environment, such as housing quality, accessibility, neighbourhood socio-economic and age composition, safety and social supports, in addition to health-related behaviours and personal attributes (Clarke and Nieuwenhuijsen, 2009; Kerr et al., 2012; Lehning et al., 2014; Roh et al., 2011; Sugiyama and Thompson, 2007). However, the complex direct and indirect relationships between the residential environment and health of older adults have rarely been studied in an integrative way.

This paper therefore aims to investigate the direct and indirect association between residential environment and the health of older adults by applying structural equation modelling, which takes into account health-related behaviours, subjective well-being and socio-demographic factors. Shanghai, one of the rapidly ageing megacities in China, is selected as our study area. In 2015, the ageing population in Shanghai was 4.4 million (accounted for 30.2% of the total population), and this number is expected to reach 5 million by 2018 (Shanghai Government, 2016). This research proposes a comprehensive conceptual model to understand the relationships between residential environment and health. Moreover, the empirical findings will provide valuable implications for policies and practices seeking to promote healthy aging in cities.

2. Theoretical framework

The concepts of both health and the residential environment are rather broad and may have various meanings for different people. The health of older adults is multifaceted and covers several inter-correlated elements such as diagnosed chronic diseases (e.g. arthritis, diabetes and depression), symptoms (e.g. pain and discomfort), functional capacity (e.g. mobility and cognition) and mortality risk. These elements are usually separated into two interlinked categories: physical health and mental health, which reflect a person's somatic and psychological conditions respectively (Barahmand et al., 2013; Yen et al., 2009). Meanwhile, health not only involves these objective health conditions, but also the individuals' perception and evaluation of their own health status (Smith et al., 2002). The residential environment of older adults refers to the physical and social neighbourhood characteristics that particularly affect older people's lives. The physical characteristics consist of the interior housing qualities and exterior neighbourhood qualities (e.g. street conditions, walkability and amenities), and the accessibility of essential facilities and services outside the neighbourhood (e.g. medical, leisure and shopping facilities) (Clarke and Nieuwenhuijsen, 2009; Lehning et al., 2014). The social characteristics comprise the socio-demographic attributes of a neighbourhood (e.g. socio-economic, racial, ethnic and age compositions) and interpersonal relationships (e.g. social cohesion, trust, safety, networks and social support) (Norstrand et al., 2012; Seeman and Crimmins, 2001).

By integrating conceptual ideas with empirical evidence from other studies (Ellen et al., 2001; Frank and Engelke, 2001; Franzini et al., 2005; Hill and Maimon, 2013; Kruger et al., 2007; Seeman and Crimmins, 2001; Villanueva et al., 2013), we come up with a comprehensive conceptual model specifying the direct as well as the indirect relationships between the residential environment and health



Note: HB = Health-related behaviours, RE = Residential environment, SD = Socio-demographics, SWB = Subjective well-being.

Fig. 1. Conceptual model for the direct and indirect association between residential environment and health.

conditions of older adults (Fig. 1). The direct effects of the residential environment (RE) on health (the arrow from RE to Health in Fig. 1) are widely acknowledged. Various physical and social characteristics of the residential environment can function as resources or stressors for an older person's health (Clarke and Nieuwenhuijsen, 2009; Ellen et al., 2001; Lehning et al., 2014). Physical resources include good quality housing, health care facilities and green spaces, which have direct positive effects on older adults' health (Yeo and Heshmati, 2014). By contrast, physical stressors such as air pollution, noise, poor street lighting, heavy traffic and uneven pedestrian paths can influence older adults' health negatively (Day, 2008). Social resources include social networks, trust and support. These resources can provide older adults with physical assistance (e.g. while encountering emergent health problems), health-related information, and financial and emotional support, and hence contribute to a better health outcome (Norstrand et al., 2012). Conversely, social stressors such as crime, violence and unsafety may negatively affect mental and physical health by exacerbating hypertension and other stress-related disorders, and by weakening the immune system and increasing vulnerability to disease and disability (Ellen et al., 2001; Roh et al., 2011).

The residential environment can also affect health indirectly. The intermediate role of health-related behaviours (HB), including physical and social activities, has received increasing attention (the arrows from RE to HB to Health in Fig. 1) (Clarke and Nieuwenhuijsen, 2009; Frank and Engelke, 2001; Seeman and Crimmins, 2001; Villanueva et al., 2013). Physical activities such as walking, cycling, exercise, sports and some leisure activities can exert a direct beneficial effect on older adults' physical and mental health (Kerr et al., 2012). At the same time, these activities are inevitably influenced by the physical and social environment. The availability, quality and accessibility of relevant facilities (e.g. sports and recreational centres), infrastructures (e.g. walkways) and spaces (e.g. parks and plazas), and the safety conditions of the residential environment can directly influence the intensity, duration and frequency of physical activities, and hence indirectly affect health (Frank and Engelke, 2001; Villanueva et al., 2013). A study in the UK, for example, showed that older adults who live in an environment that supports physical activity tend to engage in more of the outdoor activities that lead to higher probability of being in better health (Sugiyama and Thompson, 2007). By means of social activities (e.g. meeting, chatting and socialising), the residential environment also indirectly affects older adults' mental and physical health (Clarke and Nieuwenhuijsen, 2009). Specifically, the physical environment may facilitate (e.g. good accessibility, high street connectivity) or discourage (e.g. long distance) social interaction (Yen et al., 2009). The social environment, such as the compositional (proportion of older adults,

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