



Residential built environment and walking activity: Empirical evidence of Jane Jacobs' urban vitality



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ABSTRACT

This study intends to empirically verify Jacobs' urban vitality theory, which was based on the observations of her New York City neighborhood in the mid-20th century. To examine the relationship between the residential built environment and walking activity, we used telephone survey data consisting of 1823 valid samples from across Seoul, a city characterized by a high population density and a well-established public transportation system. Respondents were asked questions about their residential location, their demographic and socioeconomic characteristics, and their walking activities. This study then used geographic information systems to measure objective indicators of built environment variables within 500-meter buffer areas based on the home addresses of the respondents. Then, this study constructed multilevel regression models with walking activity as the dependent variable. Our results indicated that walking activity is associated with Jacobs' six conditions for urban vitality, including land use mix, density, block size, building age, accessibility, and border vacuums.

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Introduction

The essence of walking activity is more than a means of transportation. It also includes psychosocial elements, such as social interaction, health, and happiness (Morris and Zisman, 1962). There has been a notable increase in research exploring the relationship between the residential physical environment and walking activity (Frank et al., 2006; Forsyth et al., 2007, 2008; Lin and Moudon, 2010; Boarnet et al., 2011; Park et al., 2013). Some of these studies were spurred by an interest in whether changes to the physical environment can drastically affect the increasing levels of obesity and chronic diseases, which are attributed in part to more sedentary lifestyles (Papas et al., 2007; Durand et al., 2011; Sallis et al., 2012). One major cause of the current lack of physical activity is an excessive dependence on vehicles for daily transportation. Since vehicle use does not promote physical activity, current research in urban planning, urban design, sports medicine, and public health has attempted to identify how urban physical environments can reduce people's dependence on vehicles.

Among relatively recent studies, Saelens and Handy (2008) suggested that the indicators to identify the relationship between walking activity and the physical environment must be measured at a micro-level scale in order to assess the design-oriented characteristics of the urban form that most influence walking. The necessity of such research at this scale is also seen in Jane Jacobs' writing, particularly in her 1961 book *The Death and Life of Great American Cities*. Jacobs'

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examination of daily street life in New York City allowed her to develop theories on the impact of the design-oriented physical environment on walking activity. The possibility that Jacobs' theories could be categorized into various measurement indicators is found in [Putnam and Quinn \(2007\)](#), who advocated that Jacobs' concepts should be adapted to urban physical activities. In addition, Jacobs' observations provide more perspectives on urban design, especially in big cities, than other planning paradigms, such as New Urbanism, transit oriented development (TOD), and smart growth. Jacobs emphasized four necessary conditions for a vibrant urban environment. These are land use mix, concentration, block size, and building age. Jacobs also included two additional conditions, accessibility and lack of border vacuums, that she saw as important, but secondary to the initial four conditions ([Sung et al., 2013, 2015](#)). Researchers tested some of Jacobs' urban vitality theories related to block size, accessibility to urban parks, and street connectivity, but the conclusions drawn were not clear-cut enough to be generalized ([Koohsari et al., 2013; Saelens and Handy, 2008](#)). Furthermore, Jacobs' other theories relating to the age and condition of buildings and to border vacuums have still not been fully investigated ([Grant, 2010; King, 2013; Sung et al., 2013](#)).

Recently, her theories have been empirically tested at the street level ([Sung et al., 2013](#)) and at the district level ([Sung et al., 2015](#)). These studies verified that Jacobs' urban design theory, based on her observations of mid-20th century large American cities could be operationalized in the city of Seoul in the 21st century. However, her urban design theory has not been fully investigated at the neighborhood level. Our research question posits that the empirical operationalization of Jacobs' urban design theory can also be connected to walking as a physical activity, closely associated with the residential built environment. In this regard, this study empirically identifies the relationship between the walking activity of a population and the built environment of a residential neighborhood.

Literature review on Jane Jacobs' urban vitality

Physical environments and walking activity

Many systematic literature reviews have tried to summarize and generalize the association between the physical environment, physical activity and public health ([Owen et al., 2004; Bauman and Bull, 2007; Durand et al., 2011; McCormack and Shiell, 2011; Soltani and Hoseini, 2014](#)). Some studies have focused on specific aspects, such as walking ([Shay et al., 2003; Saelens and Handy, 2008](#)); travel behavior, such as the choice of walking as a mode of travel ([Ewing and Cervero, 2010](#)); obesity ([Papas et al., 2007](#)); and physical activity ([Gebel et al., 2007](#)).

A built environment that consists of high-density and mixed land uses, as well as pedestrian-friendly street networks, can encourage walking and other physical activities, thereby reducing rates of obesity and cardiovascular disease ([Lovasi et al., 2012; Sallis et al., 2012](#)). In addition, recent empirical studies have indicated that there is a clearer association between physical environment and walking activity with regard to utilitarian travel than to leisure travel ([Wilson et al., 2012; Wasfi et al., 2013](#)). [Ewing and Cervero \(2010\)](#) and [Durand et al. \(2011\)](#) also provided convincing evidence of a significant relationship between walking activity and the physical environment in terms of density, transport accessibility, distance to urban destinations, and land use mix. However, less clear associations were found for street connectivity, parks and open spaces, and public safety ([Saelens and Handy, 2008; Koohsari et al., 2013; Witten et al., 2008](#)). [Saelens and Handy \(2008\)](#) noted that access to street network patterns and to parks had no clear effect on walking activity. Recent studies, such as [Kaczynski et al. \(2014\)](#) and [Carlson et al. \(2015\)](#), provided evidence that street connectivity is positively associated with physical activity. [Koohsari et al. \(2014\)](#) demonstrated that street connectivity works to encourage walking for transport. [Yoon et al. \(2014\)](#) found that, in Seoul, pedestrian activity on streets can be differentiated depending on the location and the type of park. Similarly, [Koohsari et al. \(2015\)](#) found that the amount of physical activity might be influenced by the different aspects of public open space such as proximity, size, and quality. In addition, measuring the physical environment remains an important issue in the empirical study of the urban form ([Lin and Moudon, 2010](#)). Thus, these conclusions suggest that additional studies on built environmental elements at the micro-level, as well as on specific facility accessibility, are necessary.

Jane Jacobs' conditions for urban vitality

In *The Death and Life of Great American Cities*, [Jane Jacobs \(1961, 1993\)](#) argued that "life" in cities consists of pedestrian activity on city streets. She observed that expressway construction and large-scale urban redevelopment projects led to less walking activity, and therefore killed urban vitality. Jacobs emphasized the importance of walking activities to maintain the "vitality" of cities. These observations greatly influenced the advocacy planning movement, as well as the theories and practices of New Urbanism ([Grant, 2002; Laurence, 2006; Klemek, 2007; Wendt, 2009; Duany et al., 2010](#)). Jacobs argued that in order to maintain urban vitality there were four primary, and two secondary, conditions for urban diversity that must be met. Jacobs' theories on the diversity of the urban form were in direct opposition to the typical Euclidean zoning practices ([Sternberg, 2000; Wickersham, 2001](#)) that were employed in the United States during Jacobs' period of observation.

The first condition for diversity is a mix of land uses. Land use mix refers to the practice of allowing two or more types of land use, and two or more main purposes of land, within a district. Jacobs claimed that this land use mix must be maintained at the street level, at the district level, and at the city level. Land use mix is important at the district level to maintain an

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