



# The influence of residential dissonance on physical activity and walking: evidence from the Montgomery County, MD, and Twin Cities, MN, areas



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## ABSTRACT

This study investigates to what extent a mismatch between residential preferences and actual residential locations is associated with residents' physical activity and walking. The residents of Montgomery County, MD, and Twin Cities, MN, were classified into four residential subgroups, and their walking and physical activity outcomes were compared. The results showed that, for transport activity and walking outcomes, participants living in a urban location and preferring a urban environment were more likely to be active than those who lived in a suburban location and preferred a suburban environment. In a highly dense region, the influence of preferences might be overridden by the characteristics of neighborhood locations. With respect to recreation activity, no significant associations were found regarding neighborhood locations or preference for neighborhood environment.

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## 1. Introduction

Urban form is believed to influence individuals' travel patterns by affecting destination accessibility (Ewing and Cervero, 2010). Accordingly, many studies have examined the associations between the built environment of a neighborhood and the travel patterns of residents. A common criticism of travel behaviors and environmental studies to date has been their failure to account fully for neighborhood self-selection (Saelens and Handy, 2008; Cao, 2010). Neighborhood self-selection arises when those who prefer to travel by car select auto-oriented areas for their residence, whereas those who are willing to engage in other transport activity select pedestrian-friendly or transit-friendly environments. If the association between the built environment and travel behaviors is mainly a result of the neighborhood self-selection process, individuals' travel behaviors would not be expected to depend on the environment in which they live but, rather, would depend on the attributes that affect residential preferences (Cao et al., 2009). However, previous studies, even after controlling for neighborhood self-selection, have commonly reported that the built environment is significantly associated with travel behaviors (Ewing and Cervero, 2010). Thus, the influence of the built environment on travel behavior is often considered to reflect both the

influence of the built environment itself and of neighborhood self-selection (Cao et al., 2009).

Although several studies have attempted to explore the association between neighborhood self-selection and recreation activity (Xing et al., 2010; Hino et al., 2011; Van Dyck et al., 2011), previous literature has focused mainly on individuals' transport activity as outcomes in examining the association between neighborhood self-selection and travel behavior. One reason for this focus is that a causal relationship between built environment and recreation activity is not as clear as the relationship between built environment and transport activity. Some studies have suggested that a modest trade-off between ease of transport and access to recreation may occur when individuals are selecting a residential neighborhood (Forsyth et al., 2007, 2008; Oakes et al., 2007). For instance, individuals who like to walk for transport may choose neighborhoods with dense and well-connected street patterns to reduce distances to destinations, but these patterns may decrease the ability to walk for leisure or recreational purposes.

In this study, we examined the extent of agreement between preferences and actual residential locations to define groups of residents who are mismatched (dissonant) and well matched (consonant) with their neighborhoods. We then compared their transport activity, recreation activity, and walking behavior to test two hypotheses: (1) residents who live proximate to the core of the city but seek to live in the suburbs engage in less active transport activities than those who prefer living in the core of the city and actually live there; and (2) residents who prefer living in the city and

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actually live in the city engage in less active recreation activities than those who live in the suburbs. By examining these hypotheses, we attempted to address the empirical debate regarding whether dissonant residents are more or less active than consonant residents in downtown/suburban neighborhoods. Our aim is to contribute to a better understanding of the role of self-selection in the environment-mobility behavior relationship.

## 2. Background

Many scholars have speculated that a possible overestimation or underestimation of the causal influence of urban form on travel behavior has resulted from a failure to account properly for neighborhood self-selection (Saelens and Handy, 2008; Cao, 2010). If the neighborhood self-selection process is the only complete mechanism to explain travel behavior, people would be expected to select neighborhoods that physically support their preferred type of activity without exception, and the characteristics of these neighborhoods would be expected to promote their preferred type of activity. However, there is little evidence that these assumptions hold in reality (Levine, 2005). A neighborhood self-selection process involves many factors other than neighborhood preferences. Lack of development (Talen, 2001), monetary resources (Lu, 1998), and information, as well as dynamics in the course of an individual's life (Schwanen and Mokhtarian, 2004), can lead to considerable mismatch between preferences and actual residential choices. The literature indicates that at least one quarter of U.S. residents live in neighborhoods that they do not prefer in terms of the residential environment. A change of preference over time also generates dissonance. Having a child is an especially important factor that promotes a transition from an urban to a suburban preference (Talen, 2001). Furthermore, environmental characteristics that support walking represent only one aspect of the built environment. In selecting a residential neighborhood, individuals consider other attributes, such as school quality or tax rates, that are believed to be less important to understanding walking behavior. Therefore, how one defines a preference toward attributes of neighborhoods and whether one chooses to live in a preferred type of neighborhood may be more important than whether one prefers pedestrian or auto-oriented neighborhoods.

As a considerable level of mismatch between preferences and choice is likely to exist, it seems reasonable to expect that those who prefer urban neighborhoods but live in suburban neighborhoods act differently from those who prefer suburban neighborhoods (Cao, 2010). A handful of studies have examined the relative influence of neighborhood mismatch and neighborhood locations on travel behaviors (Schwanen and Mokhtarian, 2005a, 2005b; Levine, 2005; Frank et al., 2007; Naess, 2009; De Vos et al., 2012; Kamruzzaman et al., 2013). Using data from the San Francisco Bay Area, Schwanen and Mokhtarian (2005a, b) conducted two studies of neighborhood-type dissonance in which they introduced the concept of residential match and mismatch. They defined a residential matching group as true urbanites who preferred urban areas and lived in urban areas or of true suburbanites who preferred suburban areas and lived there. In contrast, they defined a mismatched group as dissonant urban dwellers who preferred suburban areas but lived in urban areas or as a group of dissonant suburban dwellers who preferred urban areas but lived in suburban areas. Regarding commute mode choice in suburban areas, the researchers found that the influence of residential location prevailed over that of the travelers' preferences, while the contributions of preferences and residential locations were relatively balanced in urban areas (Schwanen and Mokhtarian, 2005a). Regarding weekly distance traveled by private vehicle, they found that residential location had a stronger influence than preference

toward the environment in general (Schwanen and Mokhtarian, 2005b). In both studies, the researchers found that dissonant urban residents were more likely to commute by private vehicle than consonant urbanites but less likely to do so as true suburbanites.

In a similar study, Frank et al. (2007) classified participants into four groups based on their preferences and their neighborhood's walkability in order to compare the mean percentage walked and the mean vehicle miles driven within each of the four groups. Their findings indicate that, although access to walkable environments may result in increased walking and reduced vehicle use, neighborhood dissonance largely weakens those associations regardless of neighborhood location. Based on an analysis of data collected from qualitative interviews conducted in the metropolitan areas of Copenhagen, Naess (2009) reported a significant relationship between residential location and extent of travel, regardless of travel-related residential preferences. Based on recent data collected in Flanders, Belgium, De Vos et al. (2012), in contrast, showed that this relationship might differ by travel mode. Specifically, they reported that the built environment may have a considerable influence on car use, while walking, bicycling, and public transit use are mainly determined by preferences. They pointed out that rural dissonants appear more capable of realizing their preferred travel behavior than urban dissonants, as rural neighborhoods are only slightly constrained by physical conditions. However, the fact that the physical condition of rural neighborhoods in Belgium may differ from those in the United States should be considered when reviewing these results.

While many previous studies have emphasized the associations between residential preferences and transport activity, few have examined the associations between recreation activity and neighborhood preferences. Among the few, Forysth et al. (2007, 2008) and Oakes et al. (2007) reported that the characteristics of the built environment promoting transport activity may be negatively associated with recreation walking or activity and, thus, that socially similar people perform the same total amount of walking and physical activity, regardless of the characteristics of the built environment.

In this study, we examined the influence of residential dissonance on transport activity, recreation activity, and walking behaviors. We categorized preferences concerning environmental characteristics as reflecting either a pro-urban or pro-suburban attitude and hypothesized the following: (1) If individuals' personal preferences toward the urban (or suburban) environment are strongly associated with their behavior, those with a pro-urban (or pro-suburban) attitude are more likely to engage in active transport (or recreation) activity than those with a pro-suburban (or pro-urban) attitude, regardless of their actual residential locations; and (2) if neighborhood locations are strongly associated with behavioral outcomes, those who live in urban (or suburban) locations will engage in more active transport (or recreation) activity than those who live in suburban (or urban) locations, regardless of their preferences toward environmental characteristics. To test these hypotheses, and thereby fill the study gap in the empirical evidence for the existence of associations between recreation activity and a pro-urban attitude, we examined whether personal preferences toward the urban environment and residential locations affect recreation activity.

## 3. Methods

### 3.1. Study areas and study participants

Data were collected from two related projects that assessed the relationship between residential environments and behaviors in two U.S. areas: the northern sector of the Minneapolis–St Paul,

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