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Can transit-oriented developments help achieve the recommended weekly level of physical activity?

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ABSTRACT

Modern lifestyles tend to promote sedentary living, putting urban and suburban populations at increased risks for onset of chronic conditions. The promotion of non-leisure physical activity has the potential to provide substantial health benefits. This study aims to describe travel behavior of residents in Transit-oriented developments (TODs) and its impacts on levels of physical activity through utilitarian trips (i.e., routine trips to school, work and grocery shopping). Data is drawn from a survey of residents living in seven geographically-dispersed North American TODs in 2013. Approximately 20% of survey respondents achieved weekly recommended levels of physical activity through their utilitarian trips. Trip frequency was an important factor in achieving recommended weekly physical activity levels; individuals with higher levels of public transport use were more likely to achieved recommended levels of physical activity. Telecommuting might be particularly detrimental to utilitarian physical activity and could reduce public health benefits of TODs, walking friendliness of the residential location had a positive effect on levels of physical activity. Affordability of public transport and good weather contingencies were factors associated with higher in the levels of physical activity. The preference for owning an automobile to do the things that one likes remained a widely held sentiment of survey respondents, decreasing levels of physical activity by 39%. To promote active lifestyles in TODs, governments should invest in infrastructure necessary to facilitate non-car trips especially during bad weather conditions.

1. Introduction

Physical inactivity is growing in North America and active leisure times are decreasing (Transportation Research Board, 2005). Many factors and societal patterns explain this trend including the growth of white-collar jobs, the widespread use of automobiles as a primary mode of travel, and urban sprawl (Brownson and Boehmer, 2004; Ewing et al., 2003). Physical inactivity leads to health problems, straining health care systems and costing tax payers (Janssen, 2012).

In order to overcome this costly social problem, the idea of promoting physical activity (PA), such as walking, through non-leisure activity has flourished in the last couple of decades. Integrating additional walking or cycling time into one's daily routine, such as during commuting, seems, for many, a better public health strategy than creating programs that encourage people to be active during their leisure time. The reason is two-fold. First, walking is the cheapest and the most widely available form of PA (Lee and Buchner, 2008). Second, programs altering people's daily routine have been shown to be less effective in promoting PA than strategies that can be integrated into daily routines (Owen, 1996; Sallis et al., 1998; World Health Organization, 2002). Efforts to augment PA in everyday life have led to the

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development of various strategies aimed at modifying the built environment to be more conducive to active transportation. To this end, transit-oriented developments (TODs) aim to increase density and walkable destinations around mass transit stations to reduce car-dependence and encourage walking, cycling, and transit usage (Killingsworth et al., 2003). The contribution of TODs to PA, however, remains relatively unexplored.

This study aims to describe travel behavior of residents in transit-oriented developments (TODs) and its impacts on levels of physical activity through utilitarian trips (i.e., routine trips to school, work and grocery shopping). Using data from a comparative travel behaviour survey conducted in seven North American TODs and in their vicinities, a log-linear regression model is developed to further define the relationship between PA and travel behaviours.

2. Background

Four types of variables are linked to physical activity in the literature: (1) individual characteristics (genetic and socio-demographics), (2) individual preferences (time allocation and lifestyle preferences), (3) the social environment (social values, norms and preferences in term of PA), and (4) the built environment (Handy, 2005). Our focus in this study is mainly on the effect of built environment characteristics after controlling for the other types of factors mentioned earlier. Fig. 1 is a conceptual model summarizing the discussed relations and their link to travel behavior.

Individuals using public transport or walking for their commute are more likely to meet the recommended daily level of physical activity (RPA) (Besser and Dannenberg, 2005; MacDonald et al., 2010; Morency et al., 2011; Renne, 2005; Stokes et al., , 2008; Wasfi et al., 2013; Wener and Evans, 2007). This suggests that the built environment and transportation systems are factors that can facilitate or hinder PA and active lifestyles by increasing walking, cycling and transit usage. To illustrate, some studies have shown that residents of more walkable and transit-friendly places report higher levels of physical fitness and lower levels of obesity than residents of more automobile-oriented communities (Frank et al., 2004; Handy et al., 2002; MacDonald et al., 2010; Ming Wen and Rissel, 2008; Rundle et al., 2007).

For more than a decade now, urban planners have focused on this idea that land use and design policies can be used to increase public transport use as well as walking and bicycling (Handy, 1996). The new urbanism movement and the concept of TOD emerged from these efforts. TOD is defined as the area within 10 min walking around a public transport station and has the following characteristics: compact, mixed use, and connected to the public transport system through urban design (Renne, 2009). TOD designers aim at creating physical environments more conducive to active transportation (Killingsworth et al., 2003). In fact, TODs are specifically implemented to make walking and cycling more feasible, safe and attractive options, as well as to promote the use of public transport. TOD designers provide nearby walkable destinations like cafés and shops to encourage local walking and cycling trips, as opposed to long-distance car trips (Renne, 2009). Also the presence of TOD near a transit station makes it more easily feasible for residents to use transit to replace some of the daily trips that require car usage due to distances, such as work for example. Although, the use of public transit in TOD is currently under debate (Chatman, 2013), yet there has been several efforts to quantify the impacts of using transit on physical activity.

Three American studies have found that public transport users are more physically active than automobile users (Besser and Dannenberg, 2005; Lachapelle and Frank, 2009; Wener and Evans, 2007). Drawing on the US National Household Travel Survey to assess the relationship between walking and public transport use at the national level, Besser and Dannenberg (2005) found that about one third of public transport users achieve at least 30 min of PA per day by walking to and from transit stations. Lachapelle and Frank (2009) found that public transport users were more likely to meet the daily RPA than drivers in their survey research in Atlanta. Wener and Evans (2007) found that the average New York City train commuter walked about 9,500 steps per day, just slightly below the recommended 10,000 steps per day (Tudor-Locke and Bassett, 2004) and 30% more steps than the average car commuter. A recent Canadian study that was able to distinguish trip purpose and type of public transport trip taken showed that approximately 11% of commuters achieved the 30 min of RPA just through walking to and from public transport stops when commuting to work or school. In addition, they identified that commuter train users are more likely to achieve public health recommendations than any other transit users (Wasfi et al., 2013).

A key methodological limitation of previous research in this area is the selection bias associated with confounding effects of residential choice, preferences and transportation decisions in cross-sectional designs (e.g., Frank et al., 2004; Lachapelle and Frank, 2009; Lachapelle

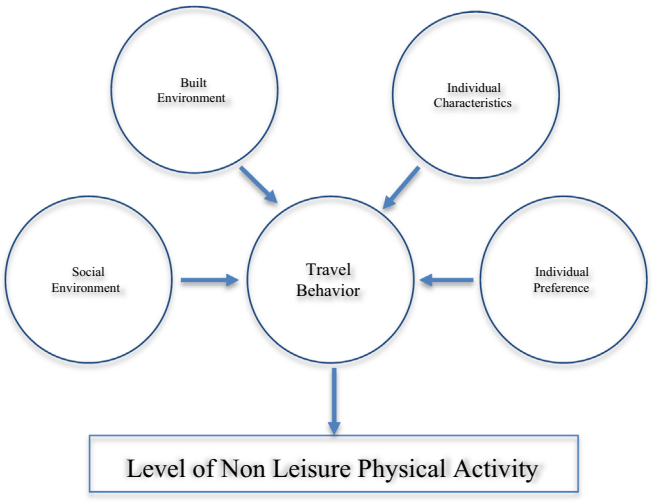

Fig. 1. Conceptual model.