



Does the social environment influence active travel? An investigation of walking in Hamilton, Canada

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ABSTRACT

This study adapts a conceptual framework from the physical activity literature to examine how walking as a mode of transport is related to individual, physical, and social environments. The data used in this study come from the Hamilton Active Living Study, which was conducted in Hamilton, Canada from May to September 2010. The analysis, based on 179 study participants, uses socio-demographic information, likert-scale questions about the social environment, and time spent walking for transport as recorded in a 7-day time-use diary. A series of linear regression models examine how components of the social environment (companionship, encouragement, role models, neighborhood social cohesion) influence time spent walking while controlling for individual and physical environments. The results find that only role models and neighborhood social cohesion influence walking time.

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1. Introduction

Over the past decade, researchers have examined how the social environment influences physical activity participation (Ball, 2006; Cleland et al., 2010; Giles-Corti and Donovan, 2002; Harley et al., 2009; Hohepa et al., 2007; Mendes de Leon et al., 2009; Trost et al., 2002). In this context, the social environment is defined as the influence friends and family have on an individual's physical activity. Past research has consistently found that a supportive social environment increases physical activity (Ball, 2006; Trost et al., 2002). While the social environment is well-established as a factor increasing such activity, research is only now beginning to unravel how the social environment influences walking. Walking is an important type of physical activity as walking provides exercise to a wide range of people. Given that researchers have just started to examine how walking is related to the social environment (Cleland et al., 2010; Hohepa et al., 2007; McDonald, 2007; Mendes de Leon et al., 2009; Páez and Whalen, 2010), little is known about how the social environment influences walking.

A conceptual framework is used in this study to understand how the social environment fits into the existing knowledge surrounding walking as a mode of transport.¹ The framework, adapted from the physical activity literature (Cleland et al., 2010; Giles-Corti and Donovan, 2002), uses individual, physical, and social environments to better understand what factors influence walking. The indi-

vidual environment refers to intrapersonal factors (e.g., personal preferences, self-efficacy) and socio-demographics of individuals, and the physical environment, otherwise known as the built environment, refers to the density, diversity, and design features of a city. Combining these different environments into a single analysis allows a better understanding as to the extent that each relates to walking.

This study makes two important contributions to the literature. First, a conceptual framework from the physical activity literature (Cleland et al., 2010; Giles-Corti and Donovan, 2002) is adapted in this study to include four components of the social environment: companionship, encouragement, role models, and social cohesion. These four components work together to create a comprehensive representation of the social environment. Second, the relationship between weekly walking time (as a mode of transport) and the social environment is examined while controlling for individual and physical environments in an effort to better understand the impact of the social environment on such walking. To our knowledge, this is the first such study on the subject.

This study uses a series of linear regression models to determine how each component of the social environment influences time spent walking while controlling for the individual and physical environments. The data analyzed in this study are from the Hamilton Active Living Study (HALStudy), which was conducted from May to September 2010 in Hamilton, Canada. Specifically, the data are drawn from two components of the data collection: the 7-day time-use diary and the personal questionnaire.

The next section of this paper presents the conceptual framework for the analysis. The data and methods section describes the data collection process, variables, and analysis approach used

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¹ This form of walking, sometimes referred to as "utilitarian" walking, falls under the umbrella of active travel.

for the study. Results are discussed next. Finally, the conclusion summarizes the key findings and discusses their importance in the context of the literature.

2. Conceptual framework

The conceptual framework developed for this study is adapted from the physical activity literature and leads to a better understanding of how walking is influenced by three environments: individual, physical, and social (Cleland et al., 2010; Giles-Corti and Donovan, 2002). The literature finds that each environment is related to physical activity, but no known studies have examined the three environments in concert with walking. The individual environment refers to how intrapersonal factors and socio-demographics of individuals influence walking behavior. The intrapersonal factors examined in the physical activity literature are preference and self-efficacy. In this study, preference is defined as the desire and interest of an individual to walk, while self-efficacy is defined as the degree to which an individual believes he or she can walk (Bandura, 1977). These intrapersonal factors are found to significantly influence physical activity participation (Ball, 2006), but most researchers rarely use preference and self-efficacy as factors influencing walking. This may be a result of researchers who investigate walking not having data to evaluate how such factors are related to walking.

Socio-demographic variables are primarily used in the literature to control for the underlying characteristics of the population and to see how socio-demographics influence walking. Four socio-demographic variables are consistently found to be related to walking: age (Harrison et al., 2007; Mendes de Leon et al., 2009), sex (Booth and Owen, 2000; Harrison et al., 2007; Owen et al., 2007), having a driver's license (Clark et al., in press; Copperman and Bhat, 2007), and educational attainment (Ball et al., 2001; Clark et al., in press). Aging is negatively related to walking due to health and mobility issues that arise as people age (Ferrucci et al., 2000; Harrison et al., 2007; Mendes de Leon et al., 2009). Males are found to walk significantly more than women (Booth and Owen, 2000; Harrison et al., 2007; Owen et al., 2007). Having a driver's license significantly decreases the propensity to walk (Clark et al., in press; Copperman and Bhat, 2007). In turn, those without a driver's license must use alternative modes of travel, such as public transit, walking, or bicycling, to access destinations. Past studies have shown that public transit users walk more than non-users (Besser and Dannenberg, 2005; Wener and Evans, 2007). Finally, a higher education level is related to a higher propensity for walking (Booth and Owen, 2000; Mendes de Leon et al., 2009). The increase in walking may be the result of more educated people having a better understanding of the benefits of walking than those with lower education levels.

The physical environment refers to the design of the urban landscape, and includes density (population density, residential density), diversity (land-use mix, accessibility), and design (street connectivity, parking availability, sidewalk availability). While past literature has tested many different components of the physical environment (Brownson et al., 2009), the general consensus is that the physical environment is significantly related to walking. This consensus has led to many researchers focusing on the relationship between walking and the physical environment, while possibly ignoring many other factors related to walking, such as the social environment and intrapersonal factors. While a few recent studies have examined how these other factors influence walking (e.g., Cleland et al., 2010; Hohepa et al., 2007), the physical environment seems to remain the primary focus for most researchers.

The review by Brownson et al. (2009) details the four most common measures of the physical environment that influence walking:

population density (Boer et al., 2007; Braza et al., 2004; Clark et al., in press; Ewing et al., 2004; Kerr et al., 2006; Rodriguez and Joo, 2004; Rutt and Coleman, 2005), land-use mix (Boer et al., 2007; Cervero and Duncan, 2003; Ewing et al., 2004; Kerr et al., 2006; Rutt and Coleman, 2005), street connectivity (Boer et al., 2007; Braza et al., 2004; Cervero and Duncan, 2003; Ewing et al., 2004; Kerr et al., 2006; Rutt and Coleman, 2005), and sidewalk availability (Clark et al., in press; Ewing et al., 2004; Rodriguez and Joo, 2004; Rutt and Coleman, 2005). The review also discusses composite measures developed to summarize different physical environment variables using a single index (Ewing et al., 2003, 2006; Frank et al., 2005, 2006, 2010; Kligerman et al., 2007). These indices, referred to in the literature as walkability indices, combine multiple components of the physical environment into a single variable that is then used to evaluate how the physical environment impacts walking. One such index found to be significantly related to walking is that developed by Frank et al. (2010). Their index combines net residential density, intersection density, land-use mix, and retail floor area ratio. These studies conclude that the physical environment influences walking and needs to be considered when examining walking behavior.

The social environment refers to the influence that friends and family can have on an individual's walking. Researchers have only started to examine how the social environment influences walking (Cleland et al., 2010; Hohepa et al., 2007; McDonald, 2007; Mendes de Leon et al., 2009; Páez and Whalen, 2010), but there is a well-established relationship between the social environment and physical activity (Ball, 2006; Trost et al., 2002). From the physical activity literature, four components of the social environment emerge (Hohepa et al., 2007) and are adapted to walking: companionship, encouragement, neighborhood social cohesion, and role models.

The first component of the social environment is walking companionship, which refers to walking with other people rather than walking alone. The physical activity literature provides important findings as to the benefits of companionship. In one study, those who exercise with companions are less likely to stop exercising in the future (Harley et al., 2009). Companions also make exercise less isolated and hold individuals accountable to others who participate (Harley et al., 2009). No matter who the companion is, research has found companionship to significantly increase physical activity participation (Ball et al., 2001; Cleland et al., 2010; Cutt et al., 2007; Giles-Corti and Donovan, 2002; Harley et al., 2009).

The second social environment component is encouragement, which occurs when family, friends, or other acquaintances promote walking. Promotion occurs when people complement improved physical appearance that results from exercise (Booth and Owen, 2000) or when feedback is given regarding participation in walking (Booth and Owen, 2000; Cleland et al., 2010; Darlow and Xu, 2011; Hohepa et al., 2007). Past work has found that encouragement can significantly increase walking (Cleland et al., 2010; Hohepa et al., 2007). One study found that women living in socio-economically disadvantaged neighborhoods participated in more walking when encouraged by family and friends (Cleland et al., 2010). The second study found that juniors in high school walked to school more often when they had more support from their peers to walk (Hohepa et al., 2007).

The third component of the social environment is neighborhood social cohesion. The social cohesion of a neighborhood is determined by the extent to which a neighborhood is socially interconnected – that is, residents feel like they belong in the neighborhood. The cohesion of a neighborhood is measured through likert scale questions used to understand the friendliness and sociability of a neighborhood. Social cohesion is a popular topic in the transportation literature (McDonald, 2007; Mendes de Leon et al., 2009; Páez and Whalen, 2010; Whalen et al., 2012), including the influence it has on walking. McDonald (2007) found

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