



Research paper

Transport walking in urban neighbourhoods—Impact of perceived neighbourhood qualities and emotional relationship



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H I G H L I G H T S

- The study stresses the role of place-related emotional correlates of walking.
- Stimulating and relaxing milieu mediated the effect of local qualities on walking.
- Planning strategies for walking should consider both physical and social qualities.

A R T I C L E I N F O

Article history:

Received 25 May 2015

Received in revised form

18 December 2015

Accepted 17 February 2016

Available online 16 March 2016

Keywords:

Human perception

Neighbourhood qualities

Walking

Attachment

Affective dimensions

A B S T R A C T

This paper adds to the relatively few European studies on the pedestrian friendliness of urban areas, and on transport walking. Using the Human Environment Interaction (HEI) model (Küller, 1991), the study explores the associations between perceived neighbourhood spatial-physical and social environmental qualities and walking to neighbourhood destinations, and examines whether these associations are mediated by the emotional relationship to the residential neighbourhood. One hundred and ten urban residents in the city of Malmö, Sweden, completed a web-based survey, including measurements of walking intentions and behaviours, and the short version of both the Perceived Residential Environment Quality Indicators (PREQIs) and the Neighbourhood Attachment Scale (NAS). Structural Equation Modeling revealed direct effects of individual factors and neighbourhood spatial-physical and social environmental qualities on transport walking. The effect of environmental qualities was partly mediated by participants' emotional relationship to the residential neighbourhood. Spatial-physical as well as social-relational features of the neighbourhood seem to play a role in walking intentions and behaviours, thereby emphasising the importance of considering both aspects in measures to improve urban pedestrian friendliness.

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1. Introduction

Western society has been adopting a more physically inactive lifestyle, partly influenced and sustained by the urban environment. Today, promoting active transportation is a primary aim of most European cities for improving the quality of the environment at a local level and with the further aim to increase residents' health and wellbeing (Green & Klein, 2011). Still, the scientific studies on

the pedestrian friendliness of European urban areas are few (Van Holle et al., 2012).

The city of Malmö, where this study is located, recently presented a *Pedestrian Program* and a *Walking Route Plan* in order to support walking and strengthen the pedestrian friendliness of the urban environment (Malmö City, 2012, 2014). The main focus of the *Walking Route Plan* is upon improving a dense web of designated routes through the city centre, where pedestrians shall be prioritized (Malmö City, 2014). As in many other municipal walking strategies the importance of the origin of pedestrians' walks, in most cases their residential neighbourhood, is not fully recognized (Lee & Moudon, 2004) and the pedestrians' emotional experiences of walking in the environment disregarded (Johansson, Sternudd, & Kärrholm, 2016).

The present study stresses the perspective of neighbourhood residents, as they are the main users of these urban spaces. The

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residential neighbourhood is a place with which people interact on a daily basis, is assumed to be where most walking for transport occurs (Shigematsu et al., 2009), and is crucial in the development of affective bonds (Amérigo, 2002). The study focuses on the association, at the neighbourhood level (as perceived by its residents), between (i) perceived spatial-physical and social environmental qualities, directly or via emotional aspects, and (ii) self-reported transport walking intentions and behaviours, in the city of Malmö, Sweden.

Using the Human Environment Interaction (HEI; Küller, 1991) model as a theoretical framework, we integrate walking practices with research on perceived environmental qualities and emotional relationship with the residential neighbourhood. In line with attempts to define overarching walking typologies (e.g., Choi, 2012) we consider walking as a mode of transportation that people consciously choose instead of other modes, in order to get to or from specific destinations, for a single trip or as part of a trip chain. We also recognise that the purpose may change during the walk, as in the case when walking to the park (i.e., transport to destination) becomes a walk for exercise once one is there (see Kärholm, Johansson, Lindelöw, & Ferreira, 2014). From this perspective, it makes little sense to differentiate across trip purposes.

1.1. A model for walking

The HEI model (Küller, 1991) postulates that when a person interacts with an environment, the appraisal process results in an emotional response. The appraisal process is influenced by the combined effect of the physical and social environment, and the activities in which the person engages in the place, taking into consideration the person's individual factors. We assume that the need to get to a destination (e.g., a grocery store) activates an appraisal process and a subsequent emotional response in deciding whether or not to walk. The appraisal processes recur in human-environment interaction and will be repeated each time a person needs to go to a place and considers how to get there (Fyhri & Hjorthol, 2009; Johansson, 2006). Consequently, the emotional outcome will guide the human response, which in our study is transport walking.

We analyse these relations at a neighbourhood level. The residential neighbourhood can be considered one of the most commonly recurring units of analysis in environmental psychology (see Bonaiuto & Alves, 2012). It includes main facilities and services (e.g., recreational, educational and social) and represents a place where social networks are established, thereby inducing a sense of belonging (Amérigo, 2002). It is, therefore, one of the most relevant environments that we daily experience. In agreement with Alfonso (2005) and Nasar (2008), we consider the perceived environmental (spatial-physical and social) qualities of the neighbourhood as key elements in the appraisal process that promote or inhibit the walking choice by, for instance, communicating that the place is safer or less safe, or more or less pleasant. We also consider that these perceived qualities, along with individual factors, will affect the emotional outcome and consequent walking intentions and/or behaviours.

Spatial-physical and social environmental qualities and individual factors are here integrated in a conceptual model for the prediction of walking outcomes (i.e., intention to choose and intention to avoid walking specific streets, duration of walking trips and number of different destinations) (see Fig. 1). The model includes qualities of the spatial-physical and social environment (density, green areas, aesthetics, sociability, discretion and security), that may be associated both to greater or to reduced perceived general evaluation of the residential environment (see Fornara, Bonaiuto & Bonnes, 2010) and to transport walking, as further described. In combination with these environmental qualities, individual fac-

tors (age, gender, economic level) are, in line with the HEI-model, expected to influence walking practices.

Following the assumed recurrence of the emotional process, we consider that the development of an emotional bond to one's neighbourhood environment (i.e., the neighbourhood attachment pattern) results from repeated human-environment interactions and emotional responses to it. This implies that the emotional bond would contribute to the effect of perceived neighbourhood qualities on walking, directly or indirectly, through residents' affective experiences of the neighbourhood. In other words, a person who has developed a positive bond (attachment) to a place is willing to keep contacting with it (Lee & Shen, 2013) and might therefore be more likely to decide on walking when aiming to get to/from destinations in the neighbourhood. The decision may be further strengthened by positive affective experiences of the place during the walk (Johansson et al., 2016; Páez & Whalen, 2010).

1.2. Previous research findings

1.2.1. Walking, perceived neighbourhood environmental qualities, and individual factors

A presence and proximity of functional destinations (e.g., grocery store), presence of high residential density and high street connectivity are factors that have been shown as promoting transport (or destination) walking (Cerin, Leslie, du Toit, Owen, & Frank, 2007; Owen et al., 2007; Shigematsu et al., 2009). Other dimensions shown to affect walking patterns are aesthetics, i.e., the appearance of buildings and general attractiveness of an area (Borst, Miedema, de Vries, Graham, & van Dongen, 2008) and safety from traffic or crime (Van Cauwenberg et al., 2012). Some of these factors (e.g., aesthetics, access to destinations) are also related to reported intentions to choose to walk in specific routes (Panter, Desousa, & Ogilvie, 2013), for their attractiveness (Agrawal, Schlossberg, & Irvin, 2008) or their transportation value (Borst et al., 2008).

Intention to avoid walking in certain routes, on the other hand, is related to the perception of negative environmental qualities that directly (e.g., presence of litter) or indirectly (e.g., perceived safety) limit one's intention to walk there (Borst et al., 2008; Guo & Loo, 2013).

Presence of other people and human activity also appears to affect general walking and transport walking behaviours and intentions (Brown, Werner, Amburguey, & Szalay, 2007; Van Cauwenberg et al., 2012). More specifically, the presence of busy streets and shops attracting people to the place are related to perceived attractiveness for walking (Borst et al., 2008).

So far, walking has been mostly studied in relation to either the physical or the social environment. However, evidence of the joint (and not only distinct) impact of spatial-physical and social neighbourhood qualities on walking has increased (e.g., Mason, Kearns, & Bond, 2011). Kaczynski and Glover (2012) found that Canadians engage more in physical activity (e.g., walking) if they perceive their neighbourhood as pedestrian friendly and socially connected.

Bonaiuto, Aiello, Perugini, Bonnes, and Ercolani (1999) identified indicators of the perceived quality of residential neighbourhoods, grouping them according to human (social-relational), spatial (architecture and urban planning), functional (services and facilities), and contextual aspects. The human and spatial indicators correspond largely to the environmental qualities presented above.

As for individual factors age and gender are frequently cited predictors of walking for transportation (Foster, Hillsdon & Thorogood, 2004; Kruger, Ham, Berrigan, & Ballard-Barbash, 2008). Besides, low income has been found to be associated with more transport walking and higher income to less of it (Boone-Heinonen et al., 2009; Kruger et al., 2008).

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