Why don’t you walk?

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Abstract

The purpose of this paper is to review the literature and have a critical look at studies analyzing factors that influence walking. How does the propensity to walk change when a condition changes and which of the factors have a proven effect? A literature research has been made in order to examine studies that aim to investigate how the propensity to walk changes due to various types of factors. In this study the word propensity refers to both actual and stated behavioural change in order to incorporate a larger number of research results. The identified factors (n = 18) have been divided into the groups individual, external and travel specific factors. Individual factors include sex and socio-economy, but also the attitudes, knowledge and demands of the traveler; external factors are foremost climate, weather and time of day; travel specific factors include the factors that are of greatest weight when the trip already has begun, especially traffic safety and fear of crime and traffic. The decision for walking and cycling trips has been divided into the following parts: trip decision, modal choice, and route choice. An important finding of the analysis is that different types of pedestrians are differently affected by the identified factors – and one can, as a pedestrian, have different preferences for different trips. The group strategy presented in this study constitutes a good base for developing a planning model for dealing with the heterogeneity of walking. The identified factors can be used as a model to analyze how measures affect different walking trips.

Biography

David Lindelöw is a PhD student at the Dep. of Technology and Society at Lund University in Sweden. The PhD subject concerns strategies for increased walking in cities and is a part of the framework project HASTA (Sustainable Attractive City).

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Introduction

Walking is not only a mode of transport in itself, but also the basis in the intermodal transport system (Rystam, 1998; Rietveld, 2000), and a foundation for accessibility (Iacono et al, 2010) – the main goal for Swedish transport policy (Prop. 2008/09:93). Hence, urban settings that support walking are an indispensable prerequisite for sustainable cities.

Still, walking as a mode of transport has been somewhat neglected within research as well as within cities' planning efforts. Generally there has been a lot of research made on factors that influence cycling, but not as much on walking – at least not from a holistic point of view, i.e. every day, utility walking carried out by pedestrians without disabilities. In the Swedish and Scandinavian context there is a lot of ongoing research and development on cycling, but the pedestrian field is not given the same priority (Lindelöw, 2009).

Aim

The aim of this paper is to critically review the literature and studies on factors that influence walking – and also develop a model for analyzing the findings. Important questions are:

1) What factors influence the propensity (both stated and revealed) to walk?
2) How can factors be used to analyze and formulate strategies for increased walking?

Method

Literature review

A literature research has been made in order to examine studies that aim to investigate how the propensity to walk changes due to various types of factors. In this study the word propensity refers to both actual and stated behavioural change in order to incorporate a larger number of research results.

The literature search was conducted between February and April 2009. Database searches were made in TRANSGUIDE, ELIN (Electronic Library Information Navigator), ScienceDirect and Google Scholar. The focus has been on scientific articles from journals about transport, urban planning, geography and medicine. A number of other research reports have also been examined.

The focus for the literature research has been on European studies from the year 2000 or newer. Although, due to the large number of American studies available, some of these have also been included in the literature screening. The literature study is concentrated on modal choice, i.e. factors that determine the choice of mode, but also deals with factors that influence the level of service during the trip.

This paper is focused on the overall findings of the literature review and the model developed thence. The results presented here are based on a previously published literature study (Lindelöw, 2009), which contains a profounder presentation of the studies.

Classifying factors

To be able to identify studies of interest a definition of the term *factor* was needed. The following criteria were assessed.

1) Definition: a factor is a variable that influences the modal share for walking in a certain and narrowed context.

2) Focus on changes for walking – not restrictions for making it harder to drive.

3) It should possible to exclude from other variables and be examined specifically.

4) It should be possible to change or lessen its effect through policy measures.

These criteria narrow down the number of studies and factors. There are, for example, many factors mentioned in the literature, without their degree of impact being clarified. Some factors, for instance traffic safety, are not often linked to their impact on modal choice and modal share. Even though the common idea is that traffic safety constitutes an important part of a walkable environment, it has not been clarified if it is a crucial factor explaining the modal choice.

Method outline

The research process is divided into the following phases:

1) Literature search

2) Identifying factor groups and the decision process for walking trips

3) Identifying and analyzing factors within the factor groups

4) Combining the conclusions of phase 2) and 3) into a model

Results I – factor groups and the decision process

The factors are divided into the groups individual, external and travel specific factors[1]. The group definitions are based on findings from the literature review – foremost the analysis of Pikora et al (2003), McCormack et al (2004) and Papadimitrou et al (2009). *Individual factors* include sex and socio-economy, but also the attitudes, knowledge and demands of the traveler; *external factors* are foremost climate, weather and time of day; *travel specific factors* include the factors that are of greatest weight when the trip already has begun, especially traffic safety and fear of crime and traffic.

The decision for walking trips have been divided into the following parts: trip decision, modal choice and route choice (see Figure 1 below). This classification was developed based on the findings from literature review and analysis within the research group. *Trip decision* concerns whether a trip will be performed or not. It's presumed that some activities can be realized without a trip being made. The focus of this study is the step *modal choice*.

Figure 1 – Model describing the decision process for (walking) trips

[1] The identified factors are listed in Table 1 further below.

Results II – factors behind increased walking

Based on the literature review and research group's own hypotheses, a number of factors were identified. There are many more factors that influence the choice to walk than those examined in literature. The so-called *presumptive factors* are those mentioned in the literature, but not being studied more closely. The effect of many presumptive factors seems to be taken for granted and have perhaps therefore not been validated. It is foremost a number of unvalidated *external factors* deemed to affect the propensity to walk. For example, society's available resources, laws, policy instruments and norms probably all affect the modal choice, but it is unclear how and to what extent.

The factors that actually *have* been examined are termed *validated factors* (n=18) and are presented in Table 1 below. Some factors incorporate a large number of investigated phenomena in order to give a comprehensive overlook. The factors have been sorted in the three defined groups presented before. Factors that have been judged to have an "apparent effect" have a somewhat unambiguous effect on the modal share and fulfill the criteria listed above.

Table 1 – The identified factors sorted into the three groups

Factor	Apparent effect
INDIVIDUAL FACTORS	
Sex & socio-economy	**NO**
Age & functionality	**NO**
Attitudes	**NO**
Habits	**YES**
Exercise	**NO**
Environmental concern	**NO**
EXTERNAL FACTORS	
Mobility Management	**NO**
Time of day	**YES**
Errand	**YES**
TRAVEL SPECIFIC F.	
Distance	**YES**
Travel time	**YES**
Aesthetics	**NO**
Urban structure	**NO**
Infrastructural design	**NO**
Traffic safety	**YES**
Perceived safety	**YES**
Destination	**NO**
Maintenance	**YES**

The studies presented below constitute the key references from the literature review and discusses some of the most important factors.

Individual factors

A study by Carnegie et al (2002) showed that persons who walk more often had a more positive view of their urban environment. McCormack (2004) stresses that individuals are physically active

due to a greater awareness of their environment, rather than because of urban form. The same conclusion holds for the study by Powell et al (2003); residents who are aware of safe and comfortable walking paths are more likely to walk. The subjective aspect of conditions for walking was investigated by a trained group of students at the University of Utah. They graded a residential area with a high level of personal and traffic safety, a socially and aesthetically appealing environment with a mix of different target points.

External factors

External factors can be defined as those which the individual cannot change before a trip starts. Bad weather, for example, can make a trip very difficult or unimaginable to perform – not the least walking.

A study by Envall (2007) demonstrated different route choices for pedestrians in Leeds at night than during the day for the same destination. The respondents graded fear of crime and the presence of other pedestrians as more important during the night, while directness of the route was seen more important at day.

Mobility Management campaigns can be a cost-efficient way of raising the number of walking trips. But the short and long term effects of such campaigns have not been thoroughly scientifically investigated. In a quantitative meta-study Möser & Bamberg (2008) tries to examine the effectiveness of so called soft measures within transport planning, such as public transport commercial, car pools and public campaigns for modal shift.

The study indicates that the incorporated evaluations show a slight decrease in car use. But the quasi-experimental nature of the evaluations and the problem of defining the term soft measure lowers the trustworthiness of the result (ibid.).

Travel specific factors

Travel specific factors affect a trip once it has begun. These factors are still affected by the individuals' conception and knowledge of them, but they exist – so to speak – independently of the individuals' perception of them. Studies about traffic safety and physical attributes are included if they examine the connection to modal choice.

Emerging research evidence supports the idea that urban form and urban design features influence various types of transport related physical activity – as walking (Dieleman et al 2002; Badland et al, 2008). In the meta-study of McCormack et al (2004) several factors were found to be positively correlated with the modal share of walking for trips to work – for instance accessibility and continuity. Pikora et al (2003) examines through a Delphi method study which factors influence the propensity of walking. The experts identified the personal safety, an attractive street environment, aesthetics and the accessibility to destinations in the neighbourhood as being of most importance. Southworths' (2005) literature study identifies several factors of importance in a walkable city. A combination of connectivity, intermodality, density, safety and path context is proposed as an instrument for a high level of walkability.

The study by Envall (2007) on pedestrians in Leeds found higher propensity to walk among respondents living nearer (< 900 m) the local store. Norheim & Stangeby (1999) found that the propensity that the share of walking decreases rapidly with distances above 2 kilometers.

In a before and after study Wennberg et al (2009) investigated how older people in the Swedish town Piteå reacted to improvements of the winter maintenance. A survey study revealed that the improvements hadn't changed the respondents' actual mobility and perceptions of their outdoor environment.

The connection between traffic safety and modal choice is hard to clarify even though the common-sense understanding is that a high level of traffic safety is a prerequisite for good walking

conditions. Noland (1995) shows with means of disaggregate individual level data how the perceived risk for different modes affects modal choice. Though, the perceived risk does not always correspond to the objective one (Ekman, 1996).

Assessing identified factors

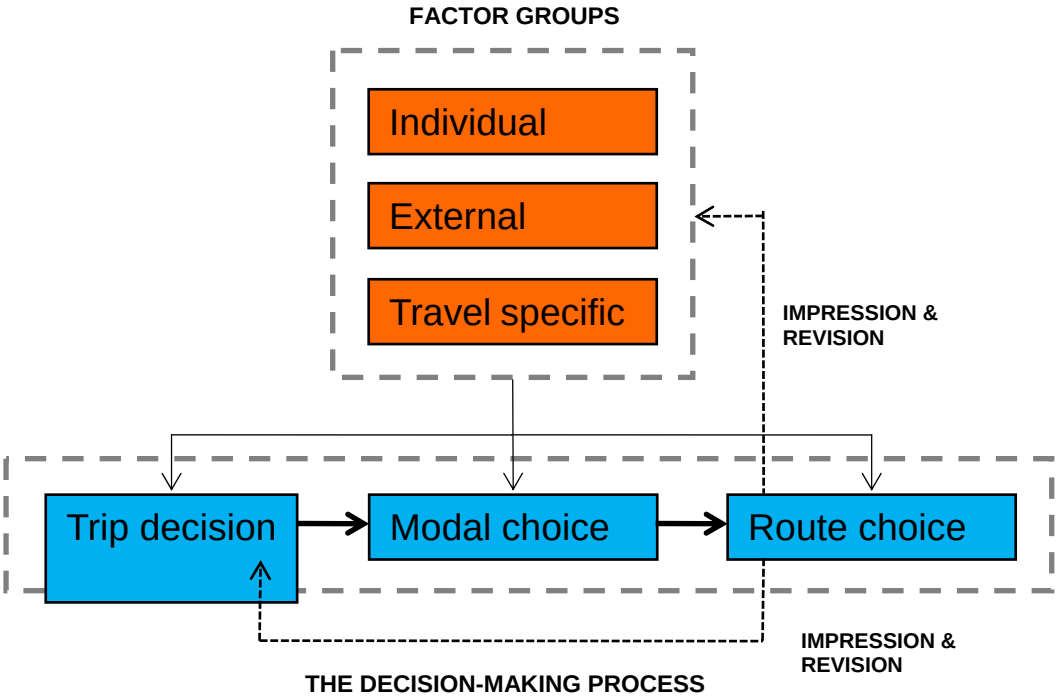
The publications studied have been assessed based on the criteria validity and trustworthiness. Trustworthiness is a combination of the studies' scientific quality and their relevancy for the purpose of this paper. Also the identified factors have been assessed with regard to the significance of their effect according to literature (see Lindelöw, 2009).

Many results are based on stated preference studies and/or surveys, in other words situations where respondents are to choose between hypothetical options or by them self answer about their daily travel behaviour. It is always problematic with the difference between stated and actual, observed behaviour. Stated preference studies are often used within transport research, but their hypothetical and out-of-context nature sometimes make them unuseful for implementation (Fujii & Gärling, 2003).

Results III – a model for analyzing walking trips

The conclusions presented here constitute a combination of the results from the result chapters above (I and II). A person performing a trip is thus confronted with the identified factors along the decision process, i.e. trip decision, modal choice and route choice. The assumed relation between the factor groups and the decision process is presented in Figure 2 below.

Figure 2 – Proposed model for analyzing walking trips



The factors are assumed to influence every decision part, although of course to different extents – and many individual factors (for example attitudes and habits) can make the two other factor groups insignificant. A habitual pedestrian can for instance be indifferent to bad weather or an unsafe traffic environment.

For many persons the process can be considered as merged, i.e. the decision to make a trip is automatically associated with a certain modal choice. Due to the habitual nature of many trips it cannot even be seen as a modal *choice*. A commuter going to work is presumed to not be as easily affected by factors compared to a person going on a leisure trip. And furthermore; travel habits are presumed to be maintained due to the effort needed to find and evaluate other modal options. The same holds true for the route choice of many habitual trips (see Gärling & Axhausen, 2003). For many trips and users event along the way do not change the attitude or future choices regarding trips, mode or route. Therefore the step *impression and revision* is assumed, in many cases, to be of minor importance. But unusual events, such as traffic accidents or infrastructural changes in one's local environment may revise the nature of future trips.

Discussion

Testing the model

The main purpose of the research within HASTA is to formulate strategies for a safer and an increased walking (and cycling). To make as most use of the identified factors and the proposed model as possible a number of *user groups* have been identified – partly to assess the importance of different factors for certain users or user groups and partly to set the focus for future research. The user groups have been identified from the presented factors – the validated as well as the presumptive ones. An individual is expected belonging to several groups at the same time.

For each group it should be possible to determine which factors or factor groups that influence the decision process – and also determine which step that is most likely to be affected. The following examples are a selection of user groups that can be analyzed with the proposed model.

Physically active

For this group the problem shouldn't be to make them walk, but instead to give incentives for walking for other trips, i.e. seeing the trip to work as a time-efficient way of combining transport and exercise. To target the individual factors, such as changing attitude or stressing the exercise benefits, could be an effective strategy.

Habitual pedestrians

Habitual pedestrians have no problem to walk, regardless of trip purpose – which make them interesting for targeting other user groups. The question of interest is how they ended up in this group and which factors that were of greatest importance for doing so.

Recreational pedestrians

This group neither has no strong aversion against walking in itself, especially not trips with the same origin and destination ("walks"), but the travel specific factors that distinguishes their route to work or the local store might hinder them to walk for such trips.

Public transport users

Frequent public transport users' every day travelling already contains a substantial part of walking. Hence, the crucial point here is not modal choice; it has more to do with factors concerning route choice. Is it travel specific factors that can motivate them to walk to a stop further away?

"Mono-modalists"

A person choosing the car (as well as any other mode) for *any* trip purpose can be expected to never see a trip as a modal choice. For these persons, going on a trip is associated with taking the car – the steps trip decision and modal choice are merged. The main strategy here is to separate the steps from each other to make sure that the modal choice really becomes a choice of its own.

Suggestions for future research

The literature review reveals a lack of knowledge concerning the impact on modal choice from traffic safety measures. The large number of stated preference studies addresses the question of how stated preferences correlate to actual behaviour.

An important finding of the analysis is that different types of pedestrians are differently affected by the identified factors – and one can, as a pedestrian, have different preferences for different trips. This has implications for both strategic and physical planning. Motorized traffic is most often separated in different networks depending on the role in the transport system, which rarely is the case for pedestrians. Do we even need a transport system with different networks for different pedestrians?

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