Walking as a transport mode

Examining the role of preconditions, planning aspects and personal traits for the urban pedestrian

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LUND
UNIVERSITY

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Abstract

The overall aim of this thesis is to examine how walking as a transport mode is constructed in the planning realm, affected by the built environment and perceived by the individual. This aim is related to the following research questions: (1) How are pedestrians and walking understood, constructed and perceived in the planning context? (2) How does individual traits and the built environment affect the propensity of walking?

The thesis starts off by arguing for the need of a holistic take on walking as a mode of transport (Study A). A framework building on the actor-network theory concepts of Paper I is used to overcome this. Study B adresses research question 1 and specifically concerns the role of the planning paradigm instrumental rationality with respect to walking. The aim is to explore to what extent pedestrian planning has subscribed to the methods employed within the limits of instrumental rationality. The study draws on planning material and data from interviews with urban and transport planners in three municipalities in the southern part of Sweden (Malmö, Lund, and Helsingborg). The analysed material displays walking as increasingly being included in planning exercises, although not with a consistent and thought-out strategy proceeding from instrumental rationality.

Study C acts as the quantitative study and addresses research question 2. The three included papers (III, IV and V) all use data from the same questionnaire concerning walking behaviour and perceptions in three neighbourhoods in Malmö, Sweden, albeit with differing approaches and analysis. Paper III draws on a time geographical conceptualisation of the individual's limits in order to explore her/his different ratings of the importance of both time and distance as factors in the decision to walk. Two variables which were intended to represent coupling constraints were associated with a positive increase in the likelihood of giving the importance of time a higher rating than the importance of distance. The findings suggest that time and distance cannot be treated as interchangeable measures. Paper IV employs a conceptual model addressing both perceptions of the built environment and perceived limits due to every-day activities as a standpoint for examining walking behaviour. The analysis revealed a resemblence with the theoretical interpretation and a significant assocation with walking propensity for the rating of one factor addressing the perceived constraints of every-day activities. Paper V aims to examine how preferences for residential choice and modal choice play out regarding walking frequency. The study design treated preferences as explicit variables predicting the amount of walking in a neighbourhood. The analysis indicated that heterogeneous preferences resulted in a heterogeneous response, in terms of walking frequency.

Key words: Walking, walkability, built environment, everyday life, transport planning, pedestrian

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To Lisa and other urban pedestrians
that have crossed my path over the years

Preface

> *Animal life like human life is characterised by short-term shifts between movement and halts. We look around us and take part in a constant walking and stopping, walking and stopping. We should not have become so captivated by the achievements of technical transport systems that we have dispensed with the awareness of the fact that our tasks make walking into the dominant form of movement.*

This quotation by the geographer Torsten Hägerstrand (Hägerstrand et al., 2009: 203) well illustrates the connecting role of walking in peoples' everyday lives as well as its persisting importance and dominance in the cities of today — despite development of faster transport modes in the recent century. The quotation also pinpoints the risk of taking walking as a given, and thereby overlooking pedestrians' needs and preferences. This thesis examines walking as a transport mode in an urban context. Its scope is within the subject of transport studies, albeit including theoretical concepts from cognate subjects. The setting for the empirical work is the Skåne region in the southern part of Sweden, primarily in the City of Malmö.

This thesis does not unveil which density threshold, sustainable innovation or particular design feature that promote walking. Nonetheless, it claims to tell planners and others something useful about walking and the built environment. It does so by somewhat distancing itself from the common approaches to this matter. This tactic fosters new questions regarding the issue of how to plan and design pedestrian-friendly urban environments — or rather, fundamental questions and issues are revived, but this time specifically targeted at the pedestrian.

List of papers

Paper I

Kärrholm, M., Johansson, M., Lindelöw, D., & Ferreira, I. A. Interseriality and Different Sorts of Walking: Suggestions for a Relational Approach to Urban Walking, *Mobilities*, in press
From the field of transport studies, David Lindelöw contributed to the literature review and writing of the paper.

Paper II

Lindelöw, D., Koglin, T., Svensson, Å. Instrumental rationality as a prescription for pedestrian planning: emerging strategies in three Swedish municipalities, re-submitted to *Planning Theory & Practice*
David Lindelöw collected and analysed the material and wrote the vast majority of the paper.

Paper III

Lindelöw, D., Ryan, J., Do travel time and cognitive distance differ in importance for different kinds of pedestrians? A Time Geography perspective, submitted to *Time & Society*
David Lindelöw designed the study, developed its conceptual approach and performed the data collection. The task of analysing the material and writing the paper was shared between the authors.

Paper IV

Lindelöw, D., Svensson, Å., Sternudd, C., & Johansson, M. What limits the pedestrian? Exploring perceptions of walking in the built environment and in the context of every-day life, *Journal of Transport & Health*, 2014, 1, 223-231
David Lindelöw designed the study, performed the data collection and the analysis, and wrote the vast majority of the paper.

Paper V

Lindelöw, D., Svensson, Å., Brundell-Freij, K., Hiselius, L. Satisfaction or compensation? The interaction between walking preferences and neighbourhood design, re-submitted to *Transportation Research Part D: Transport and Environment*
David Lindelöw designed the study, performed the data collection and most of the analysis, and wrote the paper.

Content

1. Introduction

This section places the thesis in the policy and research context of (foremost) the recent decade. Furthermore, it presents the rationale for studying walking as a transport mode. The section concludes by presenting the aim and research questions which are examined in the subsequent studies (A, B and C).

1.1 Background

Pedestrians have naturally always been a part of urban environments in Sweden, Western Europe and elsewhere, but perhaps this first became acknowledged in society during the 18th and 19th centuries when the options of other transport modes developed (e.g. horse-drawn vehicles, street cars). For some societal groups, walking became an elective activity, made by choice rather than out of pure necessity. However, it was presumably with the rapid growth of motorisation in the middle of the 20th century that the research community came to acknowledge walking as a practice and a mode of transport. This attention was even more pronounced when the effects on pedestrians in terms of decreased accessibility and safety became apparent (cf. Jacobs, 1961; Appleyard and Lintell, 1972). There are many aspects and ways of describing this development in Swedish and Western European cities and urban regions. One illustrative example is the growth of the mean daily distance travelled. For Sweden, this rose from 10 km in the 1950s to 45 km at the beginning of the 21th century (Frändberg and Vilhelmson, 2011). Since distance travelled relates to the urban structure and use of land, this rise also mirrors an increase in the distances between peoples' everyday destinations (home, work, grocery stores, leisure, etc.) (Elldér, 2015). If walking used to be the dominant form of urban mobility, it has since the dawn of motorisation been challenged by faster options. Despite being a mundane and fundamental means of travel, it has become quite absent from many people's everyday lives. However, since national travel surveys were introduced in Sweden in the year 1978, overall walking shares have remained fairly stable, albeit with fluctuations and changes with regard to different trips, genders and

geographical contexts (Frändberg and Vilhelmson, 2014). Thus, the greatest decline in walking shares most probably came about before travel behaviour was monitored on a national level.

In the 1960s and subsequently the challenge regarding pedestrians was perceived as being a matter of traffic accidents and injuries rather than the declining share of walking trips (cf. Lundin, 2008). A vast rise in the number of accidents – not least for pedestrians – led to the development of planning guidelines to tackle this. These guidelines were based on, and followed by, numerous research projects on traffic safety and street design (see Hagson, 2004; Lundin, 2008; Koglin, 2013).

In recent years, however, there has also been an increased interest in walking in the light of several societal challenges, aside from traffic safety. These challenges include the plea for an energy- and carbon-effective transport system, tackling congestion and pollution, health concerns, densification and urban renewal. Other areas of research — over and above transport studies — have increased their interest in walking in cities as an object of inquiry, including health sciences (e.g. Frank et al., 2006; Sundquist et al., 2011), social sciences (e.g. Middleton, 2011; Middleton, 2009; Hornsey, 2010), environmental psychology (e.g. Alfonzo, 2005; Johansson, 2006) and urban design and architecture (e.g. Ståhle et al., 2005; Ewing and Handy, 2009). Moreover, a number of Swedish research projects have been focusing on increasing, and improving the conditions for walking. There has been a number of initiatives, including general guidelines (Nilsson, 2013), findings on the importance of local urban form (Sundquist et al., 2011), space syntax tools (Ståhle et al., 2005), micro-simulation models (Johansson, 2013), and willingness-to-pay estimations (Björklund, 2014). If Swedish research on pedestrians used foremost to be an issue of traffic safety and accessibility for the elderly and for people with functional limitations (e.g. Ekman, 1996; Ståhl et al., 2008; Öberg et al., 1996), it has in recent years grown into a more diverse and complete body of knowledge.

In addition to this, walking has been quite visible within policy in recent years, not least within the sustainability discourse. For instance, the European Commission's White Paper on transport states that 'Facilitating walking and cycling should become an integral part of urban mobility and infrastructure design.' (European Commission, 2011, §31, p. 8). In the Swedish context, one of the goals of the present Swedish national transport policy directives is to improve the conditions for walking, cycling and public transport. Several Swedish municipalities (e.g. Malmö, Stockholm, and Lund) have produced planning strategies and guidelines devoted to walking, and many planning projects claim to be focusing on walking (again, often together with cycling and/or public transport).

However, despite this increased interest and attention, walking remains subordinate in the urban context, and knowledge about many aspects of pedestrian planning remains relatively scarce — especially in relation to the large body of knowledge having been produced for motorised modes. It is not only a matter of quantity; there is also a difference regarding the theories and methods used. Arguably, some of these differences are due to the pre-existing characteristics that each mode possesses, but this thesis argues that some presupposed differences have to do with how different modes are comprehended and which attributes and characteristics are assigned. This lack of knowledge results in difficulties for transport planning when walking is to be included in the planning, design and maintenance process (cf. Patton, 2007; Pooley et al., 2014).

This thesis does not claim to address all of these issues, but rather poses the view that this deficit can be handled and further understood by addressing what constitutes a *transport mode*, and thereby indicating that walking has not been treated as one. The thesis approaches this matter from several aspects grounded in a conceptual framework treating walking as a mode of transport. The next section reflects on previous research deemed important from this perspective.

1.2 Reflections on previous research

This section gives a brief overview of former research on walking within transport studies and cognate subjects. As pinpointed and discussed in Paper I, two important strands of research can be identified in the research on walking. The first treats walking as a given, i.e. as a behaviour that should be fostered through the examination of relevant cause and effect relationships, while the other problematises walking in itself and does not necessarily examine the phenomenon as an effect of certain causes. This overview focuses on the first area of research.[1]

Within transport studies (for instance in the Swedish context), the pedestrian has to a large extent been examined from the micro-perspective, i.e. through accident analysis (e.g. Rosén and Sander, 2009; Kröyer, 2015) and prevention (e.g. Ekman, 1996; Johansson, 2004), route choice and wayfinding simulations (e.g. Papadimitriou et al., 2009; Hoogendoorn and Bovy, 2004) and micro-level accessibility and design (e.g. Wennberg et al., 2009; Mollenkopf, 2004). Another strand of research targets conditions and needs for

[1] See Paper I for a longer overview and discussion of these two strands of research.

specific groups, such as children and adolescents (e.g. Whitzman and Pike, 2007; Kyttä et al., 2015; Kaplan et al., 2016), elderly (e.g. Hallgrimsdottir et al., 2015), women (e.g. Seedat et al., 2006) and persons with functional limitations (e.g. Newman, 2010).

In contrast to this, other areas contain relatively few examples where pedestrians explicitly have been included or targeted. When it comes to areas such as traffic flow modelling, trip forecasting and transport appraisal, the pedestrian remains somewhat overlooked. In cases where walking is included, it is often in the form of a fusion with cycling, by the use of categories such as 'non-motorised transport', 'active commuting', 'healthy transport', and 'vulnerable road user'. However, pedestrians and cyclists have too many essential differences to justify such mergers (cf. Tight et al., 2011).

This thesis, as in this overview of literature, focuses on the relationship between the built environment and the choice to walk. Just as for any other transport mode, research on walking has to a great extent looked into the determinants of the choice of mode. Factors such as distance, time, the attractiveness of competing modes, features of the built environment, preferences and attitudes have been proven to be correlated with the choice of walking. Intuitively, the possibility of walking and the experience of this is influenced by features in the built environment, and their design. 'Influenced' can in this sense be understood as the reasons for choosing to walk as well as experiences en route once a trip has begun. Given its nature, the pedestrian is influenced by other factors than the car or public transport user. Unlike motorised modes, pedestrians are more or less exposed to topography, climate, weather, fear of crime and so-called stranger danger. Hence, scholars have examined the importance of those factors as well (e.g. Cervero and Duncan, 2003; Timperio et al., 2004).

However, the built environment, unlike weather and topography, is something that planners, policy-makers and developers to quite a large extent can control. The relationship between the built environment and travel behaviour has been of interest to scholars for a long time (e.g. Hansen, 1959; Næss, 1993; Cervero and Kockelman, 1997). Within this field of research, several factors have been of interest for research focusing on walking, as well as on car and public transport use, such as density, the jobs–housing balance, and distance to the central business district (CBD) (e.g. Kitamura et al., 1997; Naess, 2012). However, some aspects have been given explicit attention by scholars looking specifically at walking, including street connectivity (Leslie et al., 2007), urban design features (e.g. Saelens et al., 2003; Ewing and Handy, 2009), space syntax integration index (e.g. Ståhle et al., 2005) and retail floor area ratio (e.g. Sundquist et al., 2011). As a clarifying and illustrative — although somewhat simplistic — dichotomy, it can be described as a focus on *where from* versus *where to*. This is to say that studies of walking seem to

emphasise the spatial context of the origin of trips (i.e. the neighbourhood), whereas studies of car use are more likely to focus on the route (e.g. level-of-service) or the destination (e.g. gravity-based models). The point of this clarification is not to say that walking has to be examined using the same variables or even the same methods, but rather to stress that these different approaches are not set in stone.

In order to represent and measure travel behaviour, many of these studies have used the number of car trips or vehicle–miles travelled (VMT) as dependent variables. However, as examined by Piatkowski et al. (2015), a case of reduced VMT does not necessarily imply a situation where car trips are substituted by walking (or cycling and public transport), i.e. a decrease in the quantity of car trips or VMT does not necessarily mean an increase in walking. From the other side of the coin, measures that increase the number of walking trips may not affect VMT. Nevertheless, the relationship between the built environment and walking has almost become a research field of its own, often termed walkability. Walkability can be defined as any planning-related factor that affects people's propensity to walk (cf. Adkins et al., 2012; Southworth, 2005), but has to a certain degree come to be represented by particular urban design features at neighbourhood and urban level (cf. Forsyth and Southworth, 2008; Handy, 2005), often in the form of studies comparing residents' walking behaviour in neighbourhoods with (essentially) different design, with contributions from scholars in transport studies, urban design and the health sciences (e.g. Brownson et al., 2009; Ewing and Handy, 2009; Sundquist et al., 2011; Van Holle et al., 2012). These studies have found correlations between walking rates and certain features in the built environment. These features of interest can normally be sorted into 'the 3 D:s', density, diversity and design (Cervero and Kockelman, 1997). Views still differ as to whether the emphasis should be on features at the micro (e.g. street and streetscape design, maintenance, greenery) or macro (e.g. proximity, connectivity, land use mix) level. The focus of these studies is, nevertheless, on the built environment, be it micro or macro (cf. Handy, 2005).

In recent years, studies of travel behaviour have also shown a growing interest in including subjective aspects both of the built environment and of travel itself (e.g. Kitamura et al., 1997; Bauman and Owen, 2009; Scheiner and Holz-Rau, 2007). One major part of this interest has been to examine the role of preferences for residential choice, often termed an issue of self-selection (Bohte et al., 2009).

A smaller, yet distinguishable, strand of research focuses on the conditions for walking in relation to non-physical factors such as time, obligations and social relations, rather than features of the built environment. This strand particularly concerns walking's role in trip chains, in the household context

and in everyday life. Walking constitutes not only a common mode of transport of its own, but also a pertinent link within trips where other modes represents the lion's share of the total distance. Especially public transport has been acknowledged as reliant on walking and the conditions for this (e.g. Rietveld, 2000; Krygsman et al., 2004; Walle and Steenberghen, 2006). The potential of the built environment to encourage walking to public transport have also been examined (e.g. Schlossberg and Brown, 2004; Werner et al., 2010). In relation to this, there have been scholars investigating the planning strategy known as TOD (Transit-oriented development), where transit initiatives are combined with walkability measures in the stations' catchment areas (e.g. Chatman, 2013; Rodríguez et al., 2009).

The role and place of travel and mobility in everyday life has been of interest for a long time (e.g. Lenntorp, 1976; Ellegård and Vilhelmson, 2004). However, transport studies focusing on walking in everyday life in particular remain relatively rare[2], with Pooley et al. (2011) being one of few exceptions. The matter of time, however, and travel time particularly, is a factor of major interest in transport studies. For instance, the actual and perceived duration of a trip for different modes strongly influences the choice of mode and thus constitutes a fundamental factor in transport modelling (Goodman, 2001; Cervero and Duncan, 2003; Handy, 2005). Furthermore, travel time reduction is paramount in travel scheme appraisal methods such as cost-benefit analysis (Banister, 2011; Eliasson and Lundberg, 2011). Recent years have seen a growing interest in challenging the view of travel time within transport planning. How valid the assumption about individuals' willingness to reduce their travel time is, and for which trips this holds true has been questioned (Mokhtarian and Salomon, 2001; Urry, 2006). One important aspect within this critique is that travel is not necessarily an ineffective use of time that ought to be minimised — i.e. it can contain other parallel activities and benefits, such as work, exercise and leisure (Middleton, 2009; Redmond and Mokhtarian, 2001). Walking in relation to travel time has been acknowledged by scholars in environmental psychology (Säisä et al., 1986) and qualitative (Middleton, 2009) as well as quantitative (Millward et al., 2013) studies in geography. However, when it comes to the *view* of, and *operationalisation* of, travel time for pedestrians within transport planning, there is still a need for further research.

Alongside an increased interest in walking within research, there has been a number of projects and initiatives in planning that — be it implicitly or explicitly — addresses walking. They have labels such as 'walkable cities', 'pedestrianisation', 'slow cities' and 'pedestrian planning'. However, these

[2] The works and studies on walking in everyday life of Lefebvre, de Certeau and their followers are not included here.

schemes have not yet been followed up to a great extent. Although recent years have seen a great increase in the number of studies devoted to walking, relatively few studies have examined how (and whether) research findings regarding walking are interpreted and used in the practice of planning and urban design, with Patton (2007) and Stangl (2008) being two important exceptions.

1.3 Research questions and the thesis' structure

As stressed in the Background and underlined in the previous section, knowledge of many aspects of pedestrian planning remains relatively scarce — especially in relation to the large body of knowledge having been produced for motorised modes. This thesis does not primarily aim to fill this gap, but rather suggest a way of *treating* walking more like a transport mode. In relation to this deficit, a few other gaps have been identified.

A few scholars have recently questioned the neighbourhood focus of walkability studies (e.g. Cho and Rodriguez, 2014; Milakis et al., 2015), but, nevertheless there is still a need to study walking in relation to other spatial scales and to discuss the role of neighbourhood design within a larger context of planning and policy. This deficit also connects to how studies are designed and which theoretical and conceptual presumptions these designs are based on.

The role of walking in the intermodal context and within trip chaining has been explored, but there is — perhaps surprisingly — a gap in research as to walking in the everyday perspective. There have been recent attempts to theoretically close this gap (Saarloos et al., 2009; Rainham et al., 2010; Perchoux et al., 2013), but the need for empirical contributions remains. In relation to the everyday perspective, travel time in particular needs to be examined from the perspective of the pedestrian.

Research into the process of transport planning has not focused on walking, and in particular it has not focused on the implications of the lack of knowledge regarding many aspects of walking. This calls for an exploration of what knowledge about pedestrians is collected and used in planning and what is not.

To summarise, there are gaps regarding walking and a need for adopting a new transport-oriented approach, including theories, methods, study design as well as empirical knowledge. The overall aim is to examine how walking as a transport mode is constructed in the planning realm, affected by the built environment and perceived by the individual. This aim is related to the following research questions (RQ).

RQ 1: How are pedestrians and walking understood, constructed and perceived in the planning context?

RQ 2: How do individual traits and the built environment affect the propensity of walking?

The thesis contains a theoretical discussion regarding the conceptualisation of walking as a transport mode together with two empirical studies. Study A acts as the conceptualisation, and first and foremost addresses the overall aim. Study B examines walking from the perspective of planning and the planner. It first and foremost addresses research question 1. Study C examines walking from the perspective of the pedestrian, i.e. pedestrians' preferences, possibilities and choices in the context of the built environment and of everyday life. It first and foremost addresses research question 2. The relationship between the studies and the research questions is illustrated in Figure 1.

Study A elaborates on theoretical concepts stemming from actor-network theory; Study B makes use of concepts addressing policy and planning issues, while Study C makes use of theories regarding the individual's preferences, possibilities and choices in the context of the built environment and of everyday life. These three strands of theoretical approach are presented in each study's section.

The next section introduces the conceptual framework used to study walking as a transport mode (Study A). Sections 3 and 4 present Study B and C. The results and implications are jointly discussed in section 5.

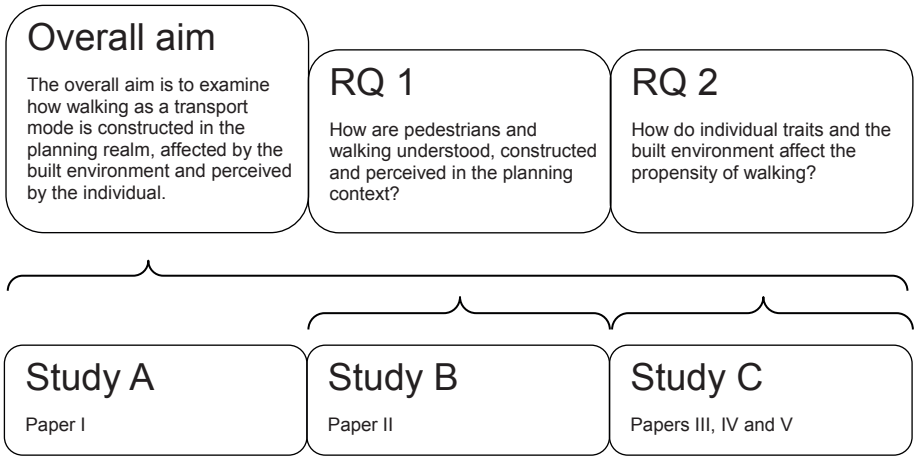

Figure 1
The scope of each study with regard to the aim and the research questions

2. Study A

2.1 Conceptualising walking as a transport mode

This section describes the analytical point of departure of the thesis by introducing what the term *transport mode* could infer for walking, and by suggesting a classification to identify at which spatio-temporal scales walking may be examined. This conceptualisation is based on the literature review above as well as the literature review of Paper I — and the theoretical exploration of this will be used as a means to position the conceptualisation theoretically.

Walking is, of course, a way of moving around and reaching destinations, both in- and outdoors, for most people of almost any age. From this point of view, it might seem superfluous to discuss the definition of the term 'transport mode' when it comes to walking. However, this thesis suggests that the term has theoretical, methodological and planning-wise connotations and implications. This means that employing a view of, for example, walking as a discursive practice (Matos Wunderlich, 2008) has implications for both research and policy. This notion relates to issues such as: what it would mean to study and plan walking as a transport mode; how the term is understood and operationalised within research and planning; which connotations it has; and which features and characteristics that are assigned.

Acknowledging the role of walking as a transport mode is not new. Various takes on this subject have emerged in research and planning, with the use of typologies such as destination walking (Alfonzo, 2005), utility walking (Pooley et al., 2014), purposive walking (Matos Wunderlich, 2008) and transport walking (Millward et al., 2013). These typologies have sometimes been contrasted with strolling walking or discursive walking, where the journey 'itself' is deemed more important than reaching a particular spatial destination. However, these classifications and typologisations appear as almost mutually exclusive, even though they in many cases rather describe different aspects of the same walking trip (e.g. a walk to day-care through a park) – or simply represent different fields of research (e.g. transport studies and anthropology). One type of walk or trip might be described using several typologies, such as destination and strolling walking. Destination walking is not essentially

different from strolling walking. Moreover, these classifications have been too blunt and simplistic to allow for conceptualisation of what transport walking infers. Thus, in this thesis, transport walking does not denote a particular kind of trip or walking behaviour, it rather constitutes a conceptual approach to walking overall. It is argued that walking is not always treated as a transport mode, and if so, often from a different perspective than other modes. This thesis suggest this deficit can be overcome by accounting for the similarities with other modes, rather than merely taking the differences into consideration. Moreover, this is also to say that the term transport mode does not equate with vehicular traffic or motorised traffic.

This *transport framework* constitutes a lens through which both research and planning could be seen. This framework is based on previous research, but also paves the way for the studies in this thesis. A focal point is that the framework calls for adopting a multitude of theoretical approaches and methods to heighten the understanding of walking as a transport mode. It also contains a normative stance, in the sense that a holistic take on walking as a transport mode could yield an increased awareness of pedestrians in planning and policy. Former approaches and research have admittedly acknowledged the role of walking as a connector to destinations and activities, but have not fully addressed what a transport view on walking implies when it comes to theoretical and methodological considerations. Thus, a transport framework regarding walking includes more than the examination of a certain walking trip or a specific measure; it rather encompasses several spatial and temporal scales deemed important from a policy and research perspective. Such a holistic approach includes a wish to understand and examine users' behaviours, choices and preferences regarding the reach of destinations, activities and goals at these different scales. A classification of these scales is presented below and in the hypothetical travel chain of Figure 2, including examples of strands of research taking stand in each of the scales. The scales do, of course, apply for more or less any transport mode, but are here used to clarify and illustrate if, and how, walking has been included and researched within each of these.

In the light of this matter, it is relevant to define and clarify some concepts of interest. The transport framework implies the investigation of walking from an everyday perspective *and* in the perspective of the whole day. 'Everyday perspective' denotes a consideration of daily habitual activities in everyday life[3], while 'the perspective of the whole day' refers to the importance of looking at individual trips in relation to other trips and activities during the length of the whole day. These concepts are certainly interrelated, but they describe different aspects of the transport framework. For this thesis, the term everyday travel (life, perspective, etc.) is used as a unifying term.

[3] 'Everyday' would correspond to the Swedish word *vardag*.

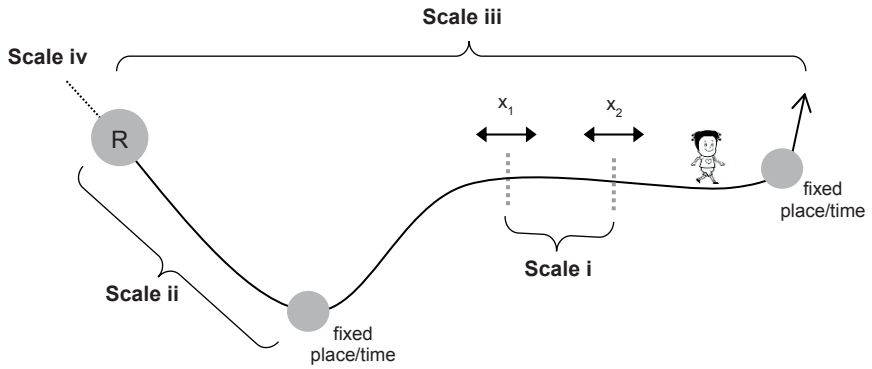

Figure 2
Graphical depiction of the four scales of the transport framework

(i) Micro-scale movements, decisions and interactions

This scale refers to the micro-level of planning and research, i.e. the street and place level and/or during short time periods. Several fields of research can be placed under this heading, such as traffic safety studies, simulation studies, person-environment accessibility and ethnographic/observational studies. As discussed in the Introduction, a lot of the research on walking has focused on this level.

From the perspective of the user or pedestrian, this scale concerns the situations and interactions they encounter in the urban realm, and, thus, choices regarding direction, stops and sudden movements. Events along the way may impact the pedestrian's experience of their trip, but does not necessarily impact the possibility of reaching any destination or purpose.

Unlike the other scales, the pedestrian is here treated somewhat in a non-contextual and instantaneous manner, meaning that the origin (x_1) and the destination (x_2) of Figure 2 can be regarded as arbitrary and floating, depending on the study site of selection. One crucial point with this in relation to other scales is that the micro context makes it somewhat obsolete where a pedestrian is heading or where she/he is coming from. The trip can be a stroll around the block, a commute to work, a demonstration, a tourist going around in the city centre, or a quick walk to the local store. The purpose of the trip may inflict on the situation being studied (e.g. safety-related behaviour), but such information is seldom collected in situ. Furthermore, socio-demographic characteristics such as household income, car access or place of residence are of minor interest and/or difficult to collect.

(ii) Modal choice: Whole trips and journeys, or part of trips

This scale refers to the place and role of walking in trips with an origin and a destination, or with a similar origin and destination. Research 'within' this scale focuses on prerequisites and factors inflicting on the modal choice to (not) walk. This entails utility-based choice models, studies on the relationship between urban form and travel behaviour, environmental psychology, studies on the role of preferences and attitudes, etc.

This scale acknowledges the natural role of walking in a multimodal context — primarily trips to and from public transport — but also the existence of trips including walking only. The origin and destination are relatively fixed[4] in space and/or time and can be the home, the workplace, a station or a bus stop, shops or other physical destinations, but also social contacts. In contrast to scale i, this line of research puts emphasis on differentiating between different walking trip purposes, as well as on the socio-demographic characteristics of individuals.

From the perspective of the user or pedestrian, this scale concerns considerations regarding the modal choice, e.g. cost, safety, distance, urban form, infrastructure, and preferences.

(iii) Modal choice: Everyday activity patterns

This scale concerns the everyday perspective. Individual trips are in this context treated as parts of a whole, such as a sequence of activities and trips or as parts of a household's everyday life. Thus, this scale sees the modal choice not only as dependent on the context of the actual trip (e.g. in terms of distance, design and preferences), but also on the context of everyday life. This scale includes research on everyday life practices, activity-based transport models and gender-related transport issues.

From the perspective of the user or pedestrian, this scale concerns the considerations and practicalities regarding the choice or possibility to walk with regard to the modal choice of other persons in the household or modal choices taking place later (or earlier) during the day. A certain choice of mode, often requires the vehicle be moved (e.g. from a parking space), thus 'forcing' the user to maintain their travel behaviour during the day (e.g. taking the car to work and then use it to buy groceries), or that a modal choice for one trip is dependent on the choice for a future trip during the day (e.g. taking the car to work to be able to have time or the opportunity to buy groceries in the

[4] The concept of fixity for activities will be expanded upon in Section 4.

afternoon). Walking is, of course, in this sense more flexible, but a pedestrian may still be 'forced' to maintain their travel behaviour throughout a day.

(iv) Residential choice: Longer term considerations and choices

This scale refers to preferences held and choices made 'beforehand', i.e. how the choice of residence impacts the propensity to walk in one's neighbourhood and/or one's everyday life. It comprises mostly research on the relationship between the built environment and travel behaviour; more precisely on how an individual's preferences for residential choice impact present travel behaviour. The temporal scale is then expanded beyond the day to earlier preferences and choices. From the perspective of the user or pedestrian, this scale concerns how a preference for walking might play a role in the choice of housing, and vice versa.

This thesis aims to examine walking through all of the scales, although foremost regarding scales (ii), (iii) and (iv). Figure 3 illustrates how the thesis' studies (Study A, B and C) relate to the four scales in the transport framework.

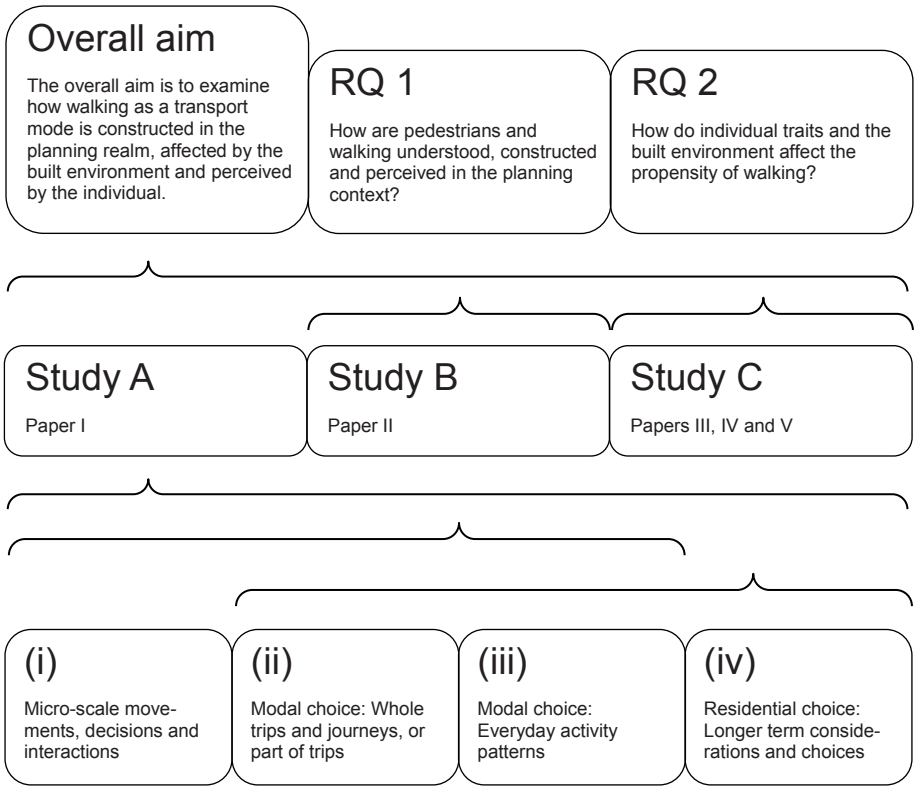

Figure 3
The thesis' studies (Study A, B and C) relate to the four scales in the transport framework, and with regard to the aim and the research questions.

2.2 The pedestrian as a socio-technical assemblage

The scales presented above represent different theoretical and methodological approaches. To study these scales jointly would demand a vast amount of data of different kinds, despite the fact that the very same individual is addressed.

In order to move beyond the methodologically focused, and somewhat divergent, interpretation of the scales, a shared terminology regarding the scales is called for. For such an approach, the theoretical point of departure of Paper I was employed. The aim of the paper was to develop a meta-language, or infra-language, for a relational approach to walking. Infra-language is a term from actor-network theory (ANT), and is a way of describing actors through their associations, without defining their true affiliation. Actor-network theory stresses that knowledge, agents, individuals and organisations are *effects*, and that these effects come from heterogeneously arranged networks of human, as well as non-human, actors (Bosco, 2006; Hetherington and Law, 2000). The use of ANT is relatively open in the sense that it offers a minimalist set of concepts and avoids assumptions about a phenomenon's characteristics or scale. Hence, it is an approach to research rather than a theory.

In the context of research on walking, previous studies have often used a priori-defined classifications or typologisations of walking, or has simply avoided classifications all together. Paper 1 wishes to circumvent these classifications by suggesting an allowing, yet precise, terminology. It elaborates on the terms *assemblage*, *objects of passage*, *boundary objects* and *interseriality*.[5] These are particularly fitting in the sense that that they can be applied in settings and contexts of varying scales (cf. Kärrholm, 2011). The concluding section (5) will recapitulate and discuss the two other studies of the thesis in the light of these terms.

In line with the reasoning of ANT, the spatiotemporal scales above should not be seen as predefined, but rather as an outcome of actions and processes in space (cf. Kärrholm, 2011). In other words, they are an effect of individuals' movement in time and space, and their size is dependent on individuals' everyday travel and the environment in which it takes place. In order to analytically address the different scales being produced and how they are related, this study treats the pedestrian as a *socio-technical assemblage*. The term has been used in for instance human geography to represent heterogeneous elements that can consist of both human and non-human actors. Assemblages contain of both a spatial and temporal dimension in that they might change shape and realign (Anderson and McFarlane, 2011). The term has been employed to understand spatial phenomena such as regions,

[5] See Paper I for a more detailed elaboration of the terminology.

cities and spatial scales, but also for studying everyday mobility (e.g. Middleton, 2010; Schwanen, 2007).

The practices and transformations of pedestrians through space and time serve as an illustrative representation of the term assemblage. From the perspective of scale (i), a stressful, risky and vibrant streetscape may force the pedestrian constantly to stay alert, and transform and negotiate their path and behaviour. Thus, one walk may comprise several walking assemblages.

However, assemblages can also be used to describe the pedestrian's practices throughout the day (scale iii). In his article on the everyday childcare strategies of working parents, Schwanen (2007) discusses the assemblage comprising bike, parent, child and child seat. This composition illustrates how both human and non-human actors serve as actors in the realisation of an assemblage. A pedestrian counterpart could be a parent taking their child to day-care (see illustrated example in Figure 4). This specific assemblage becomes transformed when the parent continues alone to a bus stop, and then, later during the day, carries grocery bags from the bus to their home. Middleton (2010) elaborates how the view of the pedestrian as a socio-technical assemblage calls for including walking attires such as clothes, shoes, communication devices and earphones. Hansson (2015) studies how individuals' shopping behaviour infers several kinds of socio-technical assemblages, comprising several non-human actors (cars, bikes as well as trollies, strollers and shopping bags).

For this study, the reconfiguration of assemblages is made through actors termed *objects of passage* (cf. Weilenmann et al., 2013). For the pedestrian, risky traffic events, bus stops and day-care centres may all act as objects of passage, where new walking assemblages can, or are forced to, emerge. These objects of passage also act as borderlines between different assemblages, within varying scales. A change of transport mode (scale ii) or residence (scale iv) can, therefore, also act as objects of passage. In relation to this, there is a need for the study of how actors work, not only as points for transformation, but also as connectors. This would imply studying how certain objects can gather or bind these different sorts of walking together, that is, *boundary objects*. A boundary object is 'an object which lives in multiple social worlds, and which has different identities in each' (Star and Griesemer, 1989: 409) and it plays an important role in the investigation of how different walking assemblages can coexist in the same urban environment, or at the same place. Boundary objects are of importance for this study, since walking assemblages cannot help but transform in order to sustain. Most walks include a series of different sorts of walking and the possible co-presence of such different sorts depends on boundary objects. A stable boundary object — such as a pedestrianised path or zone — might also prevent the need of constantly changing walking assemblages.

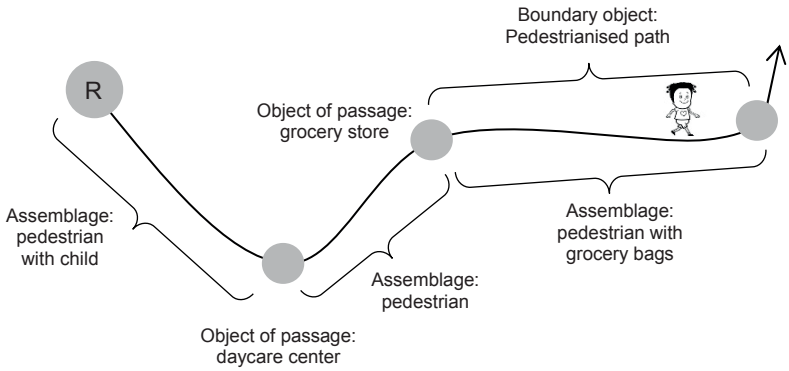

Figure 4
Graphical depiction of the four scales of the transport framework

To further address the interplay between different categories, or sorts of walking and pedestrians, the term *interseriality* is suggested. It stems from Sartre's concept of *series* (or seriality) which can be described as a number of individuals sharing a common way of acting, living or being, but who do not form a social group or community (Young, 1994). Often, series is used to describe people who share a space and an intention, but who do not know each other. It could, for example, be a group of people walking on a pavement, commuters sharing a railway carriage or people eating in a restaurant (ibid.). The way which a pedestrian becomes part of and leaves different series could be compared to the relational perspective of *intersectionality* as discussed by Valentine (2007). In her spatio-temporal take on intersectionality, she argues that different social categories (age, gender, class, ethnicity, sexuality, disability, etc.) are of concern in different situations. Thus, intersectionality, according to Valentine, is to be seen as a situated phenomenon, where a person's gender may be of more importance in one context (or place), while any disability might be more so in another. In comparison with intersectionality, an *interserial* approach would include a wider variety of different and looser sets of shared characteristics (regarding both humans and non-humans) and different sorts of practices such as walking with a bike, walking with grocery bags, etc. This approach would help to investigate how different walking assemblages relate to one another at the place of study; the perspective of interseriality is suggested as a way in which to focus on the relationship between different sorts of walking as dependent on place, time or situation. From the perspective of an individual, a walk may start in a dark park, continue along and across a busy arterial road, and end up in a crowded pedestrianised business area.

To conclude, in order to avoid rigid classifications of certain walking trips, a more person-focused perspective was put forward, where different walking assemblages become produced, then transformed through objects of passage, and sustained through so-called boundary objects. As for the scales, these concepts 'follow' the pedestrian/individual through a certain temporal or spatial context. Figure 4 shows a simplistic example in the context of spatio-temporal scales. The final section, Discussion and conclusions, will put the remainder of the thesis in the light of the concepts presented here.

3. Study B

This study concerns research question 1: How are pedestrians and walking understood, constructed and perceived in the planning context? To examine this issue, qualitative material from planning documents and interviews from three Swedish municipalities (Malmö, Lund and Helsingborg) was used.

3.1 Background and aim

In recent years, transport planning and research have seen increased attention paid to walking, not least through planning and research achievements with respect to, for instance, walkability, new urbanism, and sustainability However, despite this pronounced increase, knowledge about many aspects of pedestrian planning remains relatively scarce – as discussed in the Introduction. This study argues that these concurrent and somewhat contradictory courses in pedestrian planning constitute an interesting case for inquiry. Furthermore, that this simultaneous inclusion and marginalisation of walking ought to be examined with the help of an overarching planning concept.

Many of the methods of transport research and planning in which walking remains an exception belong to the realm of instrumental rationality (Willson, 2001), one of the core pillars of rational-comprehensive planning (Allmendinger and Tewdwr-Jones, 2002). From the perspective of transportation, instrumental rationality proceeded from systems theory and the laws of the natural sciences to model and calculate (vehicular) movement in cities and regions (Kane and Del Mistro, 2003). This (former) paradigm has been subject to heavy criticism by planning theorists (see Allmendinger, 2009), yet it remains inherently dominant in planning practice (Huxley and Yiftachel, 2000) and even more so within transport planning (Schiefelbusch, 2010). Willson (2001, p. 9) states that 'transportation planning has followed a schizophrenic path — acknowledging problems in instrumental rationality but continuing to employ it in research, practice and teaching'.

From the point of view of pedestrian planning, the rational-comprehensive approach is problematic for many reasons — both through its

focus on motorised traffic as well as through the planning and design ideals that have come in its wake (cf. Patton, 2007; Willson, 2001). In his review of research on pedestrian planning, Stangl (2008) identifies three alternative takes on instrumental rationality within this field: (i) existing models and methods need further refinement, (ii) the limits of instrumental rationality have been reached, and it requires supplementing methods and (iii) instrumental rationality does not suit pedestrian planning. Stangl seems to interpret instrumental rationality as a way of understanding pedestrian planning or walkability (e.g. in terms of needs, preferences, behaviour and design). However, as much as these three suggestions represent differing conceptions of the role or adequacy of instrumental rationality for pedestrian planning, they are also to be regarded as strategies, or prescriptions, for planning. This paper takes stand in the latter interpretation. The paper aims to explore to what extent pedestrian planning — within a specific geographical context — has subscribed to the methods employed within the limits of instrumental rationality. This topic comprises the following research questions: Has this been an explicit strategy? What might be the obstacles and pitfalls of adopting such a strategy? Is the existence of such a strategy apparent within pedestrian planning?

This study will start by expanding on instrumental rationality in transport planning. In order to address the normative and prescriptive aspects of instrumental rationality, it will then briefly elaborate on the handling of and outcome for different transport modes within the limits of this concept. The empirical part of the paper expands on this notion and presents an analysis of planning documents concerning urban and transport planning in three municipalities in the southern part of Sweden (Malmö, Lund and Helsingborg) together with transcripts from interviews with urban and transport planners in those municipalities.

3.2 The rational-comprehensive approach to transport planning

The rational-comprehensive approach is founded in the notions of instrumental rationality, which takes a positivist and seemingly objective approach to planning with its means steered by identified ends, even though instrumental rationality stipulates a strict divide between means and ends. This divide has been accused of being merely a theoretical construct rather than a description of how planning works in practice (Allmendinger, 2009). However, rational planning generally never meant merely to understand or

explain; rather, it aimed to prescribe how planning should come about. Likewise, Huxley and Yiftachel (2000) assert that much theorisation in planning is normative and prescriptive and strives to identify how planning should work, thus implicitly sidetracking any intention to explain why things are as they are. Their argument mirrors that of Marcuse (2002 [1964]) regarding the emergence of positivist research in the scientific world overall. Allmendinger and Tewdwr-Jones (2002) identify three parallel aspects of the communicative turn in planning, seeing communicative rationality as a method for analysis, as a prescription for planning practitioners and as a normative theory. This view also acts to illustrate how theory, methodology and planning practice are sometimes conflated or confused with one another. Albeit meant as a critique against planning theory (cf. Huxley & Yiftachel, 2000), it also demonstrates the impact, for instance, of instrumental rationality on practice.

In order to clarify the prescriptive and normative facet of instrumental rationality, the next section further discusses its relationship to car-based transport planning. This relationship effectively illustrates how instrumental rationality 'works' in practice, in terms of planning inputs and outcomes.

3.3 The car and the pedestrian in the realm of instrumental rationality

The utmost dominance of the car in the recent century has been conceptualised and understood in many ways (e.g. Furness, 2010; Gartman, 2004; Paterson, 2007). Urry (2004; see also Sheller and Urry, 2000) understands it as a 'system of automobility' comprising a number of components. These components generate 'the specific character of domination' of automobility (Sheller and Urry, 2000, p. 738–739), which covers the importance of the car in many aspects of society and social life. This paper does not aim to expand on Urry's concept. However, at least one of these components merits attention in this context, one described as a machinic complex encompassing related industries and subcontractors, road-building and maintenance, and urban design and planning. Although not implicitly mentioned in Urry's conceptualisation, the dominance of the car has also been prominent in the realm of transport research. The border between transport research and planning/policy is often imprecise (cf. Thoresson, 2011), where many research projects often are meant to inform, support or even justify car-focused transport planning. If planning theory and research have been accused of being somewhat distanced from practice (see Lauria, 2010; Vogelij, 2015;

Zanon, 2014), transport research has developed quite to the contrary, with many sub-fields characterised by a close connection and interaction with practice and policy.

Historically, instrumental rationality fit the need of planners in the twentieth century's automobile societies of Europe and North America (see Brown, 2006; Lundin 2008), a 'means to an end' approach ('predict and provide') that catered to a rising demand for transport. The role of the planning community was merely to execute the means needed (Owens, 1995). Transport planners managed to turn planning into a matter of solving specific problems, such as congestion and parking, based on quantitative and (seemingly) scientific methods. What started off as a broad, multidisciplinary exercise conducted by architects, engineers and planners concerned with the social, economic, aesthetic and transportation needs of city residents was turned into a narrow technical exercise (Brown, 2006; Whitley, 1988). Even if recent years have seen the introduction of new expertise and perspectives, the legacy of the methods primarily of civil engineering and economics persists (cf. Kane & Del Mistro, 2003).

All in all, it is problematic to aim at disentangling instrumental rationality from car-based planning. The relatively tight interdependence between means and ends safeguards the situation where both input (e.g. knowledge, data) and output (e.g. infrastructure design, modelling results) remain consistent and, thus, somewhat 'confirm' the present situation (cf. Schiefelbusch, 2010). Likewise, this close relationship also suggests that several of the methods stemming from instrumental rationality were originally not meant or designed for other transport modes such as walking. Yet many research efforts (e.g. modelling) regarding the automobile do not aim merely to address why vehicular traffic operates in a particular way, but rather, they address how it should function to meet certain ends (cf. Huxley & Yiftachel, 2000). The present paper contends that the realm of car-based planning well illustrates how instrumental rationality has become a prescriptive and normative exercise. Furthermore, it can also offer insight regarding the spatial and transport-wise aspects of instrumental rationality, formulated as follows: (i) who the road user is in the realm of instrumental rationality, (ii) what kind of knowledge is of interest within instrumental rationality and (iii) how instrumental rationality takes physical form.

The empirical analysis will concentrate on these particular aspects by examining the existence of a prescriptive and normative take on instrumental rationality for pedestrian planning. The next section describes the setting and the study design, followed by the empirical analysis.

3.4 Method

When researching and planning for pedestrians, the geographical scales of interest have included streets, neighbourhoods and cities. Formalised Swedish spatial and transport planning is to a great extent a municipal issue (Persson, 2013). The municipal (transport) planning discourse involves many types of potential material (meeting minutes, political propositions, public hearings, etc.), but for this study, the formalised and digested content of planning documents and strategies was of interest (cf. Tett & Wolfe, 1991). The focus was on how pedestrians and therefore strategies are described (or not) and whether instrumental rationality is immanent in these phrasings, rather than analysing the rhetorical and discursive nature of 'rationality' overall (cf. Maccallum & Hopkins, 2011). The planning documents were complemented by interviews with planners, two in each municipality. These were included to better grasp any implicit traces of instrumental rationality in the planners' reasoning.

Setting

The empirical data collection was performed in the municipalities Malmö, Helsingborg and Lund in the region of Scania in southern Sweden. The cities are relatively well recognised in the Swedish planning context for their work with sustainability in general and with sustainable transport in particular. This makes the three cities interesting for analysing pedestrian planning, but they are not necessarily representative of critical cases.

Malmö is the third largest city in Sweden, with about 310,000 inhabitants and a population density of 3,700 inhabitants per square kilometre, whereas Helsingborg (130,000 inhabitants; 2,500 per km^2) and Lund (115,000 inhabitants; 3,200 per km^2) are medium-sized cities in the Swedish context (Statistics Sweden, 2014). The three cities have a dense, fairly concentrated urban structure, and a relatively large share of the trips within and into each of the cities is made by foot, bicycle or public transport. The most recent travel survey (Wahl & Ullberg, 2014) for the region of Scania revealed walking trip shares of between 11% and 15% for the three municipalities, although such figures do not contain all walking trips in individuals' daily lives. The share of cycling trips is noticeably higher in Malmö and Lund (Wahl & Ullberg, 2014). The transport system of all three cities consists of a relatively built-up network for pedestrians, bicycles and cars as well as for buses and trains. The cities all have pedestrianised streets in the city centres and areas with traffic-calming

measures. Malmö and Lund also have certain planning strategies for pedestrians (Lund municipality, 2015; Malmö municipality, 2012a).

Swedish municipalities are obliged to have a municipal development plan, whereas mobility plans or strategies concerning certain transport modes can be produced if suggested by the planners or political representatives. The municipal development plan must contain guidelines for land-use planning within the geographical boundary of the municipality, and it includes guidelines for more detailed planning on a lower geographical level (Larsson, 2006). Its role and mandate makes it somewhat similar to the former structure plans of the United Kingdom. Larsson (2006) describes the municipal development plan as an agreement between national and local interests, even though each municipality has the right to formulate and adopt their own plan. This makes the municipality an important actor in the Swedish planning realm, particularly since regional plans most often are lacking. However, objectives and goals stipulated in a municipal development plan are not legally binding but merely act as steering recommendations and manifestations (Swedish Planning and Building Act 2010:900). The municipal development plan has a natural relationship with the transport planning of each municipality in the sense that it contains objectives for future transport planning strategies as well as in the sense that land use policies are likely to affect travel behaviour. These documents can therefore be said to be of relevance for pedestrian planning, even though they are not explicitly so and are applied on a larger geographical scale.

The relationship between municipal development plans, transport plans and pedestrian strategies is not clear-cut. The pedestrian strategies of Malmö and Lund are not planning documents as such, but they act as knowledge overviews and guidelines meant to put a greater emphasis on pedestrians in the planning process. Both of the cities' strategies contain an overview of relevant research findings, smaller questionnaire results regarding walking in the municipality and suggestions for guidelines and future planning initiatives. It should be acknowledged that specific strategies for pedestrian planning are still rare in the Swedish context. The lack of one in Helsingborg should, therefore, not be seen as a great deficit.

Data collection and analysis

The present municipal development plans (Översiktsplan in Swedish) for Lund (2010), Helsingborg (2010) and Malmö (2012b) were analysed along with the pedestrian strategies for Malmö (Fotgängarprogram 2012–2018) and Lund (Lunds fotgängarstrategi 2014–2018) and the transport strategy for Helsingborg (Trafikprogram för Helsingborg 2014). Sections of the municipal

development plans which did not directly cover transport issues were left out of the analysis.

In the semi-structured interviews, the planners were asked how they deal with pedestrian issues in their daily work, about projects where pedestrians have come into focus, which characteristics they think of regarding pedestrians and how these differ from those of other modes of transport. The interview guide contained initial questions posed to all respondents, but most follow-up questions differed among the interviews to allow the respondents to direct the interviews towards aspects that they found important. The intention was not to steer the respondents into talking about rational planning or quantification but rather, to see whether their reasoning about their work with pedestrians was related to these concepts. The planners had different amounts of experience with transport planning, from one having worked with planning for 40 years to another just having started a couple of years back. In total, six interviews were conducted — two in each city — in June and July 2010 in the planners' respective workplaces, and they lasted on average about 25 minutes. The interviews were recorded and transcribed by one of the authors.

Even though the planning documents are newer than the interview material, municipal development plans and other strategies are developed over longer time periods; therefore, we consider these data sources to be temporally relevant for studying jointly.

A common way of qualitatively approaching text-based data material such as documents or transcribed interviews is by performing a content analysis. The definitions of content analysis show great variation, but one common foundation is the identification of categories or themes in text material. The present analysis made use of concepts and techniques from directed content analysis (Hsieh and Shannon, 2005) in the sense that the coding categories were based on the three aspects of instrumental rationality presented in section 3. Each identified unit was, if possible, coded as one aspect. The next section will present the analysis of the interview and plan material.

3.5 Instrumental rationality in three Swedish municipalities' pedestrian planning

The introduction of this paper stated that walking has enjoyed increased attention in the planning and research of recent years, albeit concurrently remaining excluded from several methods originating in instrumental rationality. The following subsections will expand on the aspects introduced

above to examine the existence of a prescriptive and normative take on instrumental rationality for pedestrian planning.

The road user in the realm of instrumental rationality

This aspect addresses which transport modes are included in or excluded from means and ends in planning and how such operations are described.

Scholars have acknowledged how methods of instrumental rationality include inherent preconceptions and assumptions about how (road) users behave and operate. The notion of the rational actor is implicit in methods of instrumental rationality (Schiefelbusch, 2010) such as models of modal choice (Manderscheid, 2016). Willson (2001, pp. 3–4) states that 'it assumes that urban transportation systems operate in mechanistic, predictable ways — that immutable laws about travel behavior can be discovered and used for prediction'. As such, these assumptions do not, from a strategic perspective, necessarily pose a problem for pedestrian planning. Instrumental rationality can be seen as a matter of solving specific problems in transport planning ('how'), rather than of reaching full understanding of a phenomenon ('why') (cf. Huxley & Yiftachel, 2000; Zanon, 2014). However, since different characteristics, needs and metrics are ascribed to different transport modes, the consequences of these assumptions in planning and design merit attention.

Yet in the literature, it is somewhat ambiguous whether these assumptions are to be seen as merely theoretical constructs or as also based on findings regarding road user behaviour. In her investigation of 'utility cycling' in the UK, Aldred (2014) pinpoints how cyclists and cycling advocates feel compelled to prove assumptions that somewhat automatically are ascribed to motorised modes (e.g. time-saving, financially beneficial for society, rational). Translated to this study, Aldred's account illustrates how pedestrian planning becomes a matter of acknowledging and including walking in the (many) facets of instrumental rationality which previously only comprised motorised modes. The material in this study revealed different aspects of pedestrians' inclusion in and exclusion from planning exercises, both regarding means and ends.

The interviewed planners touched upon the issue of walking being an 'unplanned' mode of transport. Some of the respondents suggested that walking is taken for granted in planning and is thus not given enough attention. In Malmö's pedestrian strategy, it is suggested that this lack of attention occurs because pedestrians can 'move around practically anywhere' (p. 8). The planners also seemed to address the question of pedestrians being taken for granted and being somewhat 'invisible' in planning. The reasoning of one planner in Lund pointed to how the place-based and particular treatment

of pedestrians comes from a notion of their needs being fulfilled by the mere existence of sidewalks and road crossings:

> *Walking is treated quite traditionally. It has probably been seen as if 'there is always space' … [or] 'If you construct a walking and cycling track there is always the possibility to walk, right?' /…/ It has been taken for granted; 'people walk no matter what', kind of… [this is] a basic assumption in the general reasoning about transport planning, I think. (Planner 3, Lund)*

In the interview study, the respondents were asked which kind of pedestrian or walking trip they immediately thought of, and several of them thought of those trips for which walking is more or less the only option left or is at least deemed to be so. One planner in Helsingborg spoke of children's trips to school, and one planner in Malmö considered pedestrians to be those who are concerned about the environment or those without access to other modes of transport.

> *Children who are going to school, that is probably the first thing I think of when talking about walking trips. Because they haven't started cycling yet and neither are they allowed to. They must walk. (Planner 5, Helsingborg)*

> *There are people who are environmentally conscious, and there are of course people who lack financial resources and a means of transport. Then I think of cars, everyone is of course able to afford to buy a rusty old bicycle. But there are people who lack the means to buy a car, or people who are environmentally conscious and care about their health and hence walk. (Planner 1, Malmö)*

Walking is described in this case more as an act of compulsion or forced habit than as a (rational) choice (cf. Middleton, 2011). Likewise, the slowness and low cost of walking could easily cause it to be perceived as an option of those without a car or other mobility-related resources. The planners also reasoned from a spatio-temporal perspective regarding the limits of walking. One of the planners (no. 6) expressed the limits of walking by arguing that cycling dominates as a modal choice for trips 'longer than 10–15 minutes'. Another planner suggested that walking has to be purposefully and carefully scheduled into an individual's everyday life:

> *So it depends on time, quite simply how one plans their schedule for the day. Are you busy and working and planning your time so you can walk? It is, of course, a simple fact that it is something which I can prioritise; what do I want, how much of a rush am I in? / ... / If you're not in a hurry to get somewhere, you can always walk. (Planner 1, Malmö)*

Another aspect of the 'invisibility' of walking in transport planning refers to the act of treating walking as the same type of mode as cycling. There are a number of planning and research projects where pedestrians and cyclists have been merged into categories such as 'non-motorised transport', 'active commuting', 'healthy transport' and 'vulnerable road user'. Although possessing several similarities, walking and cycling are quite different modes in terms of speed, trip length and requirements regarding infrastructure. Almost everyone is a pedestrian now and then (e.g. trip chaining, strolls, etc.), while by no means everyone is a cyclist in everyday life (cf. Tight et al., 2011). Swedish transport planning in general has had a habit of almost treating walking and cycling as a single transport mode (labelled 'GC-trafik'). This phenomenon is common in planning strategies and in travel surveys, and it becomes materialised in the form of shared tracks and lanes for pedestrians and cyclists. This idea also comes through in the studied municipal development plans. However, Malmö's and Lund's pedestrian strategies express a will to refrain from merging walking and cycling in the future and also to more explicitly treat walking as a mode in itself, both in terms of organisation and design. The mere existence of these strategies is an expression of this desire.

In addition to the merging of walking with cycling, there is an implicit exclusion of walking from some parts of the transport planning agenda. In the municipal development plans of Lund and Helsingborg, walking seems less considered as a means for modal shift than are cycling and public transport. Sometimes walking is included and sometimes not, with a seemingly inconsistent pattern. The municipal development plan of Helsingborg describes cycling and public transport as potential replacers of car trips, while walking appears to function as a mode for merely creating an attractive and vital city centre.

> *Already today we have great amounts of traffic in the city centre that contribute to adverse effects for air quality and the attractiveness of the urban realm. This creates a need to develop public transport and cycle tracks as a complement to automobile-based transport. (Municipal development plan, Helsingborg, p. 13)*

Thus far, the empirical analysis has illustrated how walking, in various ways, is included or excluded within planning. However, walking can also be excluded from agreed-upon goals and ends. The municipal development plans as well as the transport-specific strategies include several goals or planning objectives which are to be achieved or aimed for. From the perspective of instrumental rationality, goals and objectives are normative by definition, but they can appear almost as necessary outcomes (ends) resulting from predictions and other calculations (means). In the municipal material, however, the goals regarding pedestrians are not based on or justified by means. Instead, they are

general, vaguely defined goals that do not address the competition between different modes; that is, they include statements such as 'It should be made easier to walk' and 'The city centre should be developed based on pedestrians' needs'. Helsingborg's municipal development plan contains such a broad objective:

> *The city must be developed on terms that are favourable for the pedestrian. The possibility of Helsingborg's residents to easily and in an unhindered manner move about on foot in central parts of the city is an important prerequisite for the public spaces to serve as meeting places. (Municipal Development Plan, Helsingborg, p. 21)*

The other kind of identified goal is that which admits to being in competition with the interests of other transport modes. For instance, in the municipal development plan of Malmö, it is stressed that restrictions on the level of service of other modes are necessary to obtain a more walkable city, and in Helsingborg's plan, it is stipulated that good conditions for pedestrians (and cyclists) should be prioritised to the same extent as for other modes. Still, the goals remain unquantified, and specific objectives regarding modal share are more or less absent.

However, the municipalities do view walking as a means to other ends (compared to viewing it as an end in itself). In recent years, pedestrian planning has been presented in many contexts as a means of addressing societal challenges, and this instrumental view regards pedestrian-friendly planning as a way of tackling public health, gender inequality, pollution and congestion issues (e.g. Southworth, 2005). Helsingborg's municipal development plan views increased walking as a guaranteed way to achieve better air quality, more space for an urban lifestyle and increased well-being. The municipality's transport strategy also points to the benefits of walking for gender equality, reduction of stress for residents and increased retail sales in the inner city. Malmö's (overall pedestrian-focused) municipal development plan even sees walking as an inevitable effect following the plan's aim of densification; that is, the planning documents justify an increased interest in walking for instrumental reasons. Malmö municipality plans for the pedestrian not only based on a normative agenda but also based on necessity.

To summarise, many of the planning documents express a will to explicitly include walking in planning exercises, but not necessarily those defining instrumental rationality. The planners seem doubtful about how to acknowledge the pedestrian and are somewhat self-critical regarding their, or their municipality's, priorities thus far.

The knowledge of interest within instrumental rationality

One important factor explaining the paradigm-like dominance of instrumental rationality is the adoption of a quantitative approach to transport planning, with a focus on mathematics, models and forecasts (Willson, 2001). This process of quantification justifies itself by appealing to values such as objectivity, formality and generalisability (Porter, 1992). Transport planning has historically been keener on using quantitative methods compared to other parts of the planning field (cf. Brown et al., 2009; Te Brömmelstroet and Bertolini, 2010). This has been particularly the case in car-based transport planning, and these methods have proven successful, intentionally or not, in their ability to justify policies beneficial for car use (Brown, 2006; Lundin, 2008). In the realm of transport planning, the pedestrian remains relatively 'unquantified' in comparison with other transport modes (Manderscheid, 2016), with traffic safety and walkability studies being two exceptions.

In Malmö's and Lund's pedestrian strategies, as well as in Helsingborg's transport strategy, the importance of quantifying the pedestrian is underlined. All three municipalities monitor walking in their city, although to a lesser extent than other transport modes. This monitoring involves volume counts, travel surveys and injury data. Helsingborg's transport strategy and Malmö's municipal development plan also highlight the vast differences between the uses of space for different transport modes. Malmö's pedestrian strategy considers volume counts as a prerequisite for monitoring the effects of physical measures, for estimating the width of pavements and for mapping where a specific measure would benefit the most pedestrians.

Still, if walking was to be counted and monitored to a greater extent, it might seem unnecessary to include it in assessments of transport investments due to its slow nature. Moreover, its limited range might make it seem of minor importance when assessing the potential of transferring car trips to other transport modes, as is expressed in the municipal development plans of Lund and Helsingborg. One respondent verbalised this concern:

> *But even so, my experience is that many times they say [about walking], for example, 'But there simply isn't so much potential,' or 'Yes, that is important, but there are so few passenger kilometres anyway; it will never have any CO2 impacts.' (Planner 2, Malmö)*

Manderscheid (2016) argues that the process of quantification (or 'numeracy', as she calls it) is an inevitable strategy for receiving attention in policy-making, notwithstanding any theoretical or methodological complications this may result in. The studied municipalities have indeed sought to measure and count pedestrians. However, it is not clear whether

these efforts are parts of an explicit and consistent strategy of quantification. To allow for commensuration (Espeland and Stevens, 1998) — that is, comparing different entities with a common metric — walking ought to be measured with the same metrics as car traffic and public transport. However, the municipalities partly measure pedestrians in other ways (e.g. presence of pedestrians at urban places, fear of crime), and some methods for data collection might exist in too early a stage to allow for comparison with other transport modes.

How instrumental rationality takes physical form

Arguably, it is more or less apparent that historically, instrumental rationality has played a role regarding the differing outcomes for different modes of transport in terms of land use, infrastructure and design. Patton (2007, p. 929) argues that both the means and ends of instrumental rationality are value-laden, and 'the resulting material forms are similarly value laden in that they shape city streets by design to facilitate particular forms of movement'. This street design ideal shares many characteristics with the ideal of modernism (Koglin, 2013; Lundin, 2008). Modernist transport planning was dominant in Sweden for many decades, and its ideas remain implicit in contemporary street design (Koglin, 2013). However, present-day Swedish transport planning also comprises street design that could be seen as competing with modernism or instrumental rationality. While modernist street design strove for a high level of service, which resulted in the separation of traffic flows and transport modes, contemporary planning often promotes integration, negotiation and interruption between different road users through the implementation of speed-reduction measures and shared space design. Yet within the Swedish planning community, there is still disagreement regarding which of these design ideas most favours and supports walking.

In Lund's pedestrian strategy, it is stipulated that the municipality's design guidelines ought to be changed to be more in line with the perspective of the pedestrian. When creating walkable environments, one of the planners seemed to be concerned about the use of prevalent level of service and design principles that were originally developed for vehicular flow:

> *Something that has bothered me in the debate about 'the walkable city' is the notion that it would all come together if we simply had much wider walkways ... that this is the thing [that is important], that two baby strollers are able to pass by a wheelchair. (Planner 4, Lund)*

This statement suggests that walkability should be about more than having sufficiently wide pavements. The same planner implicitly also addressed the issue of level of service in a discussion about the placement of pavements compared to the placement of car lanes:

> *Well, then, we instead place the pedestrian pavements next to where the cars are going [again referring to the debate about walkability in the planning community] and then instead the cars can see the women [to make them feel safer while walking] and you get a very large space that is unpleasant with cars whizzing by, etc. But then it is a street which is made with turning radii that works well for cars. (Planner 4, Lund)*

The issue illustrated here is whether principles and methods developed for a certain transport mode can be used for another. In relation to this, Patton (2007) sees the pedestrian as a representative of a competing rationality. He suggests that 'walking and driving each follow a distinct rationality, with different rhythms and concerns, that create fundamental conflicts over how streets should be designed' (p. 932).

One such conflict is present in Lundin's (2008) historical account of Swedish car-based planning in the middle of the twentieth century. He describes how transport planners acted as representatives of rule-based expertise. The nature of rule-based knowledge is that it strives to be applicable in different contexts; therefore, it must be generalisable, objective and simplistic. The other field of expertise favours knowledge based on judgement and emphasises values such as complexity, subjectivity and quality. Translated into practice, a planning project based on rule-based knowledge employs the same principles regardless of context, whereas judgement-based knowledge stresses that each situation is unique. This divide is mirrored in Stangl's (2008) study of pedestrian planning; he relates flow to 'the 'place-blind' nature of instrumental rationalism' (p. 762) and sees the concept of 'place' as advocating a focus on complexities, qualitative aspects and the mixing of several factors as opposed to the isolated thinking of instrumental rationality. However, methods originating from flow-based thinking have been deemed more applicable in different geographical contexts, making this 'place blindness' an advantage within transport planning (cf. Stangl, 2008).

In the light of these concepts, the pedestrian strategies of Malmö and Lund both express an aim to move away from, or rather broaden, the kind of 'black-spot thinking' that has characterised work with pedestrian issues in the two cities. This notion implies a focus on particular micro-scale measures, for example creating safer crossings, or measures for road users with functional limitations. Lund's strategy stipulates that pedestrian planning needs to be a part not only of the micro-level of planning, but also of the planning at the

municipal level. Malmö's strategy discusses the focus on specific measures that has historically been found in Swedish pedestrian planning, and it points out that 'general guidelines for walking are lacking' (p. 7). However, even though this lack is considered a deficit, the same strategy seems to address the place-based nature of planning:

> *There are no clear guidelines on how to take pedestrians into consideration in the planning process. However, it is difficult to develop general and clear guidelines, since planning is always a matter of combining different interests. The preconditions differ for every development depending on the block or neighbourhood. (Pedestrian strategy, Malmö, p. 26–27)*

The analysed material also revealed a positive view of place-based planning. In research, a pedestrian-friendly or walkable environment is suggested to be one that allows the pedestrian to enjoy a positive experience of the built environment (Ewing & Handy, 2009; Middleton, 2010). During the interviews, the respondents used words like 'stimulation', 'positive experience', 'joy', 'details', etc. The planning documents also connect walking to aspects such as attractiveness, interesting environments and a thriving urban life (e.g. Helsingborg munipality, 2010, p. 38). Such aspects do not necessarily belong to the place-based or judgement-based realms, but if operationalised, they come out as less quantifiable and less rigid than the concepts of flow, level of service and modal share. Stangl discusses how Southworth's (2005) widely cited definition of walkability includes, in Stangl's words, 'seemingly unquantifiable' aspects such as the quality of walking paths and the environments they run through (2008, p. 764). He argues that the issue is not only whether aspects such as quality, stimulation and complexity can be measured but that it is also whether they should be measured. To scientifically analyse them is also to risk 'concealing their multi-dimensional nature' (p. 764). This is in contradiction to the appeal to simplicity, measurability and continuity which characterises flow-based transport planning and, indeed, instrumental rationality (Stangl, 2008). One of the respondents saw the lack of continuity as a drawback for walking:

> *I think the most difficult thing for pedestrians is that there is no continuity in the walking environment. You are constantly forced to change focus…and there are different pavement surfaces [on the same stretch]. (Planner 3, Lund)*

This conflict of strategies touches upon the question of whether pedestrian planning is an issue of designing interesting and attractive places or if it merely concerns allowing for efficient flow or maintaining an acceptable level of service. However, present-day planning discourse highlights the importance of combining the flow (or link) and place functions of streets and

urban places (cf. Marshall, 2004). Malmö's municipal development strategy even refers to pedestrians as 'positive traffic flow' (p. 43). Moreover, streets or places deemed 'urban' or 'successful' are those where walking is a matter of standing and strolling as well as purposefully moving (Gehl, 2011). As mentioned in its pedestrian strategy, Malmö municipality addresses this double nature of walking by measuring the flow as well as the presence of pedestrians (i.e. the number of people using a public place).

To summarise, an ambition for standardisation regarding pedestrian-friendly design — for example through guidelines and strategic planning — is implicit in the analysed material, but not necessarily through methods of instrumental rationality.

3.6 Conclusions

This paper aimed to explore to what extent pedestrian planning has subscribed to the methods employed within the limits of instrumental rationality, by acknowledging the prescriptive and normative nature of the concept. The setting was three relatively pedestrian-friendly municipalities in southern Sweden where planners in recent years have shown particular interest in walking. The analysis was based on the three aspects regarding instrumental rationality put forward in section 3. The analysed material displays walking as increasingly being (i) included in planning exercises, (ii) monitored and measured and (iii) appointed general design guidelines. However, it cannot be concluded that these efforts form a consistent and thought-out strategy proceeding from instrumental rationality. Walking remains seemingly excluded from many methods defining this concept. Furthermore, the means are not described as explicitly related to certain ends, or vice versa.

4. Study C

This section describes the quantitative empirical part of the thesis, i.e. Paper III, IV and V. The theories and methods employed are described and discussed jointly. All of the papers made use of data from the same questionnaire, albeit through differing approaches, statistical methods and variables.

The first three sub-sections present and discuss the study's theoretical concepts regarding pedestrians' behaviour in time and space. It starts by discussing the rationales for making use of theories in the context of transport studies — and particularly when studying the built environment and everyday travel. The discussion is then organised in line with theorisations made for each of the study's papers. Paper III uses theory to examine walking and time in the context of everyday life; Paper IV links the theoretical approach of Paper III to theoretical concepts regarding the influence of the built environment; Paper V adds preferences to the discussion and reasons how this inclusion develops the understanding of the relationship between the built environment and walking. The theoretical concepts present are also linked to the transport framework introduced in the introductory section above.

4.1 Why use theory to study walking?

From a planner's point of view, it might seem self-evident that spatial planning and urban design can influence travel behaviour (in terms of mode, distance, speed, perception etc.). This notion also constitutes one of the rationales for governing a city's urban structure and design. However, from a research and policy point of view it remains crucial to examine *why*, *how, for whom, when* and *how much* the built environment influences travel behaviour. This implies addressing issues such as: What do we mean when we say that the built environment influences travel? Which features or aspects of the built environment actually influence behaviour? For which groups of individuals are measures most likely to give an effect? For which trips or modes do measures mostly influence behaviour? What is the magnitude of effect of any built environment measure — not the least in comparison with other policy

measures? Is this relationship to be seen as being mediated by perceptions and preferences rather than as a direct one? And if so, does that have implications for policy?

The questions posed above all point to the need for producing theoretically grounded findings. However, many studies on the relationship between the built environment and travel behaviour — such as those on walkability — have been criticised for lacking a conceptual or a theoretical basis (see Handy, 2005; Saarloos et al., 2009; Kwan, 2013). Moreover, it has been argued that this field, although perhaps not deliberately, to some extent employs a view of *physical determinism* (Riggs, 2014), i.e. the notion that the physical (built) environment casually influences (travel) behaviour. One reason for this might be that research questions and methodological approaches often originate from policy issues and societal challenges, instead of making a theoretical point of departure (as pinpointed by Handy, 2005).

Any attempt to theoretically advance this research field should then be welcome. In recent years, theoretical contributions have been made through the use, for instance, of social-ecological models (e.g. Sallis et al., 2006; Alfonzo, 2005) and activity-based models (e.g. Saarloos et al., 2009; Kwan, 2013). Despite these contributions, this thesis argues that such theoretical approaches still need to be adjusted to explicitly address the pre-conditions and characteristics of walking.

4.2 Theorising time and distance in the context of everyday travel

The transport framework of this thesis stipulated that walking ought to be viewed and studied at several spatio-temporal scales. The scales are spatial in the sense that they refer, for instance, to a place or a route (scale i), a neighbourhood (scale ii, iii and iv) or a city (scale ii and iii), and temporal in the sense that they refer to short moments (scale i) or a whole day (scale iii). However, making sense of, and operationalising, the term *spatio-temporal* — which implies studying time and distance concurrently — would require a theoretical point of departure. When time or distance have been put in a theoretical framework within transport research, it has often been that of micro-economic models (Börjesson and Eliasson, 2012; Mackie et al., 2001), time and distance cognition (MacEachren, 1980; Säisä et al., 1986) or *time geography* (Schwanen et al., 2008; Farber and Páez, 2011). In this thesis, time geography is used to conceptualise the dimensions of time and distance.

Central concepts of time geography

The connection between time geography and transport studies can appear almost natural. Time geography's way of describing agents as interacting in a spatio-temporal context is a powerful and illustrative framework for transport analysis and research. In addition, transport modes — for instance walking — constitute an important part of the time-geographical realm. Transport is what enables individuals to take part in activities situated elsewhere in space. The culmination of such activities is considered to constitute a *project* for the individual, giving the aggregate of activities a greater purpose than the sum of its parts (Ellegård, 1999). A project consists of series of sequential tasks necessary for any behaviour or activity with an underlying intention (Neutens et al., 2011). In this thesis, recurring everyday projects are of interest, such as working, consuming and socializing. Many projects involve other people and resources and a time-spatial coordination is therefore needed.

Individuals[6] in the space-time realm are assumed to be indivisible and therefore traverse a continuous path. The possible paths an individual can choose among are visualized through a *prism*, which size is arguably dependent on the amount of time at hand and the possible speed at which the individual can move (Hägerstrand et al., 2009). From an everyday perspective, the amount of time at hand is the daily travel time budget (TTB)[7], corresponding to approximately 80 minutes (Ahmed and Stopher, 2014). Figure 5 below depicts a prism for a pedestrian. From an everyday perspective, the figure would depict how far from home a person can travel, given that this person needs to end up at the same place ('the principle of return'). The concept of prisms is closely connected to an individual's *potential path area,* which denotes the area that a person can reach at a certain speed in a certain time, whereas the *action space* denotes the actual area traversed (Patterson and Farber, 2015).

[6] In this study only individuals are taken into account, but other (non-human) actors/entities might also be of interest (cf. Hägerstrand et al., 2009).

[7] The TTB phenomenon is expanded upon in section 4.5 and in Paper III.

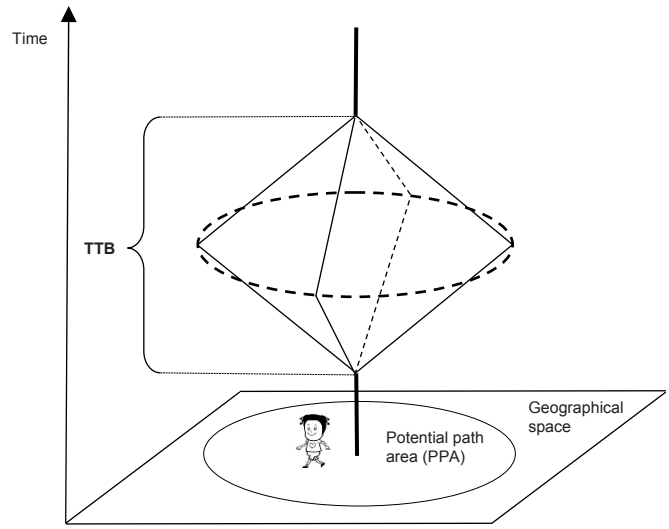

Figure 5
Theoretical prism for a pedestrian, displayed with her/his potential path area (PPA) and travel time budget (TTB).

The term pocket of local order (PoLO) is used to — so to speak — set the scene for analysis on how individuals adapt to restrictions and the available resources in a specific spatio-temporal context. A typical PoLO for analysing (travel) behaviour would be a city or a neighbourhood (cf. Westermark, 2003). The possible time-space trajectories within a PoLO are defined by three groups of *constraints*. Hägerstrand (1970), Pred (1977) and Westermark (2003) all give exhaustive definitions of the constraints said to affect the time-spatial behaviour of individuals. The following definitions derive from those, but have been adjusted to better throw light on the context of the pedestrian. However, just two of them, i.e. coupling and capability constraints, lie within the scope of this thesis and are thus included here.

Coupling constraints

An individual's coupling constraints describe the need to be present at a certain time and place, and to cross another's path at a particular time in a particular place (Hägerstrand, 1970; Hägerstrand, 1989). The coupling constraints are considered to limit or prohibit the possibility for a person to participate in other activities simultaneously or elsewhere (Hägerstrand, 1970). The coupling constraints of a person whose activities are more fixed in a spatio-temporal sense will be more apparent, while a person with more flexible activities is

considered freer to carry out movements in space and time (cf. Schwanen et al., 2008). For the sake of comparison, a person's daily walk to work is usually fixed both in time and space, while an activity such as going for a stroll could be flexible in both time and space.

Capability constraints

Capability constraints describe the individual's physical capacity, tools, skills and material resources with respect to her/his scope for carrying out activities in the context of everyday life (cf. Ellegård, 1999; Hägerstrand, 1970). For this study, it is considered that the main capability constraint facing individuals in their decision to walk is whether or not they will meet the crux between their capacity (physical and cognitive) and the pressure of the environment in which they move (cf. Lawton and Nahemow, 1973; Mercado and Páez, 2009). For most activities undertaken by many individuals on a daily basis, the environment which is traversed does not exert an overly restrictive amount of pressure, for shorter distances at least. However, for groups such as those more subject to functional limitations, this capability constraint becomes more apparent and may seriously affect the individual's propensity to walk in order to reach activities, especially if these activities lie further away (Church and Marston, 2003; Wennberg et al., 2009).

Time geography in the research world

As for any widely employed concept, the ideas of time geography have been both scrutinised and criticised since their advent in the late 1960s (e.g. Davies, 2001). Goodman (2001, p. 50) claims that time geography has a linear conceptualization of time and treats time 'as a one-dimensional, uncomplicated mechanistic and measurable concept'. It has also been accused of employing too simplistic a view of human agents and of not considering the preferences, feelings and other characteristics they may have (Lenntorp, 1999). The term 'project' has also been regarded as theoretically to primitive and not addressing the nature of social institutions (Gregory, 1984). One defence against this critique is that time geography is not to be regarded as a theory as such, but rather an ontological view to which theories on societal and behavioural issues can be linked (cf. Lenntorp, 1999).

Despite this critique, the field has seen a revival in recent years (see Neutens et al., 2011). Not the least time geography and other ego-centred concepts have been employed to study travel behaviour (e.g. Rainham et al., 2010). This is partly due to increasing computer capacity and the availability of GPS information and other 'big data' sources on a disaggregate level (Kwan,

2013), but also due to a renewed awareness of the role of time, household responsibilities and other constraints for understanding travel behaviour. Recent years have also seen attempts to address the multi-dimensional and concurrent nature of time and time use, particularly with regard to ICT use (e.g. Couclelis, 2009; Vilhelmson and Thulin, 2008). Further, Schwanen (2007, 2008) and Couclelis (2009) have sought to theoretically inform time geography.

Within transport research, time geography has, aside from empirical comparisons of prisms, mostly been employed in an 'a-modal' sense, i.e. without focusing on the characteristics of specific transport modes (cf. Neutens et al., 2011). Howerer, there are indeed differences regarding the interaction of space and time between, for instance, car travel and walking (cf. Farber and Páez, 2011). The pedestrian's trading of time for space can, compared to motorised modes, only be done within small ranges.

Paper III employs time-geography to expand on this notion and to empirically compare the pedestrian's rating of the importance of travel time and distance.

4.3 Theorising the relationship between the built environment, everyday life and travel behaviour

If time-geographical reasoning stresses a focus on constraints to understand and examine travel behaviour, much of the research on travel behaviour puts emphasis on (modal) *choice*, as discussed in section 1. Even though these two perspectives come across as somewhat contradictory, a complex of 'choice in the context of constraints' (Jones et al., 1983: 266) is a common approach within transport studies (see Elldér, 2015). This thesis continues on this path by stressing the need for viewing the choice to walk as something occurring in a context of constraints. Research on the relationship between features of the built environment and walking has not often explicitly considered the limits and constraints that time imposes, as pinpointed by Handy (2005). Moreover, just as time geography has been criticised for employing a mechanistic view of individuals' spatio-temporal behaviour, research on walkability has been deemed as ignorant of individuals' perceptions, attitudes and preferences (Handy, 2005; Bauman and Owen, 2009).

To overcome this critique and accusations of physical determinism, as well as to further the understanding of the relationship between the built environment and travel behaviour, scholars have in recent years shown a greater interest in the *subjective* facets of this relationship. In this case,

subjective encompasses both perceptions and preferences. Just as individuals perceive the built environment differently in situ, they also possess different preferences regarding travel and the built environment 'beforehand'. Although this might seem like an obvious matter, not a great deal of research has taken it into account. This deficit is probably not only due to unawareness, but also to a historical lack of such data or to a conception of socio-demographic characteristics acting as 'good enough' proxies. Variables describing travel behaviour are often taken from larger travel surveys that seldom contain information on the respondents' preferences and attitudes regarding travel, but nearly always reveal age, gender, income, etc.

Not only does the inclusion of perceptions and preferences increase the explanatory power of models, it also offers a theoretical insight into *how*, *for whom*, *when* and *how much* the built environment influences travel (as discussed above). Particularly the issue of self-selection, i.e. the role of preferences for residential choice, pinpoint these issues (cf. Bohte et al., 2009). This phenomenon refers to individuals selecting themselves into preferred choices rather than being randomly distributed (Hong et al., 2014). Self-selection effects come from preferences, attitudes as well as from socio-demographic characteristics. However, in the field of urban form and travel behaviour, the self-selection problem has mostly been understood as concerning preferences. This conception can be summarised as follows. The travel behaviour of residents in a neighbourhood is partly dependent on the fact that residents have chosen to live in a neighbourhood that they perceive lives up to their preferences of, for instance, walkability. Consequently, neighbourhoods with a large share of walking could be understood as consisting of residents who have chosen to live where they perceive walking to be feasible, pleasant, etc., in addition to the built environment itself encouraging walking. Self-selection is then considered to either lessen or strengthen the effect of the built environment on travel behaviour (Handy et al., 2005). Furthermore, with the commonly used cross-sectional datasets, it cannot be concluded that the built environment has a causal effect on travel behaviour. The use of longitudinal data is one way of getting closer to causality, although such datasets are relatively rare. To compensate for this, variables addressing self-selection have often been used to simulate respondents' preferences regarding travel and residential choice before they moved, and thereby aiming to meet the criterion of temporality, that the cause precedes the effect — in this case meaning that the influence of neighbourhood design (the cause) precedes a person's choice of travel (the effect) (Mokhtarian and Cao, 2008).

Although many cross-sectional studies have included variables addressing self-selection, fewer have discussed what it implies regarding our understanding

of the relationship between the built environment and travel behaviour. In a theoretical paper, Chatman (2014) argues that earlier studies incorporating self-selection effects have failed to recognise that individuals with different preferences may react differently to the same kind of built environment. Even though scholars have acknowledged that individuals have different preferences for residential choice, Chatman stresses that they have not been fully able to methodologically account for the existence of differing responses to the built environment, although they have understood it conceptually.

For the sake of clarification and illustration, Chatman (p. 49–51) stipulates four different generic scenarios in the case of walking that describe potential interaction patterns between the built environment, preferences and travel. The four scenarios are listed and illustrated in Figure 6. The black lines (group A and B) represent the actual levels of walking related to walkability; the grey, dashed lines are the seemingly observed relationship if preferences are unknown, but people have still selected themselves into neighbourhoods that are consistent with their preferences.

1. Walking preferences have a fixed effect on walking; the built environment has no influence.
2. Walking preferences have a fixed effect on walking; the built environment influences walking the same way regardless of preferences.
3. People with walking preferences are more responsive to the built environment.
4. People with walking preferences are less responsive to the built environment, but have a higher rate of walking.

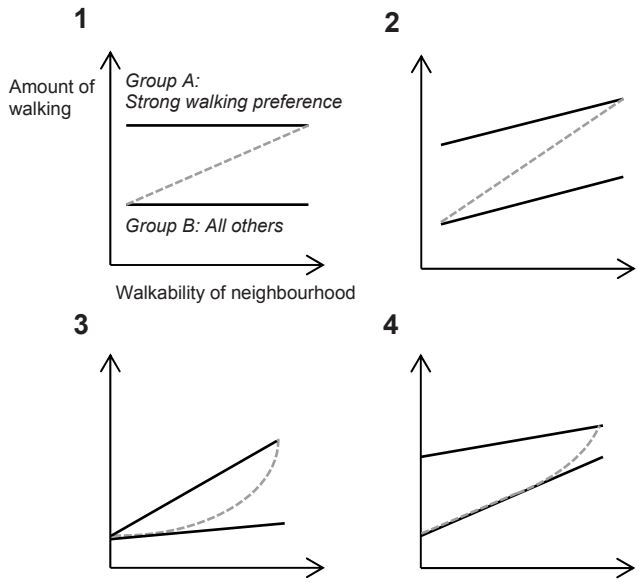

Figure 6
Chatman's (2014) four scenarios for illustrating the interaction between the built environment, preferences and walking.

In scenarios 1 and 2, the observed effect of a neighbourhood's walkability is fully (scenario 1) or partly (scenario 2) due to differing preferences regarding walking in the study sample. In scenario 1 the built environment only affects residential choice and not travel behaviour. In scenario 2 the built environment does influence travel, but the effect of preferences is still fixed. As with the common understanding of self-selection, when not taking preferences methodologically into account, the effect of the built environment might be exaggerated (Chatman, 2014).

Thus, self-selection concerns *how* (through the expression and satisfaction of individuals' preferences), *for whom* (perhaps more for individuals with certain preferences) *when* (both before and after a change of residence) and *how much* (due to travel behaviour partly being correlated to preferences 'alone') the built environment influences travel.

A socio-ecological model for analysing walkability

To recapitulate, walkability studies have been criticised for lacking a theoretical basis (Handy, 2005; Riggs, 2014), not taking spatio-temporal behaviour into

account (Rainham et al., 2010) and for not considering perceptions of the built environment and travel (Bauman and Owen, 2009; Handy, 2005).

Alfonzo's *hierarchy of walking needs* (2005), shown in Figure 7, is a socio-ecological model that can be said to address almost all of these issues by conceptualising the built environment features that have been studied in previous research. Additionally, it links these features to the limits that everyday activities and responsibilities impose. Alfonzo places the model within a social-ecological framework where a number of attributes on an individual, group and regional level are said to influence the extent to which a person is affected by the hierarchy. Hence, the model is not directly linked to the decision to walk which means that people may have different thresholds in the hierarchy where their demands are sufficiently met. Some aspects and features are seen as fundamental in the sense that they should be fulfilled in order for higher order aspects to become relevant for the choice to walk. Its principles stem from Maslow's hierarchy of needs (Maslow, 1943), but its aspects relate to the built environment and everyday life rather than individual motivations overall. At the bottom of the hierarchy is feasibility, a basic aspect describing personal limits as opposed to an aspect associated with urban form. Above feasibility lie aspects related to local urban form and urban planning. These are accessibility, safety, comfort and pleasurability (Alfonzo, 2005). This study's operationalisation of the aspects will be expanded upon in the empirical analysis of Paper IV.

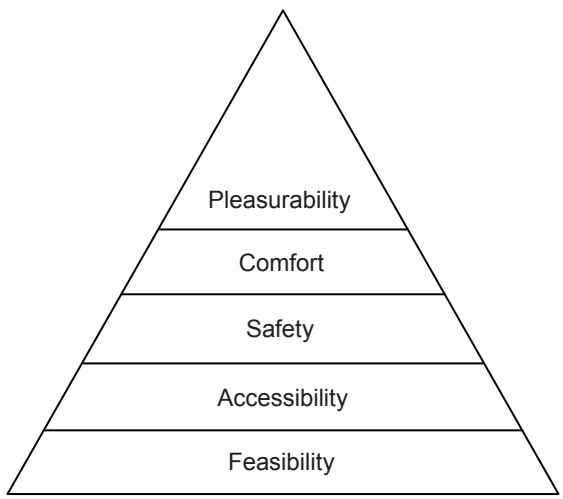

Figure 7
Alfonzo's Hierarchy of walking needs

For this study, Alfonzo's model has a fundamental and interconnecting role. It is theoretically and empirically explored in Paper IV and, through its basic aspect feasibility, is also related to the time-geographical approach of Paper III. Moreover, Paper V concerns the influence of local urban form, which constitutes the upper part of the hierarchy. Paper V also adds another temporal scale to the hierarchy with its inclusion of preferences regarding the choice of residence. These papers are presented in the following sub-sections.

4.4 Method

In order to examine individuals' walking behaviour, this study uses the home as a spatial operational point of departure. Given the thesis' emphasis on studying walking at several spatial scales and with an intermodal approach, this point of departure might seem uncalled-for. However, despite individuals' and households' mobile everyday lives, the home remains an important anchor in everyday travel. Ellegård and Vilhelmsson (2004) sees the home as a vital pocket of local order. Elldér (2015) argues that the home is a spatial unit of almost equal importance across various groups of individuals, when it comes to travel behaviour. However, from a methodological point of view, an individual's home (or residential location) should not be equated with their *neighbourhood*. The relationship between proxy variables representing the 'home' and travel behaviour can be examined without including neighbourhood characteristics, for example in studies on household interactions. This is also to say that studies regarding neighbourhood effects often lack the perspective of how 'home' or 'household' can be interpreted in the context of travel behaviour. This thesis wishes, through the use of the different theories presented above, to capture both aspects of the role of an individual's home in the choice to walk, i.e. the urban design in the vicinity of the dwelling *and* home as a pocket of local order.

From the perspective of neighbourhood characteristics, a large share of the studies regarding neighbourhood effects on travel behaviour has examined areas that qualitatively differ from each other, in terms of, for example, street structure and density (e.g. Gallimore et al., 2011; Aditjandra et al., 2013; Christiansen et al., 2014). A typical comparison looks at differences between grid-like neighbourhoods and cul-de-sac neighbourhoods. However, since regional location and local design are correlated features, this could at the same time be seen as a comparison between urban and suburban neighbourhoods (Handy, 2005). A specific local structure and design, such as an urban grid or a suburban cul-de-sac system occurs more often in some urban or regional

locations. Thus, local neighbourhood design could be correlated to average distance to the central business district (CBD) or to other proxies for assessing the urban and regional location (Cervero and Radisch, 1996; Cho and Rodriguez, 2014), and these proxies have, in themselves, an effect on modal choice and trip lengths. If certain neighbourhoods (e.g. cul-de-sacs) are placed far away from the CBD and other vital destinations, this yields a 'double effect' on the possibility to walk; the local neighbourhood may not be conducive to walking and neither may the regional location.

The impact of the built environment on (the choice of) active travel, particularly walking, has been of great interest in recent years within the American and Australian research community (see Boarnet, 2011; Frank and Engelke, 2001). It has been questioned whether results from the American context can be used in European cities, although a growing body of recent evidence suggests that these findings are geographically generalisable (e.g. Van Holle et al., 2012, Sundquist et al., 2011, Christiansen et al., 2014). Despite this, there are a number of issues that have to be considered when transforming studies and findings from the American to the northern European context. Firstly, walking is a relatively common form of transport in northern European cities compared to American cities (Southworth, 2005). Many American studies examine neighbourhoods that all have relatively high shares of automobile trips with low levels of walking and cycling (Van Holle et al., 2012). Secondly, northern European cities generally have a more compact urban structure resulting in lower average trip distances and lower vehicle miles travelled, which, regardless of neighbourhood design, could mean higher shares of walking (Van Holle et al., 2012, Aditjandra et al., 2013). Thirdly, there are rarely extreme differences between neighbourhoods in northern European cities, and they most often contain some kind of infrastructure for walking, such as pavements, paths, tunnels, public, crossings and sometimes even pedestrianised areas. It is important to bear these three issues in mind when designing studies and interpreting findings concerning the relationship between the built environment and travel behaviour in the northern European context as well as when comparing with, for instance, American studies

Setting

Three neighbourhoods in Malmö were used as the setting for examining the relationship of the built environment and walking behaviour, within the research project Urban Walking. Malmö is the third largest city in Sweden with about 310,000 inhabitants, and is located on the coast in the region of Skåne in southern Sweden (Statistics Sweden, 2014). The city has a flat, dense and concentrated urban structure. Comparatively large shares of the trips

within and into Malmö are made on foot, by bicycle or public transport (Wahl and Svensson, 2014), and the city's transport system consists of a relatively built-up network for pedestrians, bicycles and cars as well as for buses and trains. The most recent travel survey for Malmö (Wahl and Svensson, 2014) showed that people living in Malmö walk for 15% of their trips. However, as is always the case with travel survey data, this number conceals and leaves out a lot of walking trips (e.g. trips to and from public transport).

To control for the effect of urban and regional context, this study employed specific criteria for the selection of neighbourhoods. Three areas, Lorensborg, Dammfri and Rönneholm, were selected as they shared criteria concerning regional and urban context, such as distance to the city centre and access to public transport. Moreover, the neighbourhoods are located in the same part of Malmö and have similar car ownership levels. This selection of setting allowed a more explicit comparison of urban design characteristics. The neighbourhoods represent urban design characteristics that are common in many Swedish urban areas. The public transport access is of a high standard for all of the neighbourhoods, with several bus lines that connect to important everyday destinations departing more frequently than every ten minutes during peak hours. The neighbourhoods all contain schools, smaller grocery stores and other shops, and there are larger grocery stores in the vicinity. The neighbourhoods' characteristics are described in Table 1 below (Malmö municipality, 2008a; Malmö municipality, 2008b; Malmö municipality, 2008c). Figure 8 (next page) displays an orthophoto of the neigbourhoods.

Table 1
Characteristics of the three examined neighbourhoods

	Lorensborg	*Dammfri*	*Rönneholm*
Inhabitants	4,000	3,700	7,000
Area (ha)	37	31	48
Car ownership (per 1000 inh.)	270	290	280
Distance to city centre (km)	2.2	1.85	1.6
Construction period	1956–1969	1945–1955	1900–1980
Building stories (predominantly)	1–16 (8)	1–6 (3)	4–7 (4)
Block type	open-plan superblocks	closed / semi-open city blocks	closed / semi-open city blocks
Urban fabric	course grained	fine grained	fine grained


Rönneholm
Dammfri
Lorensborg
Lantmäteriet ©

Despite the similarities described above, the neighbourhood designs of the three areas are qualitatively different. The large housing development Lorensborg consists mainly of modernist superblocks with eight-storey lamellar buildings surrounding large green areas and with lower buildings facing adjacent streets. A wide arterial road runs through the area with parallel secondary streets for parking. The other side of the building blocks consists of paths for pedestrians and/or cyclists. A neighbourhood centre with a small square surrounded by one-storey commercial buildings and ground-floor retail premises in the residential blocks is located in the area, and one 8-storey residential block has retail premises at street level. Dammfri is dominated by early modern blocks with 4- to 6-storey free-standing lamellar buildings mostly lining the streets. The area is primarily residential, and only a few buildings have commercial premises on the ground floor. Rönneholm consists mostly of 4- to 6-storey closed grid blocks and lamellar building blocks surrounding Rönneholmsparken, a park with lush vegetation and tall trees in the middle of the area. Commercial premises at street level occur frequently in large parts of Rönneholm.

When it comes to the neighbourhoods' street networks, the differences are not as clear-cut as those between cul-de-sac and grid-like areas. None of the neighbourhoods have a fully segregated street network. To be able to identify and describe the physical segregation of transport modes on different scales, a distinction was made between segregation through lanes, paths, and off-street paths. All of the neighbourhoods segregate pedestrians from motorised traffic (and sometimes from bicycles) along lanes. The modernist street structure of Lorensborg also segregates pedestrians and bicyclists from motorised traffic on the neighbourhood level through off-street paths. Dammfri and especially Rönneholm resemble a grid-like street structure, in the sense that the car street network and the pedestrian network show a similar pattern. Rönneholm and Dammfri also contain off-street walking paths, although to a lesser degree than Lorensborg. None of the neighbourhoods contain fully integrated streets such as shared space areas.

The study refrained from employing previously defined concepts of walkable neighbourhoods (e.g. Frank et al., 2006; Leslie et al., 2007). The neighbourhoods that provided the setting for this study were treated as qualitatively different, and, thus, were not operationalised into commonly used quantitative measures of walkability such as residential density, street connectivity and land use mix (Frank et al., 2006).

Sample and procedure

A postal survey, in the form of a questionnaire, was carried out in the three neighbourhoods. The purpose of the questionnaire was to empirically study and compare perceived personal and environmental conditions for everyday walking. The final version of the questionnaire was preceded by a pilot study that led to minor modifications in the study design. A stratified random sample from the three neighbourhoods was drawn from the Swedish national address register (SPAR). The sample in each neighbourhood consisted of people between 18–85 years of age, of whom 50% were women. A total of 1,000 mail questionnaires were sent out to Lorensborg, 1,050 to Dammfri and 1,300 to Rönneholm. The questionnaires were distributed in October and November in 2011 to ensure that the respondents carried out a sufficient number of walking trips before winter weather conditions might affect the number of walking trips. After a reminder was circulated the response rate reached 30% (N = 1,001).

The variables of age, gender and household income were used in an analysis of representativeness. The questionnaire data (see Table 2) were compared with neighbourhood data from Malmö municipality (Malmö municipality, 2008a; Malmö municipality, 2008b; Malmö municipality, 2008c). Age and gender showed no particular bias for any of the neighbourhoods, whereas household income for the area of Lorensborg was higher in the survey data.

Table 2
Descriptives for the study sample with regard to each neighbourhood

		Lorensborg	*Dammfri*	*Rönneholm*
		%	*%*	*%*
Gender	Women	57.7%	51.9%	55.7%
	Men	42.3%	48.1%	44.3%
Children in the household	Yes	18.8%	20.5%	23.0%
(< 19 yrs)	No	81.2%	79.5%	77.0%
Employment status	Working	45.9%	66.3%	71.4%
	Studying	5.1%	6.1%	6.7%
	Retired	42.8%	22.2%	16.5%
	Unemployed	2.7%	2.0%	1.3%
	On sick leave	0.7%	0.3%	1.0%
	Other	2.7%	3.0%	3.1%
Car access	Yes	51.0%	57.0%	55.9%
	No	49.0%	43.0%	44.1%
		Mean	*Mean*	*Mean*
Age		56.1	49	46.3
Annual household income (SEK)		298,900	386,900	421,300

The questionnaire and methods for data analysis

The questionnaire consisted of three main parts: (i) personal characteristics, (ii) daily travel, and (iii) walking behaviour. All three parts contained items addressing perceptions and preferences regarding travel and the built environment. The questionnaire is attached in Appendix 1.

The part of the questionnaire about walking behaviour largely concerned the respondents' three most frequent walking trips originating from home. A trip was defined as a combination of trip purpose and spatial destination. They were asked to state how often each walking trip was made, and the variable regarding walking frequency had the response alternatives of 'Every day', 'Several times a week', 'Once a week', 'Every month' and 'More seldom'.

Respondents were also asked to state the purposes of the three trips from a list of 11 pre-coded purposes, chosen in order to obtain a variety of spatial and/or temporal fixity (cf. Doherty, 2006; Schwanen et al., 2008). For paper III and IV, the data analysis was carried out for each respondent's most frequent walking trip. This was done in order to avoid the problem of internal correlation between items addressing the respondents' three trips.

Table 3 presents an overview of the analysis for each of the papers in Study C. All of the papers made use of items regarding socio-demographic characteristics, while the kinds of dependent variables and independent variables regarding perceptions and preferences differed between the papers. The independent variables regarding perceptions and preferences, as well as the variables regarding travel time and distance of Paper III, were statements for which the respondents were to rate their validity on a 5-point Likert scale.

Principal component analysis was performed in order to extract variables representing perceptions of the aspects in Alfonzo's Hierarchy of walking needs (Paper IV) as well as variables representing preferences regarding residential and modal choice (Paper V). Principal component analysis can be used to identify latent variables based on measured items' variation and/or to condense correlated items into a smaller set of variables (Field, 2009). This analysis has been used before to explore preferences as well as perceptions regarding travel and the built environment (e.g. Handy et al., 2006, Bauman and Owen, 2009, Aditjandra et al., 2013). For both these papers, the final composition of each factor was based on its theoretical interpretation, the factor loadings of the items included and the internal reliability for the factor. The item should (i) have a factor loading of > 0.7, (ii) contribute to the interpretation of the factor, and/or (iii) contribute to a higher internal reliability. A Cronbach's $\alpha \geq 0.7$ was considered to represent a sufficient internal reliability. The factor values were calculated as the means of their included items. This technique was used in both Papers IV and V. For all of the papers, the statistical analysis was carried out using IBM SPSS Statistics and p-values less than or equal to 0.05 were considered statistically significant. The specific statistical analyses for each paper are presented in the following sub-sections.

Table 3
Overview of the analysis for each of the papers in Study C

	Paper III	*Paper IV*	*Paper V*
Aim and focus	To examine how time and distance for walking are rated differently by an individual, as well as the respondents' characteristics which demarcate such differences.	To investigate how individuals perceive their everyday activity schedule and their walking environment in terms of influencing their choice to walk.	To examine how preferences for residential choice and modal choice play out regarding walking frequency in the neighbourhoods.
Dependent variables	Statements regarding the importance of travel time and distance	Frequency of the most frequent walking trip	Number of walking trips per week
Independent variables: perceptions and preferences	-	Variables addressing perceptions of the aspects of Alfonzo's hierarchy of walking needs	Variables addressing preferences regarding residential and modal choice
Independent variables: Socio-demographic traits	Gender, age, income, employment status, household structure, car access; physical ability to walk	Gender, age, income, employment status, car access	Gender, age, income, employment status, household structure, car access
Main data analysis	Wilcoxon signed-rank test; binary logistic regression	Principal component analysis; binary logistic regression	Principal component analysis; analysis of variance (ANOVA); multiple regression

4.5 Analysis and results for Paper III

The focus in this paper was on how time and distance for walking are rated differently by an individual, and on the respondents' characteristics which demarcate such differences. As such, it is argued that time taken and distance travelled should be treated quite differently (and not as interchangeable) in planning and policy when it comes to walking. The paper draws on a time geographical conceptualisation (Hägerstrand, 1970) of the individual's limits in order to explore her/his differential ratings of both time and distance as factors in the decision to walk.

Background

Several have suggested that the issues surrounding walking as a mode of transport are not given due attention in transport research and planning (e.g. Patton, 2007; Middleton, 2011). This lack of attention is, for instance, reinforced by a ubiquitous focus on reducing travel time in policy and planning (Metz, 2008; Knowles, 2006). Even though this apparent preoccupation with travel time reduction has been challenged (Hanson, 2003; Banister, 2008), it still constitutes a pillar of transport policy (Metz, 2008).

This normative emphasis on travel time reduction is problematic for walking. Walking is the slowest mode of transport with little or no scope for increased speed; even the most prioritised walking route can only allow for marginally increased speeds, if any (cf. Forer, 1978). However, motorised transport systems can be sped up to cover greater distances within the same travel time (cf. Farber and Páez, 2011). This is primarily achieved through raising the possible speed (through infrastructure and technological advances) as well as the permitted speed (through regulation and legislation) of motorised vehicles (Knowles, 2006). While for walking, such 'speeding-up' measures are, by and large, an impossibility. As a result, 'slower' modes such as walking become largely overlooked, with public transport and car travel having been the predominant focus regarding travel time reductions.

Walking is unique in that the time taken undertaking a certain trip is more rigidly dependent on the distance travelled when compared to other (especially motorised) modes, where speeds can be increased (Farber and Páez, 2011). However, despite this relatively close dependence, this paper is based on the premise that an individual's perceptions of time and distance differ when it comes to trips undertaken on foot. Furthermore, we reason that the implications of time taken and the implications of distance travelled differ

from one individual to another, with respect to the individual's limits and opportunities to walk in everyday life.

Related research

Several have emphasised and demonstrated the problematic nature of treating both objective distance and cognitive distance as interchangeable with (perceived) travel time (Dewulf et al., 2012; McCormack et al., 2007; Millward et al., 2013; Säisä et al., 1986). However, these studies did not apply an explicit framework in which distance and travel time are treated as separate conceptualisations with respect to the individual's everyday life.

Travel time is increasingly analysed within the context of daily time use (e.g. Minnen et al., 2015; Neutens et al., 2012; Vilhelmson and Thulin, 2008). Time is always being 'consumed' by an individual, including when she/he traverses a distance. While distance is only sometimes consumed simultaneously with the consumption of time – when the individual is moving or being moved (cf. Mückenberger, 2011). In this way, the use of distance as a measure does not helpfully give a context to the extent of the travel undertaken with respect to the individual's *activity programme*, but only to their *action space*.[8] An individual with a tight schedule and a dispersed and disconnected spatial distribution of activities is less likely to choose a slow mode like walking (cf. Schwanen et al., 2008). As such, the context of the individual's daily time use is particularly relevant for a time and space-sensitive mode such as walking.

Given the priorities and commitments of individuals, people are often considered to have a daily travel time budget (TTB) of approximately 70–80 minutes which can be spent travelling to and from activities (Banister, 2011). The amount of time an individual is willing to spend travelling is said to reach a limit, while the distance they can traverse within such a time is not fixed—owing to historical increases in speed (Ahmed and Stopher, 2014). Even though the validity of the TTB concept has been questioned, it still establishes that time spent travelling is somewhat competing with other time uses. The concept also sheds light on the temporal limits of everyday travel, in which a slow mode such as walking cannot easily fit.

To summarise, the intra-personal differences in the individual's estimations of distance and travel time, and the inconsistencies therein (Dewulf et al., 2012; Säisä et al., 1986) challenge the interchangeability of the two.

[8] An individual's activity programme refers to the set of activities which the individual plans to carry out (in a particular sequence) during a particular day (see Neutens et al., 2011). A person's action space relates to the locations with which she/he has direct contact resulting from everyday activities (see Patterson and Farber, 2015).

Furthermore, the importance of focusing on trips in the context of everyday life is becoming more apparent, suggesting that the backdrop of the individual's activity programme should be inherent in investigations of travel patterns (cf. Neutens et al., 2011). However, it should also be acknowledged that time can have simultaneous uses, not least with respect to time spent walking (Middleton, 2009). Lastly, given the limited amount of time that can be afforded for travel (Ahmed and Stopher, 2014), the particular time-space sensitivity of walking means that its selection as a mode of transport can become marginalised. Therefore, it is important to analyse the individual's differential perceptions of the importance of time and the importance of distance for trips undertaken on foot.

Conceptual framework

This paper draws on the time-geographical concept of constraints[9] (Pred, 1977; Hägerstrand, 1970) in order to analyse pedestrians' differential perceptions of time and distance for trips undertaken on foot.

Constraints describe the spatio-temporal fixity that individuals are subject to. Even though the fixity of trips has often been something 'objectively' defined by the researcher, it is nevertheless regarded as a highly subjective phenomenon (cf. Schwanen et al., 2008). For instance, if we apply this consideration to walking, one person may perceive that it is feasible to fit a 15-minute walk into a specific slot in their daily activity schedule, while another person with an identical daily activity schedule may perceive it as being nearly impossible. Therefore, owing to interpersonal variation in coupling constraints, and indeed in the perceptions of coupling constraints, one person's abstract time of 15 minutes is not necessarily directly comparable to another person's (Mückenberger, 2011b; Schwanen, 2008). This conceptualisation, as such, makes interpersonal comparisons of 'objective' time without the context of the individual's constraints rather problematic. While for distance, a person more subject to capability constraints than they are to coupling constraints, the period of time it will take to cover a certain distance (e.g. 2 kilometres) may not be their greatest concern. Instead, being physically capable of covering the 2 kilometres (the distance) in a particular environment may be their main apprehension in deciding whether or not they should — or indeed can — reach the activity on foot.

For this paper, the individual's perception of travel time and distance for walking trips is conceptualised as being dependent on her or his coupling and capability constraints. Here, it is considered that time is the greatest concern

[9] Constraints were expanded upon in section 4.2 above.

for particular types of pedestrians, while distance is the greatest concern for others. Drawing on these considerations, the following two questions are posed (the first relating to coupling constraints, and the second to capability constraints).

- Do respondents more subject to coupling constraints tend to consider that a reasonable travel time is more important than a reasonable distance when they choose to walk?
- Do respondents more subject to capability constraints tend to consider that a reasonable distance is more important than a reasonable travel time when they choose to walk?

The model

Binary logistic regression

A binary logistic regression model was constructed in order to analyse the relationships between the respondents' coupling and capability constraints (independent variables) and their different ratings of the importance of a reasonable travel time and a reasonable distance for the same trip (dependent variable). Regression results were compared using the odds ratio value (OR).

Dependent variable

The dependent variable was constructed as a binary format, interaction variable based on the respondents' ratings of (i) the importance of a reasonable time and (ii) the importance of a reasonable distance in deciding to walk for this particular trip. The two ratings consisted of the response alternatives 1 ('of no importance') to 5 ('of great importance') on a Likert scale. Those who gave a higher rating for a reasonable travel time than the rating they gave for a reasonable distance were coded as '1', and those who gave a reasonable distance a higher rating than they gave a reasonable travel time were coded as '0'. Respondents who gave the same rating for both time and distance were excluded from the analysis, as these respondents were considered to place the same importance on both time and distance.

Independent variables

Independent variables were constructed, categorised as either a 'coupling constraint', a 'capability constraint', or as a control variable, and included in the analysis. Some variables were excluded from the final regression model, as their associated p-values in the model were greater than 0.05 and their

inclusion did not improve the model's fit. Some were also excluded due to their stronger correlations with other variables in the model.

Coupling constraints

Coupling constraints were defined in two different ways: those dealing with the indicators of the respondents' everyday coupling constraints (everyday activities that tie them to a specific place for a specific time), and those dealing with the fixity/flexibility of the purpose of the trip with which the question was concerned.

Being employed/in full-time education was categorised as being associated with coupling constraints. It was considered that an average person who is employed or on a full-time educational programme (code '1') is more likely to be subject to coupling constraints (Ellegård and Vilhelmson, 2004; Schwanen, 2008).

Gender (being female) was categorised as being associated with coupling constraints. It was considered that female respondents could have a tendency to place a higher importance on time than they would place on distance.

The presence of children in the household was categorised as being associated with coupling constraints. If the respondent has children (< 18 years old) in the household, then this respondent was coded as '1', and those without children were coded as '0'. Earlier studies have shown that the rigidity of daily activity schedules are pronounced by child-care commitments, especially for women (Scheiner and Holz-Rau, 2015; Kwan, 2000). Thus, two interactions variables were constructed, combining the binary variables gender (one for men and one for women) and children in the household.

Trip fixity was developed based on the association of the trip purpose/activity with degree of fixity. The eleven activities were categorised as either 'more fixed' (code '1') or 'less fixed' (code '0') in a spatio-temporal sense.[10]

Capability constraints

The capability constraint variable capacity was constructed based on whether the respondent stated that she/he has physical problems walking shorter distances (0–1 km) (coded as '1'), with the remainder of respondents coded as '0'.

Control variables

The control variables of car access and income were included in the analysis in order to attempt to account for potential underlying socio-economic/economic

[10] These activities are outlined in Paper III.

and car access differences which may exist among respondents. Car access was considered to constitute a mobility resource (Le Vine et al., 2013), albeit not explicitly for pedestrians.

Empirical findings

This section presents a comparison of respondents' ratings of the importance of distance and travel time and a binary logistic regression analysis regarding the association between constraints variables and these differential ratings.

The Wilcoxon signed-rank test showed an overall significantly higher rating of the importance of distance (mdn = 4.00) than of travel time (mdn = 3.00) (Z = -7.002, p = 0.00). Table 4 presents the binary logistic regression examining the association of variables intended to represent spatio-temporal coupling constraints with the rating of the importance of travel time in comparison to that of the importance of distance.

Table 4
Binary logistic regression results for paper III

Variables	*Odds ratio (OR)*	*p-value*	*CI 95%*
Gender (women)	2.194	0.008	(1.226-3.926)
Employed/in full-time education	2.833	0.002	(1.484-5.409)
Trip fixity	0.809	0.462	(0.461-1.422)
Car access	0.678	0.175	(0.386-1.190)
Constant	0.196	0.000	
N = 266; -2 log likelihood = 293.375			

In the final model, women were more than twice as likely to give the importance of time a higher rating than they gave the importance of distance when undertaking their most frequent walking trip (OR = 2.194, CI = 1.226-3.926). The variable children in the household did not produce a statistically significant result; nor did it improve the fit of the model. It was, therefore, excluded from the final model. The interaction variable women with children was associated with a slight increase in the odds of giving travel time a higher importance, but reduced the model fit. The interaction variable men with children was associated with a significant decrease in the odds ratio.

Even though distance was rated as more important overall, the variable capacity was excluded from the regression model as the variable was not statistically significant and did not improve the model's fit. This was most probably due to only a very small minority of individuals reporting that they have problems walking shorter distances.

Those employed or in full-time education were also much more likely to give the importance of time a higher rating than distance (OR = 2.833, CI = 1.484-5.409). The interaction of employed/in full-time education and gender (women) was also statistically significant, but did not result in an increased odds ratio or improved model fit.

Trip fixity was not significant in the model, suggesting that either there is no rigid divide between the more and less fixed trips or that trip fixity should be considered as a linear phenomenon (cf. Schwanen et al., 2008).

Discussion and conclusions

This paper drew on a time geographical conceptualisation of the individual's limits in order to explore her/his different ratings of the importance of both time and distance as factors in the decision to walk. The focus was on how time and distance are rated differently by an individual, and on the individual's characteristics which might demarcate such differences. This analysis was undertaken with an explicit regard for the context of everyday life, and its inherent constraints (Hägerstrand, 1970).

As detailed in above, most of the respondents gave the importance of distance a higher rating than they gave the importance of time as a factor in the decision to walk. It was considered that those subject to capability constraints would be more likely to give the importance of distance a higher rating than the importance of time. However, the exclusion of the variable addressing capability constraints meant that focus shifted to those who had given time a higher rating than distance. Thus, it was considered that these individuals would be more subject to coupling constraints, having selected and tested a number of variables to represent such constraints.

Two variables which were intended to represent coupling constraints — gender (women) and employed/in full-time education — were associated with a statistically significant positive increase in the likelihood of giving the importance of time a higher rating than the importance of distance. Women were more than twice as likely as men to give the importance of time a higher rating than distance, perhaps indicating that time is a greater consideration when it comes to undertaking trips on foot — in this case, the most frequent trip on foot — for women than it is for men. This was further pronounced by a significant increase of odds for the interaction variable of women with

children. This not only suggests that time and distance cannot be treated as interchangeable measures, but also that the importance of the two differ from person to person, with the factor of gender demarcating a difference between individuals' perceptions of distance and time. This could in turn reinforce previous research in its findings that women are more subject to coupling constraints than men, with complicated scheduling arrangements, the balancing of activities and struggles between commitments particularly evident in the everyday life of women (e.g. Turner and Grieco, 2000; Dobbs, 2007).

Turner and Grieco (2000) emphasise the issue of time poverty in women's everyday lives, owing in part to the fixity of women's daily activities such as household and child-care-related activities. The primary responsibility for caring for children most often lies with the mother of the child (Craig and Mullan, 2011), meaning that mothers' coupling constraints could be described as much more apparent, with trips more fixed and scheduling much more complicated (Scheiner and Holz-Rau, 2015).

Those employed or in full-time education were almost three times more likely to give the importance of time a higher rating than distance in comparison to those who are not engaged in such activities. This finding may indicate that those who are in full-time employment or education — of both genders — are more subject to coupling constraints than those who are not, owing most likely to their having to be in one place for an extended period of the day. As such, this finding can be compared to that of Schwanen et al. (2008) where the activity 'paid labour' was rated as one of the most temporally and spatially fixed.

Conclusions

As suggested in this paper, it is problematic to treat one person's 15 minutes travel time as interchangeable with that of another person. It was considered that interpersonal comparisons of 'objective' time should be carried out with respect to the individual's perception of the importance of time and with respect to the individual's constraints. Feminist researchers have also criticised time geography for having too linear and physical a view of time and as being equally available for everyone (Scholten et al., 2012; Davies, 2001). Our results would suggest that comparisons between, for instance, women's and men's use and perception of time should be approached with caution.

The findings of this paper and its policy implications are further elaborated in the final Discussion and conclusion.

4.6 Analysis and results for Paper IV

This paper examines the idea that a supportive or walkable built environment is not sufficient to fully support certain types of walking trips; rather these trips are made possible if the choice to walk fits into the daily activity schedule *and* is supported by the built environment. Figure 9 depicts this hypothesised independence between the walkability of an individual's neighbourhood and the limits imposed by her/his daily activity schedule.

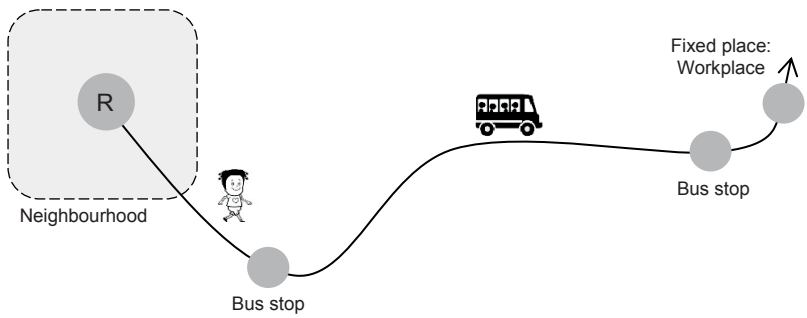

Figure 9
Ilustration of the independence between the walkability of an individual's neighbourhood and the limits imposed by her/his daily activity schedule

Hence, a supportive built environment can only affect the choice to walk to a certain extent. Acknowledging the limits that spatio-temporal constraints impose on travel behaviour is not new. It is, for instance, one of the fundamental ideas of person-based accessibility. However, studies taking space-time behaviour into account have seldom examined people's *perceptions* of the constraints that everyday activities impose, with Schwanen et al. (2008) acting as one of few important exceptions. Incorporating such perceptions could mean addressing questions such as: How much of a constraint do pedestrians perceive their everyday activities to be? And, given these perceived constraints, to what extent can urban and neighbourhood design support the decision to walk? A need remains to substantiate the perceptions of constraints in everyday life in terms of the choice to walk; and to relate these to the field of urban form and travel behaviour. The aim of this paper is to investigate how individuals perceive their everyday activity schedule and their walking environment in terms of influencing their choice to walk.

Analytical point of departure

Alfonzo's (2005) Hierarchy of walking needs is used to explore these issues. As described in section 4.3 above, the hierarchy includes both aspects of the built environment and of the context of everyday life, and places them within a socio-ecological framework.

Alfonzo's framework has been used in earlier studies (Alfonzo et al., 2008; Larco et al., 2012; Trumpeter and Wilson, 2013). However, these studies did not include all aspects of the hierarchy, nor did they explicitly analyse the hierarchical structure that Alfonzo suggests. Thus, there is still a need to empirically examine perceived feasibility aspects in relation to perceived environmental qualities, when it comes to walking. Furthermore, this paper relates Alfonzo's framework to other concepts and theories within research on the built environment and travel, and empirically explores all of the aspects. Thus, Alfonzo's framework is neither tested nor evaluated, but its elements are rather explored in the light of findings and concepts relevant to the setting for this study.

The most basic aspect in the hierarchy is feasibility, which could be described as the limits that time, capacity and responsibility for others place on the individual's everyday life — and, thus, also the possibility to walk. Feasibility does not relate to urban form per se, but provides a basis for understanding how possible it would be to undertake specific trips on foot in a given built environment. This reasoning derives from that of time-geographical thinking, from which coupling constraints best relate to feasibility.

The four aspects which lie above feasibility concern urban form and design. Accessibility is considered the first and fundamental urban form aspect related to the choice to walk. Alfonzo seems to understand accessibility in a place-based sense, by including land use (e.g. quantity and the quality of nearby amenities and infrastructure (e.g. connectivity, sidewalks and other walking paths) in her definition. In this paper, accessibility was understood and operationalised as an issue of perceived ease for walking and the street networks' directness.

The aspect safety is related to fear of crime in the built environment. In this paper, safety in the built environment includes both traffic safety and the fear of crime. Traffic safety could — as is the case with crime — work as a perceived barrier to walking (Cho et al., 2009). Car speed is correlated to the frequency and severity of accidents among pedestrians (Nilsson, 2004), and it affects how pedestrians perceive the traffic environment (Risser and Lehner, 1998). Furthermore, perceived level of safety and fear of crime have been linked to walking levels in neighbourhoods (Doyle et al., 2006).

Alfonzo interprets comfort as an issue of convenience for walking in terms of level of ease and contentment. Comfort mirrors the relationship between pedestrians and motorised modes. Conditions of sidewalks and pedestrian walkways as well as the presence of features such as speed bumps, buffers and even the width and length of streets are considered to contribute to pedestrian comfort. Matan and Newman (2012) also associate the level of maintenance and order, air quality and soundscape with comfort.

The highest level of the model is pleasurability and concerns how enjoyable and interesting an area is for walking, which is related to the overall visual pleasantness of urban space (Küller, 1991) and covers pedestrians' experiences of urban design qualities such as imageability, coherence, complexity, and presence of greenery (Ewing and Handy, 2009). Other research points to perceived pleasantness (Ball et al., 2001), attractiveness (Handy et al., 2006) and aesthetics (Pikora et al., 2002; Day et al., 2006) as aspects of pleasurability associated with walking.

Empirical findings

Principal component analysis

The items operationalised from the theoretical interpretation above were included in a princip component analysis. The analysis obtained five factors with eigenvalues above 1 which accounted for 67 per cent of the total variance.

Factor I consisted of all of the items representing pleasurability and did, therefore, correspond to our theoretical interpretation. Factor II was interpreted as describing feasibility in terms of the respondents' perception of time and space. Factor III consisted of items describing accessibility — the directness of the route, in particular. Contrary to the theoretical interpretation presented above, Factor IV consisted of items meant to address both safety and comfort. [11] To obtain a higher internal reliability and to give the factor a conceptual coherence, it was defined as describing perceptions of the traffic environment. The items in Factor V corresponded to the theoretical interpretation regarding feasibility in terms of fitting walking into everyday life.

The principal component analysis suggested — with minor exceptions — that there was a correspondence between the theoretical definitions of environmental perceptions relevant for urban walking and the respondents' perceptions of their walking environment. The final compositions of the indices capturing environmental perceptions (Accessibility, Traffic and Pleasurability) meant a somewhat new division between perceptions of the

[11] Errata: The numbers of the factors III and IV have been confused in Paper IV (p. 228).

traffic environment (Traffic) and the built environment (Pleasurability). Accessibility remained stable, but only for describing the directness of the route. Feasibility was not as consistent as suggested and was divided into two factors in the analysis of the empirical data. Feasibility in terms of time-space formed a coherent index, whereas feasibility in relation to everyday life had a low internal reliability.

Regression analysis

The factors obtained were used as independent variables in a binary logistic regression analysis with walking frequency as the dependent variable. The regression analysis was used to check the extent to which the factors obtained influence the likelihood of a walking trip being made more often (cf. Field, 2009). In order to place the factors within a socio-ecological context, variables representing gender, age, household income, employment status and car access were included in the regression.

Binary logistic regression analysis was carried out using walking frequency as the dependent variable for the most frequent walking trips. Hence, the dependent variable was dominated by the response alternatives 'Every day', 'Several times a week' and 'Once a week' ($\mu = 4.24$; SD = 0.837). The dependent variable was constructed to compare everyday walking trips ('Every day') with those done more seldom ('Several times a week' or less often). This division was chosen in order to analyse trips that are more likely to be part of an everyday routine.

Table 5 presents the logistic regression analysis for each person's most frequent walking trip. Due to its low internal reliability, the factor Feasibility: Everyday life was represented by merely the item about the household's activities.

Table 5
Binary logistic regression for the most frequent walking trip (Paper IV)

Independent variables	*β*	*p-value*	*Odds ratio (OR)*	*CI 95%*
Pleasurability	0.054	0.468	1.055	(0.913-1.220)
Traffic	-0.120	0.169	0.886	(0.747-1.052)
Accessibility	-0.085	0.204	0.918	(0.805-1.048)
Feasibility: Time-space	-0.094	0.166	0.910	(0.797-1.040)
Feasibility: Every-day life	0.162	0.002	1.176	(1.059-1.305)
Gender	-0.047	0.755	0.955	(0.713-1.278)
Age	0.001	0.804	1.001	(0.991-1.012)
Household income	-0.099	0.015	0.906	(0.836-0.981)
Employment status	0.049	0.829	1.050	(0.673-1.638)
Car access	-0.271	0.092	0.763	(0.556-1.045)
Constant	0.613	0.332		

N = 803; -2 log likelihood = 1060.419

The regression partly established the fundamental role of feasibility — in being a significant contributor to the likelihood of a walking trip to be made on a daily basis, which suggests that if this need is not met, walking is less likely to occur. The control variable of household income reduced the likelihood of a walking trip being made on a daily basis. This is in line with previous findings in the field (Forsyth et al., 2009; Sundquist et al., 2011). However, gender and age did not significantly contribute. Nor did car access and employment status affect the likelihood of a walking trip to be made on a daily basis.

These findings will be further deliberated and interpreted in the next section Discussion and conclusion.

4.7 Analysis and results for Paper V

This paper describes a study of preferences, neighbourhood design and walking. It complements the focus on perceptions in Paper IV. The aim is to examine how *preferences* for residential choice and modal choice play out regarding walking frequency in the neighbourhoods, and to explicitly study the interaction between preferences, neighbourhood design and walking.

In the context of northern Europe, the role of preferences regarding residential choice has in recent years been shown to be significantly associated with travel behaviour (Scheiner and Holz-Rau, 2007; Næss, 2009; Haybatollahi et al., 2015). The importance of neighbourhood design for the choice to walk has also been examined in a Swedish urban context (Westford, 2010; Sundquist et al., 2011). However, the role of preferences and the interaction with neighbourhood design have not been explicitly examined.

Analytical point of departure

The study design of this paper — unlike the case of earlier studies on walkability — explicitly acknowledges that heterogeneous preferences implicate the existence of a heterogeneous responsiveness to the built environment (cf. Chatman, 2014). In doing this, preferences are treated as explicit variables predicting the amount of walking in a neighbourhood, rather than as control variables that alter the estimated effect of the built environment. Furthermore, to capture the effects of choices made both 'before moving' to the neighbourhood (theoretically speaking) and those made on a daily basis, this study examined preferences for both residential and modal choice. Preferences regarding residential choice and preferences regarding modal choice are understood as two conceptually and temporally different, yet related, phenomena. Residential choice refers to the aspects being considered prior to an actual change of residence or when considering current preferences for residential choice. Such preferences may include aspects of travel, but also affordability, aesthetics, fear of crime, the neighbourhood's reputation, etc. (Hedman and van Ham, 2012). Preferences regarding modal choice refer merely to attitudes regarding different modes of travel and any preferences towards certain modes. In some cases, these two types of preferences can address the same issue, e.g. the desire to be able to walk to work, but a focal point is the presumption that a positive preference towards walking does not necessarily influence preferences regarding residential choice.

Empirical findings

This section presents (i) an examination of the items regarding residential and modal choice, (ii) a regression analysis of preferences, neighbourhood design and walking, and (iii) a simplified, illustrative example to interpret the findings in the light of this paper's aim.

Preferences for modal and residential choice

The principal component analysis only comprised items addressing residential choice, whereas preference regarding modal choice was represented by one item. Factor I consisted of items describing park proximity and the ease of walking in the neighbourhood, whereas Factor II was interpreted as describing the importance of regional accessibility in terms of destination to workplace or school. Analysis of variance (ANOVA with Tukey's HSD Post-hoc test) for the preference variables for both residential and modal choice indicated that the preference variables were not significantly different between the neighbourhoods, i.e. respondents in the three neighbourhoods gave equal importance to qualities related to residential and modal choice.

The interaction between preferences and neighbourhood design

To study the interaction effects of preferences and neighbourhood design on walking frequency, a multiple regression was performed. In order to address the issue of self-selection, the technique of statistical control (see Cao and Ettema, 2014) was employed, although allowing for interaction effects between preferences and neighbourhood design, thereby avoiding to make implicit assumptions of independence. The other aspect of residential self-selection — socio-demographic traits — was represented by the variables describing gender, age, household income, children in the household (pre-school and school age), employment status and car access.

The dependent variable — the number of walking trips for each individual — was calculated by summarising the frequency for the three most common walking trips. The independent variables were the socio-demographic variables and the preferences for residential and modal choice, as represented by the estimated factor values. The regression also contained interaction variables for the neighbourhoods of Dammfri ('D') and Rönneholm ('R') with Lorensborg acting as the baseline. Table 6 presents the outcome of the interaction regression analysis, including effects between preferences and neighbourhood, combined with socio-demographic characteristics. Rönneholm was the only neighbourhood where all of the preference variables affected walking frequency. For the other neighbourhoods, it was only the variable neighbourhood walkability that remained significant. Thus, the regression

analysis suggested that preferences of greater importance for walking frequency in Rönneholm than in the other neighbourhoods. It also indicated that heterogeneous preferences imply a heterogeneous responsiveness to the built environment. The special status of Rönneholm was further underlined by the absolute frequency of walking trips. Post hoc comparisons using Tukey's HSD test indicated that the mean walking frequency for Rönneholm ($\mu = 8.6$; S.D. = 4.7) was significantly higher than in Dammfri ($\mu = 7.5$; S.D. = 4.6; $p = 0.04$), although the difference to Lorensborg was not significant ($\mu = 7.9$; S.D. = 4.8; $p = 0.124$).

Table 6
Interaction regression analysis for preferences, neighbourhood and socio-demographics (Paper V)

Independent variables	*B*	*St. β*	*t*	*p*
Constant	6.735		2.695	0.007
Preference: Commuting distance	-0.280	-0.080	-1.165	0.244
Preference: Neighbourhood walkability	0.915	0.151	2.139	0.033
Preference: Walking	-0.048	-0.012	-0.187	0.851
Neighbourhood dummy: Dammfri	-0.284	-0.028	-0.086	0.932
Neighbourhood dummy: Rönneholm	-5.417	-0.577	-1.654	0.099
Gender	-4.057	-0.436	-4.212	0.000
Age 19-45	-0.334	-0.036	-0.416	0.678
Age > 65	0.659	0.058	0.649	0.517
Household income: lower tertile	0.487	0.052	0.611	0.541
Household income: upper tertile	0.039	0.004	0.040	0.968
Pre-school children (in the household)	4.374	0.299	2.212	0.027
School children (in the household)	1.832	0.125	1.165	0.244
Employment status	-0.747	-0.070	-0.621	0.535
Car access	-1.335	-0.143	-1.862	0.063
Gender*Pre-school children	1.659	0.086	0.690	0.490
Gender*School children	1.083	0.057	0.564	0.573
Gender*Employment status	3.281	0.346	2.526	0.012
D*Preference: Commuting distance	0.251	0.090	0.696	0.486
D*Preference: Neighbourhood walkability	-0.916	-0.400	-1.572	0.116
D*Preference: Walking	0.255	0.101	0.692	0.489
D*Gender	5.743	0.457	3.646	0.000
D*Age 19-45	-0.103	-0.008	-0.098	0.922
D*Age > 65	-0.858	-0.042	-0.565	0.572

D*Household income: lower tertile	-0.623	-0.042	-0.572	0.567
D*Household income: upper tertile	-0.230	-0.015	-0.190	0.849
D*Pre-school children (in the household)	-4.788	-0.201	-2.017	0.044
D*School children (in the household)	1.773	0.065	0.858	0.391
D*Employment status	0.465	0.043	0.261	0.794
D*Car access	2.316	0.192	2.411	0.016
D*Gender*Pre-school children	1.144	0.036	0.386	0.699
D*Gender*School children	-3.387	-0.084	-1.223	0.222
D*Gender*Employment status	-5.235	-0.375	-2.777	0.006
R*Preference: Commuting distance	0.670	0.261	2.121	0.034
R*Preference: Neighbourhood walkability	0.389	0.184	0.716	0.474
R*Preference: Walking	0.797	0.348	2.413	0.016
R*Gender	3.349	0.303	2.218	0.027
R*Age 19-45	0.014	0.001	0.014	0.989
R*Age > 65	-1.753	-0.099	-1.243	0.214
R*Household income: lower tertile	-0.722	-0.056	-0.706	0.481
R*Household income: upper tertile	-1.514	-0.113	-1.314	0.189
R*Pre-school children (in the household)	-3.312	-0.161	-1.471	0.142
R*School children (in the household)	-1.480	-0.067	-0.750	0.454
R*Employment status	-1.018	-0.104	-0.600	0.549
R*Car access	0.706	0.065	0.795	0.427
R*Gender*Pre-school children	0.400	0.014	0.142	0.887
R*Gender*School children	-0.011	0.000	-0.005	0.996
R*Gender*Employment status	-2.663	-0.221	-1.462	0.144

R Square: 0.160

Illustrative interpretation of the main findings

To interpret how the findings of the regression analysis relate to this paper's analytical point of departure, the interaction regression model was used to hypothesise scenarios where individuals with differing preferences were compared with regard to walking frequency. Table 7 presents these scenarios in the form of six hypothetical persons residing in the three neighbourhoods and having differing preferences regarding walking. They are all male[12], employed, have an average income (income group 2), have no car access, have no children in the household, and are 50 years of age (age group 2). Each neighbourhood is presumed to contain two such persons, one with a low preference for walking (Preference: Walking = 1) and one with a strong preference (Preference: Walking = 5). The other two preference variables were given a value of three 7(3) for all of the six individuals. The walking frequencies displayed in Table 7 correspond to the number of walking trips per week and illustrate that the hypothetical person in Rönneholm with a high preference for walking walks more often (8.4 times per week compared to 5.4), whereas the hypothetical persons in Lorensborg have the same walking frequency irrespective of their preference towards walking (7.7 times per week compared to 7.8, $p > 0.05$).

This example acts as an illustration of how two individuals with the same preference can be differently 'satisfied' in different environments and how heterogeneous preferences, especially in the case of Rönneholm, correspond to a heterogeneous response to the built environment. The findings for Rönneholm confirms Chatman's (2014) scenario 3, in that a positive preference for walking resulted in a higher walking frequency, i.e. the built environment satisfies those with a strong preference, rather than compensates for those with a lower preference (which is the case in scenario 4).

Table 7
Walking frequencies for six hypothetical individuals residing in the neighbourhoods.

Walking preference	*Lorensborg*	*Dammfri*	*Rönneholm*
Low	7.8	6.3	5.4
High	7.7	7.1	8.4

[12] This choice was due to the unexpected result regarding women's walking frequency in Lorensborg.

Conclusions

To summarise, even though the preference variables did not differ between the neighbourhoods, the interaction of preferences with neighbourhood and socio-demographic characteristics produced differing outcomes in the three neighbourhoods. The heterogeneity of the responsiveness to the built environment was further illustrated by the hypothetical scenarios. A hypothetical person residing in Lorensborg with a preference for walking walked as much as a hypothetical person from the same neighbourhood without a strong walking preference, whereas a preference for walking in Rönneholm yielded a higher walking frequency.

The findings suggest that heterogeneous preferences regarding residential and modal choice are indicative of the existence of heterogeneous responses to the built environment, in that the built environment can satisfy positive preferences for walking.

5. Discussion and conclusions

The overall aim of this thesis is to examine how walking as a transport mode is constructed in the planning realm, affected by the built environment and perceived by the individual. This concluding discussion will elaborate on these issues and departs from to the two research questions.

5.1 Recapitulating the research questions

RQ 1: How are pedestrians and walking understood, constructed and perceived in the planning context?

From the perspective of the municipal planner, Study B does not reveal how to make a municipal walking strategy, but it does illustrate what such strategies say about the comprehension of walking in the planning realm. The lesson for policy is to be aware of how pedestrians are perceived by planners, which knowledge and data that is collected (if any) and how, and when, this knowledge is used in planning.

If planning documents and methods (i.e. means) partly or fully continue to leave pedestrians out, then the produced findings and design outcomes (i.e. ends) will be at risk of lacking the pedestrian perspective. Likewise, if pedestrian-friendly design is considered merely a matter of, for instance, safety and neighbourhood design, research will continue to collect data regarding these aspects. Such a routine risks merely confirming the present situation.

In order to enable explicit comparisons between walking and other transport modes, pedestrian advocates will need to stress the importance of including data regarding walking which will, at the very least, allow comparisons and appraisal beyond the 'intra-modal' realm. As things stand now, much of the knowledge on walking in the studied municipalities does not seem comparable to the knowledge on other transport modes.

RQ 2: How do individual traits and the built environment affect the propensity for walking?

This research question was addressed through the theoretical and empirical examinations of Study C. It included two ways of studying the relationship between the individual, the built environment and travel. Paper III and foremost paper IV argued that perceptions of the built environment are of importance, while paper V focused on preferences supposedly held at the time of a residential change.

The theory section of Study C provided two reasons for incorporating theories in research on walking. The first concerned how to interpret the interplay between time and space in the transport framework, where time geography was employed to overcome this; the second reason was to fruitfully address why, how, for whom, when and how much the built environment influences travel behaviour, for which theoretical takes on perceptions and preferences were employed. Theories merely studying the relationship between the built environment and travel fail to take the transport aspect of walking into consideration. Time geography linked with the Hierarchy of walking needs helped in overcoming this, and the theoretical concepts' usefulness was supported by the empirical findings. The aspect feasibility, as well as time-geographical concepts, were included to let the pedestrian be treated as someone having fixed destinations that are part of an everyday travel pattern, or, put differently, to be an agent making a 'choice in the context of constraints' (Jones et al., 1983, p. 266). Thus, reaching a destination (i.e. 'where to') was treated as a matter of being able to undertake everyday activities through walking, in addition to its strictly spatial connotation.

Paper III argued for studying travel time and distance jointly, yet not as interchangeable. When it comes to the empirical results, Paper III revealed differences in the rating of the importance of time versus distance in the choice to walk. Such differences played out regarding gender as well as employment status. Women were more likely than men to give time a higher rating than distance. Furthermore, those who were employed or participating in a full-time education programme were more likely to give time a higher rating than distance. These results were interpreted as being signs of the impact of an individual's everyday coupling constraints on the view on travel time for walking.

Paper IV studied walking from both the perspective of the built environment and of everyday life. This was achieved by employing a theoretical model addressing both of these aspects. The principal component analysis of Paper IV suggested — with minor exceptions — that there was a correspondence between the theoretical definitions of environmental perceptions relevant for urban walking and the respondents' perceptions of

their walking environment. Moreover, the fundamental role of the aspect feasibility was established — which could be described as the limits that time, capacity and responsibility for others place on the individual's everyday life — in being a significant contributor to the likelihood of a walking trip to be made on a daily basis. This suggests that, if this need is not met, walking is less likely to occur.

Paper V examined the outcome in walking propensity due to preferences held beforehand, i.e. at the time of residential change. Walkability studies not taking preferences for residential choice explicitly into account fail to address the role of a populations' differing demand for certain urban design characteristics. Even though the preference variables did not differ between the neighbourhoods, the interaction of preferences with neighbourhood and socio-demographic characteristics produced differing outcomes in the three neighbourhoods. The findings suggest that heterogeneous preferences regarding residential and modal choice are indicative of the existence of heterogeneous responses to the built environment, in that neighbourhood design can satisfy positive preferences for walking.

The approaches of Paper IV and V side-tracked the issue of whether the built environment affects travel 'in itself' by deliberating whether that is the relevant research question entirely. If there is a relationship between the built environment and travel behaviour, it is not far-fetched to say that this interplay includes an individual — and the perceptions and preferences of this individual is not an error term to control for, but rather a vital part of the picture.

5.2 Implications for research and planning

This section jointly discusses the planning implications of the three studies of the thesis, and also offers suggestions on how to move forward regarding some of the research gaps that have been identified.

The thesis started off by arguing for the need of a holistic take on walking as a mode of transport. A framework building on Paper I was put forward to overcome this. The framework, displayed in Figure 9 consisted of four different spatio-temporal scales at which walking could be (and partly have been) studied, together with a set of theoretical concepts for describing pedestrians' behaviour within and between these scales. The theories, study designs and findings of the two empirical studies (Study B and C) meant to cover the whole span of these scales — from the almost micro-perspective (i) of

Paper III, through the trip and everyday focus (ii and iii) of Paper II and IV, to the longer term issues of Paper V (iv).

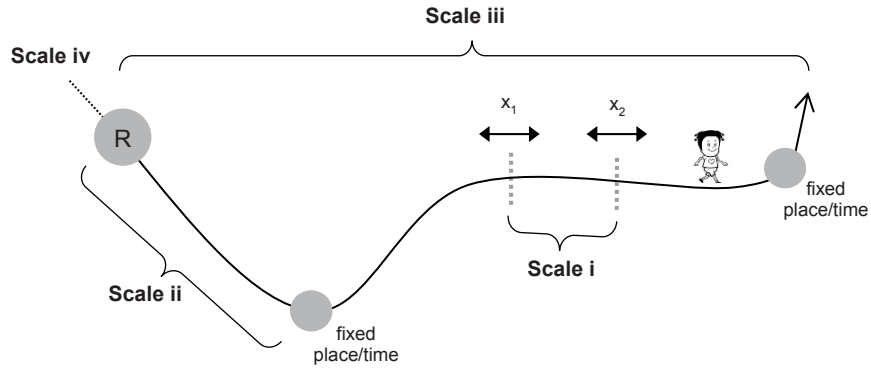

Figure 9
Graphical depiction of the four scales of the transport framework

The theoretical concepts of Study A — walking assemblage, objects of passage, boundary objects and interseriality — offered a meta-language for the four analytical scales. What is transport research and planning to do with these? To acknowledge walking as a transport mode includes seeing it as parts of a whole — of an assemblage, of a trip, of a day, etc. The concepts walking assemblage and interseriality address how a pedestrian needs to transform in order to sustain. On the other hand, supportive boundary objects can safeguard that a pedestrian can sustain her or his behaviour, but they can also facilitate simultaneous walking assemblages (comprising various behaviours, constraints, preferences, walking attires, etc.). Immediate examples of boundary object are design solutions such as shared space areas, pedestrianised paths or low speed precincts.

However, this thesis first and foremost concerned the pedestrian on a larger spatio-temporal scale. Here, boundary objects are represented by non-human actors beyond those strictly physical. Through the relaxation of spatio-temporal constraints, these actors inflict on the prospects for different walking assemblages to sustain or coexist These actors include, but are not limited to, smartphones, social networks, accessibility, opening hours or urban temporal policies. Paper III and IV of Study C aimed to shed light on the underpinning argument for acknowledging these non-physical boundary objects. It should be said, however, that the theoretical concepts of Study A question the use of binary and exclusive classifications of pedestrians and walking trips (e.g. destination walking and strolling walking). This poses great challenges for

quantitative methods employed in transport research, which often use categorical variables in order to allow comparisons and yield results. For instance, in this thesis, Paper III and IV categorised walking trips as more or less spatio-temporally fixed. Even though this comes across as a binary classification, the papers' time-geographical point of departure views them as related to an individual's other trips and activities during a day.

The aspect feasibility from Paper IV could in itself be seen as having planning aspects to it. The spatial distribution of activities and destinations impacts on how limiting time, a person's own capabilities, as well as responsibilities for others are. From this perspective, feasibility is not a rigid phenomenon, but dependent on the structure of the built environment. It is to be seen as a necessary, but perhaps not a sufficient, condition for walking. Walkability should thus be an issue for transport and urban planners at local, urban and regional levels. Local urban design (e.g. densification and streetscape design) does undeniably play a role, but its possibility of altering transport behaviour is limited. Feasibility of walking is also connected to policies regarding education, opening hours and access to services — sometimes labelled urban temporal policies (Mückenberger, 2011a).

Further, as examined in Paper IV and V, the focus on neighbourhood design is problematic from a theoretical and methodological perspective, but it can also be misleading when it comes to policy, planning and design. In her critical review of studies on the built environment and active travel, Handy (2005, p. 21) argues that

> *[M]ost studies are driven by questions that emerge from current trends and policy proposals, with most focusing on the new urbanism movement and calls for more traditional design in suburban areas.*

Even though this statement better describes the situation in the U.S., these ideas have gained ground in the Swedish planning discourse as well. This is not to say that only theories should drive research, but rather to acknowledge that policies based on research findings should account for the 'risk' that these findings might originate from certain a priori planning policies and ideals as well, i.e. that research is undertaken merely to justify such policies. Further, the methodological approaches of such studies almost imply a certain outcome in themselves.

In contrast to this approach, Paper IV and V do not unveil which street network, which density threshold or which particular design features, make people walk. Nonetheless, they claim to tell planners something useful about walking and the built environment. The theoretical approaches and the study designs address how the concept of the 'walkable neighbourhood' fits into the wider context of the interplay between planning and travel behaviour, rather

than of what the concept comprises designwise. This interplay concerns, for example, the effect of changes to the built environment (e.g. densification, urban renewal or fill-in developments). Such changes not only affect individuals currently residing in an area, but are also likely to attract those who perceive that their preferences will be met there.

Paper III examined the understanding of pedestrians' use of travel time and distance. It was suggested that transport policies focusing on travel time (reduction) have different implications, as opposed to those concerning distance (reduction). Time-related measures often comprise larger specific road or rail infrastructure projects, which merely affects the travel time between amenities and activities rather than the distance between them. Such measures do not explicitly promote walking. On the other hand, distance-related measures — such as densification and mixed-use planning initiatives — could reduce the distance between everyday amenities and activities, and, thus, increase the utility and propensity of walking. If such distance-related measures were to be included in cost-benefit analyses, walking would likely be given a 'fairer' treatment. This notion reflects the discussion of Study B on whether pedestrian planners should aim for quantifying walking by using metrics commonly applied in transport planning. Such a strategy for pedestrian planning could very well be fruitful, albeit with concern to some of the caveats raised in this thesis. To mention but a few, Study B highlighted the challenges of using quantified walking data in the planning process, while Paper III questioned how suitable or justified certain metrics — such as time-savings, speed or flow — generally are for walking.

As suggested in the conceptualisation of walking as a transport mode put forward in Study A, walking is not always treated as a transport mode, and if so, often from a different perspective than other modes. The thesis suggested that this deficit could be overcome by accounting for the similarities with other transport modes, rather than merely taking the differences into consideration. This mostly came to mean an attribution of walking trips as (i) having destinations or a purpose, (ii) being part of an everyday routine, and (iii) being explicitly included in evaluations and planning projects.

Concluding remarks: From walkability to walkactivity?

The suggestions for future work are many. The thesis offers several theoretical takes on walking, and the empirical findings warrant further investigation.

The theoretical concepts in Study A would benefit from being employed in an empirical setting, preferably through the use of qualitative methods. Study B opens up for further (and follow-up) examinations of emerging planning strategies regarding walking. Study C aimed to problematise the

theoretical and methodological rationales of so called walkability studies. It did so by seeing walking trips as a part of everyday routines and activities. However, further work is warranted within this field. Such a *walkactivity* approach could include quantitative and qualitative investigations of the constraints and possibilities regarding everyday walking. Last, but not least, it is vital to continue including walking in existing research areas — if not to make use of the findings, then at least to show that it is possible and plausible.

Walking deserves to be taken seriously, and this calls for a shift in both research and policy. In addition to any (apparent) health or environmental benefits, investments in walking ought to be seen as the fundamental part of societal life they really are.

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David Lindelöw,
Sofielund, 17th of April 2016

Appendix

LUNDS UNIVERSITET

We are interested in learning about what you think about your residential area and your walking environment. By completing this questionnaire, you will be helping to make Malmö a better city for pedestrians!

Contact:

David Lindelöw
Doctoral student
Lund University, Faculty of Engineering

david.lindelow@tft.lth.se
0706-472462

Your dwelling and your values

1	What is your type of dwelling?	❑ Rented accommodation ❑ Housing co-operative ❑ Own property (detached house, terraced house, etc.)
2	Does the dwelling belong to you?	❑ Yes, I own or rent my dwelling ❑ No, I am a lodger or sub-tenant, or similar
3	How long have you lived there?	❑ 0-1 years ❑ 2-5 years ❑ 5-10 years ❑ More than 10 years
4	Do you have a driving licence?	❑ Yes ❑ No
5	How often do you have access to a car?	❑ Always ❑ Sometimes ❑ Rarely ❑ Never
6	Do you have access to a fully-functioning bicycle in your household?	❑ Yes ❑ No
7	Do you have any physical problems that prevent you from walking short distances (0-1 km)?	❑ Yes ❑ No
8	**How important are the following factors in your choice of dwelling?**	
a)	Close to work and/or school	❑ ❑ ❑ ❑ ❑ *unimportant* *very important*
b)	Close to public transport	❑ ❑ ❑ ❑ ❑ *unimportant* *very important*
c)	Close to food shops and other services	❑ ❑ ❑ ❑ ❑ *unimportant* *very important*
d)	Close to parks and other green areas	❑ ❑ ❑ ❑ ❑ *unimportant* *very important*
e)	Easy to walk in my neighbourhood	❑ ❑ ❑ ❑ ❑ *unimportant* *very important*

	At this time of year, what is your usual form of transport?	
9a	How far is it from your home to your daily activity, such as work or school? *If you do not work or study, go on to Question 10.*	❑ 0-1 km ❑ 1-3 km ❑ 3-5 km ❑ 5-10 km ❑ 10-20 km ❑ More than 20 km
9b	How do you usually travel to work or school at this time of year? *Please state the mode of transport for the longest part of the journey.* *Please give only one answer.*	❑ Walk ❑ Cycle ❑ Bus ❑ Train ❑ Car ❑ Other: _____
10	How do you usually travel to food shops at this time of year? *Please state the mode of transport for the longest part of the journey.* *Please give only one answer.*	❑ Walk ❑ Cycle ❑ Bus ❑ Train ❑ Car ❑ Other: _____
11	How far do you normally walk each day?	❑ I do not walk at all ❑ Up to 10 minutes ❑ 10-30 minutes ❑ 30-60 minutes ❑ More than 60 minutes
12	Where in Malmö do you mainly walk? *Give several answers if applicable.*	❑ In my neighbourhood ❑ At my workplace ❑ In the city centre ❑ In parks ❑ By the sea ❑ Other: _____
13	How often do you travel by bus in Malmö? *'Bus' means both regional buses (yellow) and city buses (green).*	❑ Daily ❑ Several times a week ❑ Once a week ❑ Once a month ❑ More rarely ❑ Never
14	How often do you cycle in Malmö at this time of year?	❑ Daily ❑ Several times a week ❑ Once a week ❑ Once a month ❑ More rarely ❑ Never

15	How often do you drive or travel by car in Malmö at this time of year?	❑ Daily ❑ Several times a week ❑ Once a week ❑ Once a month ❑ More rarely ❑ Never
16	If you were to take a train from Triangeln station, how would you usually travel to the station?	❑ Walk ❑ Cycle ❑ Bus ❑ Car ❑ Taxi ❑ Other _____ ❑ I never take a train from Triangeln
17	**What do you think about using the following modes of transport within Malmö?**	
a)	Bus	❑ ❑ ❑ ❑ ❑ ❑ *bad* *good* *Never use*
b)	Car	❑ ❑ ❑ ❑ ❑ ❑ *bad* *good* *Never use*
c)	Cycle	❑ ❑ ❑ ❑ ❑ ❑ *bad* *good* *Never use*
d)	Walk	❑ ❑ ❑ ❑ ❑ ❑ *bad* *good* *Never use*
18	**How well do the following statements apply to you?**	
a)	Most of the people who are important to me often choose to walk to places or when on errands	❑ ❑ ❑ ❑ ❑ *Untrue* *True*
b)	People who are important to me feel it is impractical to walk for everyday journeys	❑ ❑ ❑ ❑ ❑ *Untrue* *True*
c)	People who are important to me support me if I want to walk to various places	❑ ❑ ❑ ❑ ❑ *Untrue* *True*

Your walking and your neighbourhood

19 Choose from the following destinations/journeys the three (3) where you most often walk from your home

Select your three choices by marking A, B and C in the list.

The following questions concern these destinations/journeys.

_ Bus stop
_ Railway station
_ Walk/recreation
_ Food shop
_ Other purchases
_ Workplace
_ School/education
_ Leave/collect children at pre-school
_ Meet friends
_ Exercise/training
_ Other: _____

20 *How often* do you walk to A, B and C?

A	B	C	
❑	❑	❑	Daily
❑	❑	❑	Several times a week
❑	❑	❑	Once a week
❑	❑	❑	Very month
❑	❑	❑	More rarely

21 *When* do you usually walk to these places?

Both alternatives may be selected.

A	B	C	
❑	❑	❑	During the day
❑	❑	❑	Evening/night

22 **The map to the right shows your neighbourhood and its immediate surroundings. Use this map to answer Question 22 and the questions that follow on the pages after the map.**

a) On the map, draw – as best you can – the route you take to these three places (A, B and C) from your dwelling. Label the routes A, B and C.

b) Are there places on the map that you avoid? ❑ Yes ❑ No

If yes, draw a circle around these places.

De närmsta busshållplatserna
är utmärkta med ett ”H”

23 **Why do you choose to walk to A, B and C?**

Please rate the significance of the following statements.

a) It is a practical way to travel

Journey **A**	Journey **B**	Journey **C**
❑ ❑ ❑ ❑ ❑	❑ ❑ ❑ ❑ ❑	❑ ❑ ❑ ❑ ❑
insignificant *significant*	*insignificant* *significant*	*insignificant* *significant*

b) It is a good way to get exercise

Journey **A**	Journey **B**	Journey **C**
❑ ❑ ❑ ❑ ❑	❑ ❑ ❑ ❑ ❑	❑ ❑ ❑ ❑ ❑
insignificant *significant*	*insignificant* *significant*	*insignificant* *significant*

c) It is a reasonable distance to walk

Journey **A**	Journey **B**	Journey **C**
❑ ❑ ❑ ❑ ❑	❑ ❑ ❑ ❑ ❑	❑ ❑ ❑ ❑ ❑
insignificant *significant*	*insignificant* *significant*	*insignificant* *significant*

d) The time it takes to walk is reasonable

Journey **A**	Journey **B**	Journey **C**
❑ ❑ ❑ ❑ ❑	❑ ❑ ❑ ❑ ❑	❑ ❑ ❑ ❑ ❑
insignificant *significant*	*insignificant* *significant*	*insignificant* *significant*

e) I prefer to walk rather than use other modes of transport

Journey **A**	Journey **B**	Journey **C**
❑ ❑ ❑ ❑ ❑	❑ ❑ ❑ ❑ ❑	❑ ❑ ❑ ❑ ❑
incorrect *correct*	*incorrect* *correct*	*incorrect* *correct*

f) Walking fits in with my and other household members' activities during the day

Journey **A**	Journey **B**	Journey **C**
❑ ❑ ❑ ❑ ❑	❑ ❑ ❑ ❑ ❑	❑ ❑ ❑ ❑ ❑
incorrect *correct*	*incorrect* *correct*	*incorrect* *correct*

The question continues on the next page →

g) Walking is the only reasonable alternative I have for getting there

Journey **A**	Journey **B**	Journey **C**
❑ ❑ ❑ ❑ ❑	❑ ❑ ❑ ❑ ❑	❑ ❑ ❑ ❑ ❑
incorrect *correct*	*incorrect* *correct*	*incorrect* *correct*

h) What other reasons are there for you choosing to walk on each journey?

Journey **A** .....

Journey **B** .....

Journey **C** .....

24 **For A, B and C, how well do the following statements apply?**

a) I feel safe (in relation to threats, violence, etc.) when walking this route during the day

Journey **A**	Journey **B**	Journey **C**
❑ ❑ ❑ ❑ ❑	❑ ❑ ❑ ❑ ❑	❑ ❑ ❑ ❑ ❑
incorrect *correct*	*incorrect* *correct*	*incorrect* *correct*

b) It feels safe to walk this route in terms of traffic

Journey **A**	Journey **B**	Journey **C**
❑ ❑ ❑ ❑ ❑	❑ ❑ ❑ ❑ ❑	❑ ❑ ❑ ❑ ❑
incorrect *correct*	*incorrect* *correct*	*incorrect* *correct*

c) The environment along the route is beautiful and attractive

Journey **A**	Journey **B**	Journey **C**
❑ ❑ ❑ ❑ ❑	❑ ❑ ❑ ❑ ❑	❑ ❑ ❑ ❑ ❑
incorrect *correct*	*incorrect* *correct*	*incorrect* *correct*

d) The route is the fastest route to my destination

Journey **A**	Journey **B**	Journey **C**
❑ ❑ ❑ ❑ ❑	❑ ❑ ❑ ❑ ❑	❑ ❑ ❑ ❑ ❑
incorrect *correct*	*incorrect* *correct*	*incorrect* *correct*

The question continues on the next page →

e) I feel this route is easy for me as a pedestrian

Journey **A**	Journey **B**	Journey **C**
❑ ❑ ❑ ❑ ❑	❑ ❑ ❑ ❑ ❑	❑ ❑ ❑ ❑ ❑
incorrect *correct*	*incorrect* *correct*	*incorrect* *correct*

f) The route feels planned for me as a pedestrian

Journey **A**	Journey **B**	Journey **C**
❑ ❑ ❑ ❑ ❑	❑ ❑ ❑ ❑ ❑	❑ ❑ ❑ ❑ ❑
incorrect *correct*	*incorrect* *correct*	*incorrect* *correct*

g) The route is the shortest route to my destination

Journey **A**	Journey **B**	Journey **C**
❑ ❑ ❑ ❑ ❑	❑ ❑ ❑ ❑ ❑	❑ ❑ ❑ ❑ ❑
incorrect *correct*	*incorrect* *correct*	*incorrect* *correct*

h) The environment encourages me to walk along this route

Journey **A**	Journey **B**	Journey **C**
❑ ❑ ❑ ❑ ❑	❑ ❑ ❑ ❑ ❑	❑ ❑ ❑ ❑ ❑
incorrect *correct*	*incorrect* *correct*	*incorrect* *correct*

i) I think it is problematical to walk along this route

Journey **A**	Journey **B**	Journey **C**
❑ ❑ ❑ ❑ ❑	❑ ❑ ❑ ❑ ❑	❑ ❑ ❑ ❑ ❑
incorrect *correct*	*incorrect* *correct*	*incorrect* *correct*

j) I feel unsafe (in terms of threats, violence, etc.) walking along this route in the evening

Journey **A**	Journey **B**	Journey **C**
❑ ❑ ❑ ❑ ❑	❑ ❑ ❑ ❑ ❑	❑ ❑ ❑ ❑ ❑
incorrect *correct*	*incorrect* *correct*	*incorrect* *correct*

The question continues on the next page →

k) I worry about the traffic when I walk along this route

Journey **A**	Journey **B**	Journey **C**
❑ ❑ ❑ ❑ ❑	❑ ❑ ❑ ❑ ❑	❑ ❑ ❑ ❑ ❑
incorrect *correct*	*incorrect* *correct*	*incorrect* *correct*

l) The environment along the route is boring

Journey **A**	Journey **B**	Journey **C**
❑ ❑ ❑ ❑ ❑	❑ ❑ ❑ ❑ ❑	❑ ❑ ❑ ❑ ❑
incorrect *correct*	*incorrect* *correct*	*incorrect* *correct*

m) This route is most suitable for cars and/or buses

Journey **A**	Journey **B**	Journey **C**
❑ ❑ ❑ ❑ ❑	❑ ❑ ❑ ❑ ❑	❑ ❑ ❑ ❑ ❑
incorrect *correct*	*incorrect* *correct*	*incorrect* *correct*

25 **How do you usually feel when you walk along this route? Please rate your feelings on the following two scales.**

a)

Journey **A**	Journey **B**	Journey **C**
❑ ❑ ❑ ❑ ❑	❑ ❑ ❑ ❑ ❑	❑ ❑ ❑ ❑ ❑
passive *active*	*passive* *active*	*passive* *active*

b)

Journey **A**	Journey **B**	Journey **C**
❑ ❑ ❑ ❑ ❑	❑ ❑ ❑ ❑ ❑	❑ ❑ ❑ ❑ ❑
negative *positive*	*negative* *positive*	*negative* *positive*

26 **Now we would like you to assess these three routes using your own words.**

a) The *best things* about this route are…

Journey **A** .....

Journey **B** .....

Journey **C** .....

b) The *worst things* about this route are …

Journey **A** .....

Journey **B** .....

Journey **C** .....

27a Have changes in your neighbourhood in the past year affected ❑ Yes

	your walking?	❑ No
27b	If yes, what has changed?	
	.....	
	.....	
	.....	

	And finally, a few questions about you…	
28	In which year were you born?	_____
29	Are you a woman or a man?	❑ Woman ❑ Man
30	How many people live in your household (*including* yourself)	_ children aged 0-5 _ children aged 6-15 _ young people aged 16-19 _ people over 19
31	What is your current main occupation?	❑ working (employed/self-employed) ❑ studying ❑ retired ❑ looking for work ❑ on sick leave ❑ other: _____
32	What is the total income of your *household* before tax?	❑ Up to 100 000 SEK ❑ 100 000 – 200 000 ❑ 200 000 – 300 000 ❑ 300 000 – 400 000 ❑ 400 000 – 500 000 ❑ 500 000 – 600 000 ❑ 600 000 – 700 000 ❑ 700 000 – 800 000 ❑ More than 800 000
33	What is your highest level of education?	❑ Compulsory school ❑ Upper secondary school ❑ University ❑ Other: _____

In the spring of 2012, we will be carrying out a study in which residents will be able to assess their local environment on site together with researchers. Are you interested in participating in this study?

Name: _____

Telephone number or email address: _____

Many thanks for your participation!

Please return the questionnaire in the postage-paid envelope.

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