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Levelling-up walking as a mode of transport - a case for changing hierarchies

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A R T I C L E I N F O

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A B S T R A C T

Introduction: Walking has a key role in achieving the compact and 15-min city, improving public health, and reaching sustainability goals. However, whilst walking is placed at the top of the transport hierarchy in public documents throughout Scandinavia, in reality, walking as a mode of transport is consistently downplayed and hierarchically placed in the bottom of the transport hierarchy. Focus in the public and planning discourse is instead commonly on either motorised transport, public transport, or cycling, regardless of whether the focus is on city planning, logistics or safety.
Methods: To better understand why this is the case – as well as attempting to suggest solutions to levelling-up walking as a mode of transport – academics, policymakers, and practitioners from across Scandinavia were strategically selected to contribute with their knowledge through focus groups and individual surveys during 2021 and 2023.
Results: In the analysis of the material, it became clear that walking was largely viewed in the parallel perspectives of two fields: planning and safety. These fields coexist as disparate and disconnected fields, basing their work on different methodologies and input data, resulting in an incoherent understanding of walking as a mode of transport. However, the analysis also enabled the development of a thematic model: realising walking as a mode of transport, illustrating an ideal construct in which planning and safety perspectives work coherently.
Conclusion: The results suggest that there is a strong desire to level-up walking as a mode of transport and change the status and hierarchy in the transport system. However, to do so requires a more holistic and multi-disciplinary view.

1. Introduction

From an urban design perspective – especially in an urban context – walking as a transport mode is critical (Chapman, 2018; Lindelöw et al., 2016). Not only does walking connect all the other types of transport modes together (Hillnhütter, 2016; IFT, 2012), but physical activity in public spaces has considerable health and wellbeing benefits (WHO, 2015). For mental and physical health, it

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assists in preventing loneliness and depression (Iwarsson et al., 2013) and brings significant psychosocial value as it provides an arena for human interaction (Baobeid et al., 2021; ITF, 2012; Tourula and Rautio, 2014). Walking is universal and inclusive (Chapman et al., 2024; ITF, 2012) and promotes vibrant urban environments helping to maintain a sense of control and a continued sense of purpose in later life (Baobeid et al., 2021).

As such, encouraging walking as a mode of transport not only reduces the levels of physical inactivity in society – responsible for 1.6 million deaths each year worldwide – it can also reduce health costs due to low physical activity levels worldwide, which attribute 1–3 % of both high income and low income countries national healthcare expenditures to physical inactivity (WHO, 2018). It also brings societies closer to reaching the UN's Sustainable Development 40 Goals and the World Health Organization's Age Friendly Cities (WHO, 2007), reduces air pollution from motor vehicle emissions, which causes 3 million deaths per years (WHO, 2016), decreases congestion, vehicle noise and operation costs (ITF, 2012).

Walking underpins critical town planning initiatives of compact and 15-min cities (Merlo et al., 2025; Willberg et al., 2023). Such initiatives emphasise creating attractive places with short distances between places, which in turn influences and encourages walking (Ayala, 2022; Chapman et al., 2024; Hernandez-Palacio, 2018). Policies seek to shape cities in a way that is supportive of public transport and make walking an attractive option (Carmona, 2021; Khavarian-Garmsir et al., 2023; Mandal et al., 2023), the intention being to allow people to use the city in a more connected, sustainable and resource efficient manner, underpinning the Paris Agreement (UNFCCC, 2018) and the UN's Sustainable Development Goals, especially goal 11, sustainable cities and communities. The overarching proposition is that by being attractive, compact, diverse, well-connected and walkable, settlements can help reduce energy consumption and emissions by limiting vehicular use (Brand et al., 2014; Jenks et al., 1996; Moreno et al., 2021). By reducing transport use and reducing emissions, walking helps to curb global warming meaning that walking as a mode of transport is a crucial ingredient to reach sustainability goals linked to town planning and land use matters (Moss et al., 2008; Roaf et al., 2024; van der Vlugt et al., 2025).

Despite this, planning for walking is largely neglected. Walking statistics are inherently faulty, frequently underreported and inadequately incorporated into planning and policy development (ITF, 2012; Johansson et al., 2022, 2023). The perspective of walking as a mode of transport – defined as understanding walking as a means for reaching every-day destinations and activities, with planning and research efforts supporting and exploring this approach (Lindelöw, 2016) – is largely disregarded from the societal agenda in several countries (Chapman et al., 2024; ITF, 2012), including Sweden (Johansson et al., 2022, 2023) and throughout Scandinavia. A continued emphasis is on either motorised transport or transport modes such as cycling, regardless of whether the focus is on city planning, urban design, logistics or safety (Johansson et al., 2022, 2023) and 'walking as a mode of transport' is omitted from some critical Scandinavian transport policy documents (Finnish Government, 2022; Ministry of Culture, 2007).

However, such examples do not mean that 'walking as a mode of transport' is absent from the societal agenda. Walking is mentioned in national level Nordic architectural and urban design policy (Ministry of Culture, 2014; Norwegian Ministries, 2009; Government Offices of Sweden, 2018), and in government documents highlighting the importance of promoting walking, by providing citizens with safe, accessible and inspiring public spaces (Regeringskansliet, 2017; The National Board of Health and Welfare, 2022), not least as tools to reach international sustainability goals. However, when mentioned, two aspects are apparent. Firstly, walking is commonly mentioned from a single perspective, for example as vulnerable road users or in relation to public health, rather than combining roles or perspectives. Secondly, walking is largely an add-on to the central theme. This is despite the fact that official documents place walking at the top of the traffic hierarchy, and that walking is a multi-faceted, transdisciplinary undertaking related to climate-, design of the public realm- or maintenance-related factors (Chapman and Larsson, 2019; Larsson and Chapman, 2020). From a Scandinavian perspective, the prioritisation of other transport modes and down-grading of walking is also seen in the fact that whilst there are (one or more) large state-funded research centres for car-based transport, public transport, and cycling, no such centre exists for walking (Johansson et al., 2023).

To better understand why this is the case, how the broad field of walking as a mode of transport is understood, what problems, issues, and priorities exist, and how these can be overcome, leading practitioners, policymakers, and researchers from the Nordic countries, particularly from Sweden – who in different and various ways work with fields related to walking as a mode of transport – were invited to contribute with their perspectives. By including multiple perspectives and delving deeper into these experts' current state of knowledge, the overarching aim of this paper is to identify ways of levelling-up walking as a mode of transport.

2. Materials and methods

2.1. Material

The recruitment of participants was performed through a strategic selection from the authors' professional networks and a snowballing process in which participants were asked to spread the invitation to those they thought were relevant. The authors have considerable research and/or practical experience in the fields of traffic safety, walkability, traffic maintenance, urban design, security, and health, meaning that the networks were considerable and encompassing. The aim was to include a wide variety of policymakers, researchers, interest groups, public sector authorities, and private companies from across Scandinavia with a balance between different sectors.

This resulted in 162 individuals who took part in stage 1. Of these, 68 individuals took part in step 2 of the data collection, 10 individuals took part in step 3, and 18 took part in step 4. Whilst they participated in their professional role, thereby eliminating any ethical issues in terms of anonymity, the participants' identity has been kept anonymised to ensure that participants felt free to contribute unrestrictedly. However, for the sake of transparency, available descriptive statistics on the participants is presented in

Table 1. It is important to note that no new participants were added at each stage. In other words, the participants at stage 3 and 4 were also participants at stage 2, and the participants at stage 2 were participants at stage 1. Unfortunately, no data was collected on the original 162 individuals.

2.2. Method

Given the aim – combining different opinions from as many different societal actors in the broad field of walking as a mode of transport as possible – a concurrent embedded mixed methods design (Creswell and Clark, 2011) was used in which data from surveys and discussion groups were combined. Specifically, the methodology meant that participants were asked to fill in a survey individually, the results of which were discussed in focus group seminars. The combination of both individual and collective opinions has the advantage of both making sure that all individual's specific comments are included as well as including combined experiences and perspectives (Wibeck, 2010). This is particularly important when involving different fields and individuals at varying hierarchical levels to ensure that all opinions are included.

2.3. Data collection

In terms of the data collection and data analysis, this was achieved in four stages.

2.3.1. Stage 1 - data collection

First, during the autumn of 2021, 162 individuals were invited, through email, to both fill in a survey and to take part in an online focus group. The survey consisted of two questions;

1) What do you think are the biggest challenges and possibilities for increasing pedestrian traffic?
2) What do you think are the biggest challenges and possibilities for improving the traffic safety situation for pedestrians?

2.3.2. Stage 1 - data analysis

To produce a semi-structured guide for the focus groups, the survey data was analysed before-hand by the research team. This was done in a two-step process. First, each member of the research team individually analysed the material. Then, the individually-assessed data was analysed collectively by all of the members of the research team in a group process. The aim of this step was two-fold: to ensure that the multidisciplinary nature of the research team was intact and to ensure that all perspectives were included in the analysis.

Three themes were identified; Policy and strategy; Objective and subjective safety; and Create, design and maintain.

2.3.3. Stage 2 – data collection

During the autumn of 2021, 15 online thematic focus groups were held within the three themes, with five separate groups in each theme. In total, 68 persons participated (see Table 1), some of whom participated in several focus groups. The structure of the focus groups was an introductory presentation of the results of the survey and then group discussions. The questions in each were;

- What knowledge does society (defined in the broadest possible way) lack when it comes to
  - policy and strategy for pedestrian planning? (theme 1)
  - objective and subjective safety for pedestrians? (theme 2)
  - physical design for pedestrians, i.e. create, design and maintain? (theme 3)
- What hinders society from obtaining this knowledge?
- What hinders society from using the knowledge we already possess?

Table 1
A Summary of participants.

Organisation Type	Autumn 2021 Thematic workshops (stage 2)	Spring 2023 Expert Workshop (stage 3)	Autumn 2023 Local, National & Academic Workshops (stage 4)
Swedish universities	17	3	4
Norwegian universities	4		2
non-Nordic universities	2		
Swedish transport-related authorities	13	4	10
Norwegian transport-related authorities	3		
Consultancy companies	8		1
Swedish municipalities	14	1	1
Swedish research organizations/ institutes	7	2	
Total	68	10	18

2.3.4. Stage 2 – data analysis

After the focus group the same analytical structure was used as after the survey, i.e., an individual and then collective analysis process, thereby jointly informing the research team of indications of knowledge gaps that could be relevant to dig deeper into in the next data collection stage. From the focus group, key experts were also identified whom we believed could offer deeper insights in the state of knowledge of the entire broader field.

2.3.5. Stage 3 – data collection

As such, 10 experts, from a range disciplines and hierarchy, convened in a physical focus group in May 2023 to dig deeper into the issue of walking as a mode of transport. The aim was for the experts to reflect on the analysed results from the previous workshops and to identify specific knowledge gaps.

2.3.6. Stage 3 – data analysis

The discussions were observed by the research team and documented independently and was then analysed in the same way as in the previous data analysis stages.

2.3.7. Stage 4 – data collection

As a final step, a final group of three online focus groups were held in which groups were constructed from the perspective of societal levels, rather than thematic. All participants from the original focus groups were invited to take part. A total of 18 individuals choose to take part in the focus groups (held in the autumn of 2023) and were divided into groups representing the local level, national level and academic level. The aim of these focus groups was also to reflect on previous results and identify further knowledge gaps.

2.3.8. Stage 4 – data analysis

The discussions were observed by the research team and documented independently, and was then analysed in the same way as in the previous data analysis stages.

Combined, the data collection followed a stepwise structure in which the data from each data collection (survey or focus group) was analysed independently to then inform the next step of the process. This means that the collected data cannot be viewed as independent results. Rather, all of the data has been produced in a co-production between the research team and the participants, building upon the knowledge created in the previous stages.

After the final workshop, all of the material was combined. All research members analysed the material through content analysis, first independently and then collectively, in alignment with the recommendations from Graneheim and Lundman (2004).

3. Results

Given the number of focus groups and the broad competencies amongst the participants who took part in the study, a large amount of data was produced in the discussions concerning knowledge gaps and the different approaches to walking as a mode of transport within different fields.

3.1. Pre-conditions for walking

Throughout the focus groups it was clear that compared to other transport modes, central terms, concepts and typologies have yet to be defined or clarified. Likewise, it was argued that many global prerequisites had not been tied into the idea of walking. Not having such pre-conditions in play, it was argued, means that several of the other aspects of promoting walking as a mode of transport falter or entail a degradation of walking compared to other modes of transport.

3.1.1. Rights

Starting with the most overarching ethical perspective, it was put forth that walking should be seen as a human right; that the right to be a part of the local community should be protected. Whether the lack of ability to be a part of the local community was due to problems in the physical environment, for example a lack of winter maintenance due to the fact that removing snow or ice is the responsibility of the individual homeowner, or that (often older adults) individuals who are physically unable to leave their house have no right to come outside, the participants strongly emphasized the inhumaneness in the fact that walking - in a broad sense - is not seen as a human right.

3.1.2. Policy goals

Several of the large international policy goals were also seen to be directly applicable and highly relevant for walking as a mode of transport. Participants raised the importance of walking for reaching the Sustainable Development Goals, Agenda 2030 and the Paris Agreement but also discussed the fact that links between policy goals and walking were often absent from discussions. Other policy goals, such as those proposed by the World Health Organisation in achieving improved health metrics were also raised, with discussions highlighting the difficulty of applying such metrics. Swedish national safety policy goals, most notably Vision Zero, were also mentioned but received surprisingly little attention.

3.1.3. Definitions

Continuing with pedestrian collisions, a recurring theme in the focus groups was the problematic nature of defining traffic collisions when involving pedestrians, particularly single collisions, i.e., falls and slips in the traffic environment. The lack of consistency and inclusiveness was seen as down-grading walking as a mode of transport. A similar sentiment was put forth in terms of defining walking, for example how wheelchairs should be assessed.

3.1.4. Concepts

In similarity to policy goals, certain concepts were identified that participants believed should more clearly be connected to walking. In particular, walking was seen as crucial in the ideas behind the urban policies for the compact and 15-min cities and their adaptation in Scandinavia. Here, sentiment was that while walking was central to these policies, little evidence, compared to other modes of transport, was available to justify the importance of walking in urban planning. For example, the reliance on walking metrics of 'steps' or 'time' in compact and 15 min city discussions, rather than the multifaceted outcomes (Social, Economic, and Environmental) is problematic. Especially, as this lack of evidence means that the benefits of walking are not accounted for properly in cost-benefit analysis of policies and proposals.

3.1.5. Typologies

Connected to all of the above were various typologies that require clarification, for example space, people, time, and incidents. Participants appreciated that at a basic and case study level, broad understanding exists about urban forms, designs and typologies of space that are critical for pedestrians. However, detailed knowledge or deepened understanding was not.

3.2. Qualitative input data - walking needs

The importance of data was raised in all focus groups. Although this often involved and was focused on quantitative data (see below), the importance of qualitative data was also raised. In particular, the underlying understandings of why people walk - or refrain from walking - was a critical issue that was raised from an urban design and aesthetic perspective, more than a safety or maintenance perspective.

3.2.1. Understanding needs and desires

Although the issue of where and how people walk is predominantly a quantitative issue (see below), the issue of *why* people walk is a qualitative question. It was clear in the focus groups that practitioners, policymakers, and academics all felt that there lacked knowledge in this field, especially on how innate desires differed amongst different societal groups, for example, differences between young and old people, gender differences, cultural differences, as well as in relation to the context; often from a rural/urban perspective.

3.2.2. Motivation for walking

Related to the category above was the issue for motivation, i.e., why individuals choose different route choices. It was argued that such knowledge was crucial both in terms of urban design and maintenance. In other words, the issues or questions that were raised were: why do individuals choose certain paths? What attracts individuals to choose a certain route?

3.2.3. Communication of walking

Whilst the categories above related to how individuals understand walking, in some of the focus groups it was also discussed how "society" views walking. When such discussions were delved deeper into, it became clear that three sub-categories emerged: political, media and social. All of these contribute to how walking is communicated in society. It was argued that, politically, walking is downgraded in relation to other modes of transport and seen as an invisible factor that ties together other transport modes. It is also downgraded in terms of safety. Media are also contributory in downgrading walking, for example in terms of reporting on serious collisions amongst motorised vehicles compared to serious single pedestrian collisions. Finally, it was put forth that the social view of walking - in which, for example, the prioritisation of snow removal for bike lanes or roads ahead of footpaths is an accepted social reality - also contributes to a downgrading. Together, such factors were understood to be of upmost importance in qualitatively understanding the role of walking in today's society.

3.3. Quantitative input data - in relation to socio-demographic factors

The importance and need for sound quantitative data was apparent in all focus groups, particularly involving participants who were active in the safety or maintenance aspects of walking. Regardless of the type of data, the participants regularly returned to the fact that data needed to be understood in relation to the individual's socio-demographic background, e.g., age, sex, cultural background, place of residence (urban/rural), income, education, etc.

3.3.1. Travel data

Data regarding how individuals travel was deemed as a critical data input to understand how walking occurs and exists in society. From a safety perspective, the ability to understand exposure was seen as essential, whilst from an urban design and maintenance perspective, issues of pedestrian flow and route choices were particularly highlighted. For many of the participants the absence of complete travel data was clearly a decisive issue and one that hindered the entire process of understanding walking as a mode of transport.

3.3.2. Incident data

The second category of quantitative data that was deemed important was data related to incidents. Commonly, what was discussed were different types of collisions, i.e., single collisions or collisions involving others in the transport environment, and the data quality surrounding these incidents. It was commonly put forth that the knowledge surrounding such unwanted events is lacking compared to incidents involving motorised transport or cycling. Whilst – from a Nordic perspective – there is collected data on the number of pedestrian-related incidents, who is affected, and the general location of the event, more precise knowledge about how the event occurred, exactly where it occurred, and how society should assess the costs of such events, was seen to be severely lacking, generally as a consequence of such data not being recorded by the police (but rather the hospitals).

Incidents related to security were also discussed, for example crime. For these incidents, data was seen to be more readily available, not least due to the data being recorded by the police.

3.4. Qualitative methodology

Several qualitative methodological approaches were raised in various discussions in the focus groups. The context differed somewhat, ranging from identifying successful examples of urban environments to the innovation of new designs.

3.4.1. Case studies

Particularly from an urban design perspective, but also in terms of maintenance (and to a lesser degree safety), examples from other contexts - both national and international - were raised in the discussions. Often, these were successful projects in urban environments in which a design- or strategy-based solution had increased walkability, improved safety or improved efficiency. While useful as creative ideas and examples, there was an acknowledgement that the influence of case studies was limited. The success in a particular setting usually reflected a very unique range of ingredients for each case: the place, urban policy and economics and local and political will: meaning knowledge could be difficult to apply elsewhere. In particular, it was noted that few well-designed studies had been performed in Scandinavian settings where cycling is often promoted and where harsh climate conditions affect the situation for walking.

3.4.2. Innovation

Untested ideas were also raised in the discussions and the importance of being creative in the methodological approaches to solving walking issues. Design thinking and living labs were raised as ways of gaining insight into the complexity of walking, especially from broad and different perspectives. Urban labs with the community came forward as ways to engage with people, to understand motivations, fears, etc. Understanding individual perspectives was seen as important counterpoints to quantitative data.

3.5. Quantitative methodology

3.5.1. Encompassing risk measure

A foundational factor that was regularly returned to - and connected to the quantitative data input - was the calculation of risk. Predominantly from a safety perspective, but also from a walkability and security perspective, the importance of calculating risk was reiterated several times. The combination of travel data with collision data, crime data, perceived security data, etc. was viewed as a central methodological approach to promote walking and understand walking as a mode of transport. Discussions regularly returned to the belief that without reliable data and sound methodology, fully understanding walking as a mode of transport was not possible. It was argued that for both motorised transport and cycling travel data is much more reliable, both due to data collection methods (for example annual motor vehicle inspections) but also due to walking not only being a singular mode of transport but also a way of connecting other transport modes. Exposure data is therefore much more difficult for walking.

3.5.2. Effect evaluation (cost-benefit analysis)

Linked to the risk measure was the perceived importance of evaluating the societal effect of different interventions as well as calculating the effect of not introducing different interventions. It was generally believed that to affect politicians and decision makers there is a need for reasoned justification and cost-benefit analysis to show the economic importance of promoting walking and protecting pedestrians. As such, within this category were also discussions related to how one could place a monetary value on the experience or freedom of walking good urban design can create. However, the underlying intent was to enable comparisons to other modes of transport.

3.5.3. Planning strategies for walking (create-design-maintain)

In planning and urban design scales (transnational, national, city, and neighbourhood), outcomes focused on the national and local levels of guidance. These two output categories differ in that at the national level there was a clear focus on thematic planning matters and at the local on more urban design and physical interventions. Regardless of whether focus was on the national or local level, there was an interesting connection to the importance of design in reducing risk, i.e., similar ideas to crime prevention through environmental design but related to risk more generally.

3.5.4. National

In the focus groups it was often noted the lack of a national plan or guideline regarding walking in the Nordic countries. The experiences from other countries - such as the UK, the Netherlands or Denmark - were often used as case studies in which national plans existed. It was generally believed that a national plan or guideline was required to promote walking as a mode of transport. National guidance was seen as validating the production of local design guidance for walking as a mode of transport.

3.5.5. Local

Whilst national guidelines were seen as important there were also discussions highlighting the problematic nature of such documents in countries with vast differences between rural and urban areas and large climatic variation. Examples of "imported" walking or bicycling strategies from Stockholm to local rural areas were used to exemplify the problems of merely focusing on standardised measurements, without taking the local context into consideration. Here local urban design guidance was seen as the opportunity to create place-specific proposals.

3.6. Interventions

Surprisingly, relatively few specific solutions or ideas to stimulate walking as a mode of transport were discussed. However, it was clear that the participants saw new - or developed - technology as the way to solve many of the problems around walking. These problems were predominantly related to safety issues, either protective equipment to be worn by the individual (such as anti-slip devices/footwear or hip protectors), placed on the ground (such as impact absorbing asphalt) or on motorised transport. Another element of new technology that was discussed was the impact and possibilities associated with digitalisation, artificial intelligence, and autonomous vehicles.

4. Realising walking as a mode of transport

As an overarching theme of the data collection, it was clear that there was a goal or vision of realising walking as a mode of transport. Although the participants came from a large range of backgrounds, research fields, societal levels and with different individual interests, the common thread was a desire to increase walking in society whilst also making it safer and more secure.

By organising the above-mentioned categories with this theme in mind, Fig. 1 was produced where the different categories construct a model of knowledge production and ideal construct of a multidisciplinary realisation of walking as a mode of transport. The model illustrates the importance of combining a range of different data input, using different methodologies, and thereby producing different outputs: at different societal levels and in different forms.

However, despite this commonality, the discussions also indirectly showed the problematic nature of the field in its current state. A number of barriers or knowledge gaps were identified that the participants put forth as factors that hindered the model from working successfully and realising walking as a mode of transport. These barriers have been illustrated in Fig. 2.

As is seen in Fig. 2, there are interconnected parts of the model though also separate, unconnected elements. We put forth that there are currently two unconnected fields; the traditional risk field and the traditional planning field.

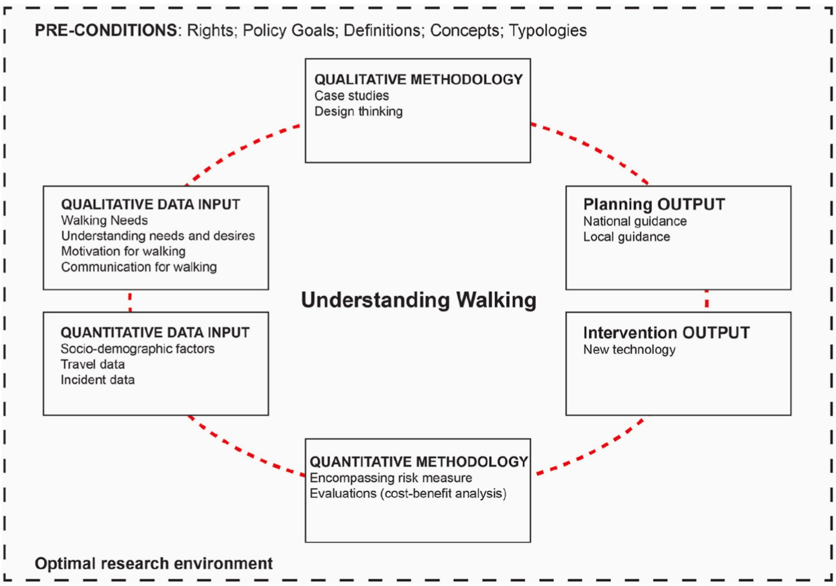

Fig. 1. The optimal research environment.

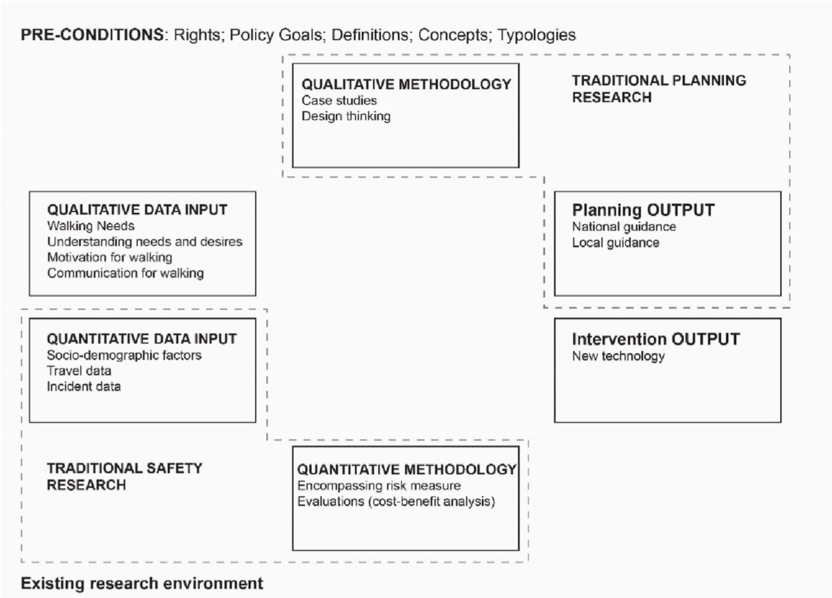

Fig. 2. The existing research environment.

4.1. *The traditional risk field*

Starting with the traditional risk field, i.e., the area of walking associated with safety and security, there is a strong influence from medicine and engineering meaning that solid and encompassing quantitative data and methodology has been a central core for researchers and policymakers in this field. The epidemiological nature of the field has meant that exact data is seen as highly important. In the Nordic countries – as a consequence of systematised control of vehicles and highly reliable injury and collision data – exact risk or cost-benefit calculations are possible when discussing motorised transport. Perhaps because of this, researchers, policymakers and other decision makers regularly returned to the belief that equivalent robustness is needed for pedestrians. Simultaneously, it was raised that accomplishing this is very difficult and requires considerable resources, largely due to the absence of exposure data (for example distance, as in Feleke et al., 2018). Such data is in turn inherently difficult to assemble correctly meaning that there was a frustration that data on walking could never be as comprehensive as for other modes of transport. In turn, this was viewed as problematic as it is often believed that any suggested interventions need to be underpinned by robust and correct calculations, regardless of whether this relates to objective or subjective safety or security, or whether it relates to maintenance factors (that in turn are related to safety or security). The difficulty in attaining data therefore transcended to problems in innovation but also difficulties in arguing for the case of levelling-up walking as a mode of transport.

4.2. *The traditional planning and urban design field*

If the safety field was preoccupied with robust data and quantitative methodology, the focus groups clearly showed that the traditional planning and urban design field approached the issue of walking as a mode of transport from a very different perspective. This field were much more preoccupied with case studies and design precedents. Ideas from other contexts, often international, or from other fields, were promoted as exemplars that showed desired outcomes of guidelines or plans.

However, it also became clear that contextual information, data or perspectives from the end-users was often lacking or severely compromised in terms of systematic approaches. Implementing "solutions" from contextual settings without fully collecting data (qualitative or quantitative) about the pedestrians, the culture, the climate, etc., meant that the approach – in similarity to the safety field – was inherently top-down. This lack of data-based solutions was understood and was seen as problematic as believed outcomes of case studies can be easily challenged with a lack of a robust evidence base.

4.3. *The knowledge gap of walking needs*

As is also seen in Fig. 2 there was an identified knowledge gap regarding the lack of qualitative data input in regard to walking as a mode of transport. Although many participants from a large range of fields reiterated the importance of understanding the underlying and differing needs, desires and views associated with walking, it was exceedingly clear that this category was largely unstudied as well as being largely ignored in the practical policymaking processes. Route choices were largely seen as a quantitative issue in practice even though it was widely recognised that route choices are motivationally based. Likewise, although it was discussed that there are differing needs from different societal groups, the modus operandi was still very much a focus on standardised measurements regardless of whether the approach was design, safety, or maintenance. Finally, in relation to walking needs it was clear that simply applying a transport perspective on walking was insufficient. Motorised transport is to a very large extent a tool for helping individuals or products to go from A to B. Whilst walking also has this role, it also has a sociable, health-related role. This difference makes the application of tools designed in the motorised transport sector on to walking difficult and an important issue going forward, i.e., to see walking as a mode of transport but also more than purely logistics.

5. Discussion

The aim of this study was to identify common problems, issues, and priorities within the broad field of walking as a mode of transport, as perceived by a large and diverse group of policymakers, practitioners and academics in the Nordics, with a particular focus on Sweden. Despite the large amount of data, through surveys and focus groups, the analysis produced a comprehensive conceptual model of how walking as a mode of transport could be realised as well as the current knowledge gaps or barriers that are hindering this realisation.

In terms of the comprehensive model, it is clear that the two main perspectives exist on the issue of walking as a mode of transport; risk-based and planning (urban design)-based. The two fields are clearly interlinked in practice, given the importance of the environmental context in relation to pedestrian injuries (Amin et al., 2022), feelings of safety/security (Crowe and Fennelly, 2013; De Vos, 2018), and the overall attractiveness of the built environment (Hidman, 2018), and pedestrian infrastructure Kerr et al. (2012); Michael et al. (2006) linked to general ideas about walkability (Southworth, 2005). However, they clearly have very different approaches to the issue and different prerequisites. The risk-based field is highly quantitative, basing its work on hard data, cost-benefit calculations and interventions that can be assessed and evaluated through quantitative methodology. Within the risk-based field also exists the field of maintenance. Although maintenance can be viewed as its own field in walking, the purpose of the maintenance is in a very large percentage of cases either an improvement in safety (e.g., removal of snow, mending pavements, etc.) or to improve the perception of safety and security (e.g. lighting or removal of trees/bushes). Also within maintenance, therefore, there is a focus on cost-benefit and other quantitative measurements.

The planning (urban design)-based field, meanwhile, is comparatively qualitative, basing decisions on evidence and knowledge tools, of research, principles, case studies and design precedents (Carmona et al., 2021; 2023) coupled with design thinking (Carmona et al., 2017) and Charrette processes. Comparatively to risk-based work, little hard data is available in the field and where available, conceptual and practical problems exist with its use (CABE & DETR, 2001), meaning evidence-based policy and decision makers often relying on the 'best practice'. Here outcomes are not guaranteed as projects are speculative, unique and highly bespoke, i.e., not replicable. Deployment of evidence and knowledge tools is difficult as tools often exist outside statutory planning systems and their power relates to education, encouragement and nudging (Carmona et al., 2023). Similarly, design thinking is usually non-data driven, precedent based and speculative, with outcomes from professionals or laypeople being grounded in collective agreements.

Despite the norm of design thinking not being based on hard data, it is possible for projects to be more persuasive, as outcomes reflect stakeholder consensus, aiding decision maker confidence (Campion, 2018). For example, while residual land value may not be commonly seen as a metric for walking, quality of the environment connects directly to property and land prices (CABE Space, 2005), giving an underlying value-based metric that can be brought into focus. For planning (urban design)-based fields, this unique data set is, however, problematic as 'benefits' usually jump over this field and go directly to owners. For example, some past research in London suggested that improvement in street design quality could result in 5.2 % rises in residential values and 4.9 percent in retail rents (CABE, 2007). A walkable environment also has a positive impact on commercial property values (Shin and Woo, 2024), while pedestrians can contribute to local economy as valuable consumers (Carmona, 2021; ITF, 2012). Here there is clearly potential in integrating more data-driven methodology in the design-based field.

A strong underlying strand in this study was the perceived separation between the two fields of safety and design. Such a silo-based perspective is far from new. On the contrary, when handling societal challenges silo perspectives are very common (Campbell and Cowan, 2002; Lofstedt and Schlag, 2017; Nilson and de Herve, 2023). In the transportation field, safety has been the primary health concern (De Vos, 2018) long before the automobile era (ITF, 2012). Historically, measures for walking have been reactive, addressing site-specific safety issues as they arise rather than through comprehensive planning (Carmona, 2021; ITF, 2012), yet pedestrian infrastructure is still often treated as an addition rather than a fundamental part of transport planning.

A major contributor to this silo-based perspective is the organisational structure of local or national governance. The multi-faceted nature of planning and urban design, national to local, and the need to work simultaneously between the scales of strategic to detailed, means many projects and decisions come forward in parallel, with different actors (architecture, urban design, traffic planning, maintenance, public health, etc.) being responsible for particular areas. This leads to disconnected or colliding work, where subject tradition influences the manner in which projects are shaped and where individuals lack an understanding or comprehension of each other's perspectives. Not least, this was apparent in the focus groups as many participants were well acquainted with people in their own field but had no connections with participants in other fields even though they worked on similar issues, projects or geographical areas.

To overcome these inefficiencies, stronger coordination is needed. While pedestrian infrastructure is typically managed at the local level, walking is not merely a local issue. Successful examples demonstrate the benefits of a structured legal, administrative, and technical framework at the national level to effectively address pedestrian needs (ITF, 2012). Without such coordination, actions to support walking often remain isolated, inefficient, or even impracticable. Bridging these gaps through interdisciplinary collaboration and integrated policy frameworks is essential for promoting safer and more walkable environments. One such bridge-building approach could be to view and plan walking from a holistic (public) health point of view, as suggested in recent articles (e.g.

Glazener et al., 2021; Higgsmith et al., 2022; Roaf et al., 2024; Stroope et al., 2022). Using (mental and physical) health as an approach could help in joining the safety and the planning sides through common quantitative, commodified metrics and goals. For instance, following one of the recommendations of Roaf et al. (2024): “Greater consistency in measurement tools for active travel interventions is needed”. However, this would require that such bridge-building metrics efforts were made.

Apart from the finding of the two parallel – somewhat unconnected – fields, the other important finding was the fact that walking needs, regardless of whether these were on a micro-, meso-, or macro-level, seem to be decidedly under-studied. From the perspectives of the respondents, why individuals choose – or don’t choose – to walk, or how society views walking, are critical factors in increasing the status of walking as a mode of transport and adapting societies to encourage and promote walking. Despite this, the respondents identified this area as a considerable knowledge gap. Whilst considerable focus was placed on understanding exposure and correctly understanding flow, the underlying motivation behind walking or the barriers to refrain from walking is perceived to be largely unknown. Whether this is a case of a lack of research and knowledge or a perceived lack of knowledge amongst the respondents regarding these aspects, remains to be studied. Regardless, it was clear that from a Nordic perspective, qualitative data on the motivations of pedestrians is lacking.

The importance of understanding why individuals choose to walk, or not, has been emphasized in previous research. Alfonzo (2005) proposed a hierarchy of five needs that influence walking decisions: Feasibility, Accessibility, Safety, Comfort, and Pleasurability. However, walking may still not be the preferred mode of transport, even if these needs are fulfilled (Alfonzo, 2005; Methorst, 2021), highlighting the necessity of exploring individual perspectives to overcome the existing knowledge gap. Additionally, different groups of pedestrians have distinct needs, prerequisites, and motivations for walking. Factors such as cultural values, attitudes, weather conditions, infrastructure, and distance all influence walking behaviour and physical activity levels (Chapman and Larsson, 2019; ITF, 2012), as does topography. Sociodemographic disparities further highlight the need for deeper research, as groups such as women, older adults, individuals with limited mobility, and those with lower incomes might face restricted access to safe and appropriate walking environments (World Health Organization, 2018). Pedestrian mobility is under-researched and often missing from transport statistics, including data on pedestrian safety (single collision and crash). While there are numerous data on motorised traffic, pedestrian data remains insufficient, preventing effective planning and recognition (ITF, 2012; Johansson et al., 2022, 2023). Increasingly, there are researchers (Amin et al., 2022; Branion-Calles et al., 2025; Methorst, 2021) arguing that pedestrian falls should be included in official traffic statistics, thereby expanding the current road traffic injury (RTI) definitions; an important first step in levelling-up walking as a mode of transport.

The fact that the respondents believed that there is a knowledge gap may also be a consequence of the included participants in this study and the before-mentioned silo-nature of walking as a practical or research field. Although we aimed to include as many different perspectives as possible, through the transdisciplinary nature of the research group and the application of a snowballing system where participants were given the opportunity to suggest other relevant actors, we cannot disregard the possibility that research fields, policymakers, or practitioners were missed in the data collection, thereby skewing the results. However, simultaneously, as is seen in Table 1, there was a considerable breadth in the competencies of the participants. Also, this study has a Nordic approach. Whilst we believe that the proposed model as well as the identified unconnected elements and knowledge gaps are likely to be transferable to other contexts, this needs to be confirmed in future studies.

6. Conclusions

By bringing together a large number of Scandinavian actors within the broad and hierarchically diverse field of walking as a mode of transport and undertaking data collection in varying ways, this study can introduce a conceptual model of realising walking as a mode of transport from the perspective of these experts. The model clearly illustrates the diversity of walking as a mode of transport and the fact that two overarching – often separated – approaches exist, that use very different methodologies and approaches to the issue. This difference was understood as one of the major barriers to realising walking as a mode of transport and thereby bringing walking to the forefront of urban design and transportation. Likewise, the fact that the needs, desires, motivation and demands of both individuals and societies represent a large knowledge gap in this field is also indicative of the lack of focus on walking amongst policymakers, practitioners and academics.

As mentioned previously, this paper should be viewed as a first step in understanding the current situation, the desirable future, and the barriers to reach this future. As such, the conceptual model presented in this paper is not necessarily a full picture but the understanding of a diverse group of interested and knowledgeable individuals.

To level-up walking as a mode of transport, the presented model can be a framework for combining different perspectives. However, this will require an interest amongst relevant actors; something that was clearly observed in this study. As such, there is considerable hope for changing the hierarchies in the urban design, town planning and transport sectors and raising the importance of walking.

CRediT authorship contribution statement

David Chapman: Writing – review & editing, Writing – original draft, Methodology, Investigation, Funding acquisition, Conceptualization. **Charlotta Johansson:** Investigation, Funding acquisition, Conceptualization. **Glenn Berggård:** Investigation, Conceptualization. **David Lindelöw:** Investigation, Conceptualization. **Agneta Larsson:** Writing – review & editing. **Luisa Merlo:** Writing – review & editing. **Finn Nilson:** Writing – review & editing, Writing – original draft, Investigation, Funding acquisition, Conceptualization.

Declaration of competing interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests:The authors report financial support was provided by Swedish Transport Administration and the Kamprad Family Foundation. The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Data availability

No data was used for the research described in the article.

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