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## Everyday leisure travel

### Understanding car use for social and recreational trip purposes

Strömblad, Emma

2025

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*Citation for published version (APA):*

Strömblad, E. (2025). *Everyday leisure travel: Understanding car use for social and recreational trip purposes*. Department of Technology and Society, Lund University.

*Total number of authors:*

1

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# Everyday leisure travel

Understanding car use for social and recreational trip purposes

EMMA STRÖMBLAD

FACULTY OF ENGINEERING | LUND UNIVERSITY





Everyday leisure travel



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purposes

Emma Strömblad



**LUND**  
UNIVERSITY

DOCTORAL DISSERTATION

Doctoral dissertation for the degree of Doctor of Philosophy (PhD) at the Faculty of Engineering at Lund University to be publicly defended on 7<sup>th</sup> of March at 10:15 in auditorium V:A, Department of Technology and Society, John Ericssons väg 1, Lund

*Faculty opponent*

Professor Yusak Susilo, BOKU University

**Organisation:** LUND UNIVERSITY

**Document name:** Doctoral dissertation

**Date of issue:** 7 March 2025

**Author:** Emma Strömblad

**Sponsoring organisation:**  
The Swedish Energy Agency

**Title and subtitle:**

Everyday leisure travel: Understanding car use for social and recreational trip purposes

**Abstract**

The aim of this thesis is to contribute to the understanding of everyday leisure travel for social and recreational trip purposes by describing and problematising car use for such trips. Leisure trips are a significant contributor to greenhouse gas emissions and reductions are needed to mitigate climate change. Technical solutions, such as electric vehicles, contribute but research has demonstrated that behaviour change is also needed. Travel behaviour is therefore the focus of the thesis.

The thesis includes five research papers with different focus and method. The first paper describes characteristics of leisure travel based on travel survey data and creates an understanding of the variation between societal groups and leisure trip purposes. The first paper is followed by two segmentation studies, one based on qualitative interview data and the other on quantitative travel survey data. Both studies focus on mode choice for leisure travel and provide clues to the possibility for different groups to change to less car-oriented leisure travel. The fourth paper learns from changes in leisure travel behaviour due to the COVID-19 pandemic. Methodological challenges, such as assigning the correct number of trips and kilometres travelled for leisure purposes in trip chains, are explored in the fifth paper.

The discussion revolves around three themes. First, challenges on how to define and measure everyday leisure trips make it difficult to categorise leisure trips in travel surveys. For example, leisure trips often have more than one purpose. Second, insights into mode choice behaviour reveal how flexibility is highly valued for leisure trips in particular. However, knowing flexibility is available is more important than being able to go by car at any time. Third, the thesis shows that it is important to match public transport supply with leisure travel needs and improve the possibility of carrying and storing things without a car. Also, the joint character of leisure trips poses challenges in reducing car use. More effort should therefore be put into targeting trips when fewer people travel together, for which the climate efficiency potential is greater.

The conclusions of the thesis demonstrate that there is no "one size fits all" solution when finding measures to reduce car use for leisure trips. Instead, a variety of measures is needed to be relevant and effective for different leisure trip purposes and groups of travellers. Finally, due to the importance of leisure trips for our well-being, changes must be made with consideration.

**Key words:** Leisure trips, Travel behaviour, Car mileage, Mode choice, Segmentation, Travel surveys

**Language:** English

**Number of pages:** 92

**ISSN and key title:** 1653-1930

Bulletin – Lund University, Faculty of Engineering, Department of Technology and Society, 336

**ISBN:** 978-91-8104-376-1 (print), 978-91-8104-377-8 (electronic)

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Emma Strömblad



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Faculty of Engineering

Department of Technology and Society

ISBN 978-91-8104-376-1 (print), 978-91-8104-377-8 (electronic)

ISSN 1653-1930

Printed in Sweden by Media-Tryck, Lund University

Lund 2025



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**MADE IN SWEDEN** 

*To my family*

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## Acknowledgements

Did I really manage to finish my thesis? Well, I did! And it was not only thanks to my efforts, although significant, but also with the help of amazing supervisors, colleagues, family, and friends. First of all, I would never have made it without the invaluable support and recurring energy boosts from my three supervisors: Lena Winslott Hiselius, Lena Smidfelt Rosqvist, and Helena Svensson. Thank you all for contributing with your brains, your vast experience, and for complementing each other perfectly! In addition to your professional skills, I also want to highlight how Lena Winslott Hiselius has made an effort to keep me on track while having an eye on the end result, how Lena Smidfelt Rosqvist has pointed out that I should stop procrastinating for my own sake rather than for others, and how Helena Svensson has reminded me that the difficulty of balancing work and private life is quite reasonable. Finally, I am grateful that you have always found time for my work despite having the kind of busy calendar common to a professor, CEO, or director.

When it comes to advancing the thesis work, I would like to express my gratitude to Trude Tørset, Katarina Haugen, and Karin Book for constructive feedback at my halftime and final seminars. Although somewhat overwhelming at the time, it meant significant help and inspiration as I continued the work of writing my kappa to find a coherent story in my research. On a similar note, reviewers have given valuable feedback on my published papers. I have not always agreed with your comments, but you have nevertheless helped improve my work. Further, I would like to thank the Swedish Energy Agency for funding, and Emeli Adell, David Carpenfelt, and Lovisa Indebetou at Trivektor for generously sharing TravelVu data and for giving me inspiration on how to conduct the study for my third research article. During my work, I also received important input from the reference group members Håkan Johansson, Emma Morin, Lars Nilsson, and Karin Svensson Smith. And to my interviewees in Gävle: I would not have been able to complete my thesis without your valuable participation!

As I started my doctoral studies, I returned to the place where my career as a transport analyst once began. I took my Master of Science degree in Environmental Engineering at the Faculty of Engineering at Lund University, at the time a newly started program with courses and fellow students that suited me well. After the first three years of basic courses, I discovered that it was possible to choose Transport Planning as an orientation in the advanced courses. I fell for it immediately and have not regretted it since. The courses were studied at the Division of Transport and Roads, where I also met nice colleagues. And this still holds true! I want to thank each one who has engaged in interesting conversations in the coffee room. I also want to place special thanks to Astrid, Ina, Helena, and Petra for helping me with administrative matters, and for

offering discussions and support on life in general. I have further had access to another inspiring work environment at K2 – The Swedish Knowledge Centre for Public Transport. I am grateful for all the inspiring seminars and for getting an arena for interesting discussions with colleagues from many different research areas.

Others who have contributed with feedback on my work, and even more on my general progress as a researcher, are my fellow doctoral students at K2 and Transport and Roads. Our doctoral student seminars and other get-togethers along with the courses I have taken have greatly improved my skills as a researcher. I want to place special thanks to: Alfred and Anders, for inspiring me to take the leap and start my doctoral studies; Jean, for showing me the process of the public defence and subsequent party just a few weeks into my studies; Daria and Oksana, for offering great support as all three of us started our studies at roughly the same time; Ulrik, for sharing knowledge on app-based travel surveys; Jakob, for discussions on research ethics and for taking notes on my final seminar; Joel, for a pedagogic presentation of the process of the public defence when I needed to plan for it; and Janet, for being able to closely follow your work on finalising the thesis just before it was my turn. And the rest of you, I have really enjoyed your input and company too: Alexandra, Anna, Annika, Azreena, Carl, Carl-William, Elias, Elvira, Erik, Eva-Lena, Frida, Jens, Jessica, Johan, Grace, Gustav, Kah Yong, Khashayar, Linus, Malin, Marcella, Matilda, Maya, Michelle, Pajtim, Phil, Ruben, Russell, Sergei, Vendela, and Zhankun.

I have had the privilege of working with countless nice colleagues over the years: Ingrid and others at the City of Uppsala, who gave my untested self a first chance, Johanna and others at the City of Helsingborg, a social workplace that gave me experience as a practitioner, and a whole bunch of wonderful colleagues at WSP, who generously shared their knowledge with me. I am not able to mention all your names since it would fill the entire page. However, I want to place special thanks to Eva and Karin. Eva, I will forever remember your wisdom, care, and contagious laughter. Karin, I am incredibly grateful for you being my biggest fan, for scientific brilliance, large amounts of praise, and for always sharing exciting real-life stories at the coffee table. Together with other invaluable colleagues we created an amazing Malmö team, despite great competition the warmest work environment I have ever encountered.

I recently listened to a Swedish singer talking about the importance of taking a chaos pill every now and then, since it means great things can happen. I just swallowed such a pill by starting my new job at Bouvier Advisory in parallel with writing the final parts of my thesis. I hope you will bear with my somewhat shaky start and look forward to working and hanging out with both old and new colleagues and friends: Alexander, Anna, Björn, Christian, Ebba, Isabelle, Joakim, Joakim, Joel, Per, Tobias, and Victor. I am convinced we will do great work together!

Now it is finally time to express my gratitude to family and friends: my parents Birgit and Leif for endless love and support, my sister Elin and brother Erik with families for cheers and for not asking too many questions about how the work proceeds when I am all stressed out, David for supporting me when embarking on this journey, grandmother Ingrid for helping out with the girls, my extended family for support on our weekly dinner meetings at Nilstorp, my dear friend Emma for listening to endless stories about my endeavours when lunching together, Magda and Johannes for dinners and important talks, and Anne and Jocke for generous parties. And of course, my dearest thanks to my amazing daughters, Bodil and Ninni – you make my life sparkle.

Last but not least, a big thanks to myself for not giving up but fighting my way to the finish line. I am extremely glad that I pursued the work and eventually understood how to eat an elephant – one bite at a time. I will forever be grateful for all the things I have learned on my thesis journey. However, now I think I have earned some leisure time!

Emma Strömblad

22 January 2025

## Populärvetenskaplig sammanfattning

Det är viktigt för vårt välbefinnande att delta i fritidsaktiviteter. En del av dem kan vi genomföra hemma medan andra kräver en resa. Det vardagliga fritidsresande som studeras i den här avhandlingen omfattar såväl sociala resor för att träffa familj, släkt och vänner som rekreationsresor för motion och friluftsliv, underhållning och kultur samt att gå på restaurang och café.

Bilen har många fördelar för fritidsresor och används därför i stor utsträckning. Samtidigt har bilresandet negativa effekter på vår hälsa, tar mycket plats i anspråk samt påverkar miljö och klimat. Trots att elbilen är på frammarsch finns det även ett behov av att minska bilresandet. Fritidsresor står för så mycket som en tredjedel av alla kilometer med bil i Sverige. Ändå har dessa resor tidigare inte fått lika stor uppmärksamhet som exempelvis arbetsresor, tjänsteresor och semesterresor, varken i debatten eller i planeringen.

I denna avhandling riktas därför strålkastarljuset mot vardagliga fritidsresor. Syftet är att öka kunskapen om dessa resor utifrån en önskan om att på sikt bättre förstå hur bilanvändningen kan minskas till fördel för andra färdstätt såsom gång, cykel, elsparkcykel, anropsstyrd trafik och traditionell kollektivtrafik. Detta görs genom att studera utmaningar med att definiera och mäta fritidsresande, vilka faktorer som påverkar färdmedelsvalet för fritidsresor samt vilken roll fritidsresornas egenskaper spelar i valet av åtgärder som kan minska bilresandet.

Avhandlingen pekar på svårigheter med att tydligt definiera vardagligt fritidsresande, vilket påverkar möjligheten att med precision mäta fritidsresandets omfattning. För de som svarar på resvaneundersökningar är det ibland svårt att skilja fritidsärenden från inköps- och serviceärenden och semesterresor. Dessutom har fritidsresor ofta mer än ett ärende, till exempel att träffa vänner och gå på restaurang. Sammantaget leder detta till att många svarar övrigt istället för ett att ange ett specifikt ärende, vilket innebär att fritidsresandet blir underrapporterat i resvaneundersökningar.

Resultaten från framför allt intervjuer om färdmedelsval för fritidsresor visar att flexibilitet är väldigt viktigt för oss när vi gör fritidsresor. Vi vill kunna göra vad vi vill, var vi vill och resa dit när vi vill, vilket ställer höga krav på resan. Bilen och cykeln är två färdmedel som båda kan tillgodose önskemålen om flexibilitet, och även om detta är svårt för kollektivtrafiken att matcha är det angeläget att jobba för mer flexibla kollektivtrafiklösningar. Samtidigt visar forskningen att det inte är avgörande att kunna resa flexibelt varje gång vi gör en fritidsresa, utan att det allra viktigaste är att känna att den möjligheten finns. Åtgärder som i större utsträckning ger oss anledning att välja bort bilen de gånger behovet av flexibilitet inte finns är därför betydelsefulla.



Fritidsresorna har flera egenskaper som skiljer dem från andra restyper, och vissa av dem kan vi dra nytta av i planeringen. Till skillnad från pendlingsresorna görs fritidsresor exempelvis mer utspritt över dygnet då det finns tillgänglig kapacitet att utnyttja i kollektivtrafiken. Samtidigt drar sig många för att resa kollektivt vid fritidsresor eftersom dessa resor ofta görs i sällskap med andra och kollektivtrafikresan då upplevs som dyr. Därför är det extra viktigt att erbjuda tillsammansrabatt för just fritidsresor. Eftersom resenärerna ofta har många prylar med sig när de gör fritidsresor behövs även lösningar för att smidigt kunna ta med sig saker under resan, och att kunna förvara saker på plats.

Det avhandlingen bidrar med är att belysa egenskaper som påverkar möjligheten att minska bilanvändningen för vardagliga fritidsresor. Det faktum att fritidsresor ofta har mer än ett ärende, att flexibilitet är mycket önskvärt och att de i stor utsträckning görs tillsammans med andra innebär att det inte finns en enskild åtgärd som kan minska fritidsresandet, utan att det behövs en mångfald av lösningar som är skraddarsydda för olika typer av resor vad gäller ärende och sällskap.

Avslutningsvis pekar avhandlingen på vikten av att tydliggöra att minskat bilresande inte är synonymt med inget bilresande. Tvärtom kan bilens flexibilitet och andra positiva egenskaper fortfarande komma resenärerna till nytta, ibland. Med vetskapen om att bilen finns där när dess bekvämligheter gör som störst nytta blir det enklare att betydligt oftare än idag avstå dessa till fördel för andra viktigheter, såsom klimatet.

# List of papers

## Paper 1

Strömblad, E., Winslott Hiselius, L., Smidfelt Rosqvist, L., & Svensson, H. (2022). Characteristics of everyday leisure trips by car in Sweden – Implications for sustainability measures. *Promet - Traffic&Transportation*, 34(4), 657-672. <https://doi.org/10.7307/ptt.v34i4.4039>.

### *Authors' contributions*

ES: Conceptualisation, Formal analysis, Writing – original draft, Visualisation. LWH: Conceptualisation, Writing – original draft, Funding acquisition. LSR: Conceptualisation, Writing – original draft, Funding acquisition. HS: Conceptualisation, Writing – review & editing.

## Paper 2

Strömblad, E., Winslott Hiselius, L., Smidfelt Rosqvist, L., & Svensson, H. (2022). A qualitative case study examining individuals' perceptions of mode choice and the possibility to reduce car mileage for everyday leisure trips. *Case Studies on Transport Policy*, 10(4), 2183-2194. <https://doi.org/10.1016/j.cstp.2022.09.013>.

### *Authors' contributions*

ES: Conceptualisation, Methodology, Formal analysis, Investigation, Writing – original draft. LWH: Conceptualisation, Methodology, Writing – review & editing, Funding acquisition. LSR: Conceptualisation, Methodology, Writing – review & editing, Funding acquisition. HS: Conceptualization, Methodology, Writing – review & editing.

## Paper 3

Strömblad, E. (2024). Identifying mobility segments for leisure travel: A cluster analysis based on a one-month travel survey. *Transportation Research Part A: Policy and Practice*, 181, 104001. <https://doi.org/10.1016/j.tra.2024.104001>.

### *Authors' contributions*

ES: Conceptualisation, Methodology, Formal analysis, Data curation, Writing – original draft, Visualisation.

## Paper 4

Strömblad, E., Winslott Hiselius, L., Smidfelt Rosqvist, L., & Svensson, H. (2021). Adaptive travel behaviors to cope with COVID-19: A Swedish qualitative study focusing on everyday leisure trips. *Sustainability*, 13(23), 12979. <https://doi.org/10.3390/su132312979>.

### *Authors' contributions*

ES: Conceptualisation, Methodology, Formal analysis, Investigation, Writing – original draft, Visualisation. LWH: Conceptualisation, Methodology, Writing – review & editing, Funding acquisition. LSR: Conceptualisation, Methodology, Writing – review & editing, Funding acquisition. HS: Conceptualisation, Methodology, Writing – review & editing.

## Paper 5

Strömblad, E., & Svensson, H. Challenges in measuring leisure travel behaviour: Examples from an app-based travel survey. Accepted for publication in *Transportation Research Procedia*.

### *Authors' contributions*

ES: Conceptualisation, Methodology, Formal analysis, Data curation, Writing – original draft, Visualisation. HS: Conceptualisation, Methodology, Writing – review & editing.

# Abstracts

## Paper 1

In search for measures to reduce greenhouse gas emissions from transport, insights into the characteristics of all sorts of trips and specifically trips by car are needed. This paper focuses on everyday leisure trips for social and recreational purposes. Travel behaviour for these purposes is analysed considering individual and household factors as well as properties of the trip, based on Swedish national travel survey data. The analysis reveals that everyday leisure trips are often of joint character and that the average distance travelled per person and day increases with, for example, income, cohabitation, children in the household and residence in rural areas. The result also shows that the studied characteristics vary between studied trip purposes, influencing the sustainability potential of a reduction in car use and suggested measures. For instance, the largest share of passenger mileage comes from social trips, whereas trips for exercise and outdoor life have the largest share of car trips below 5 km. Several characteristics indicate difficulties in transferring trips by car to, for example, bicycle or public transport due to convenience, economy, start times, company etc. The study indicates that there is a need to take a broader view of the effective potential.

## Paper 2

In the transition to more sustainable travel behaviour, there is a need to reduce car mileage for all sorts of trips including everyday leisure trips for social and recreational purposes. In this case study, qualitative interviews were conducted to improve and deepen the understanding of transport mode choice for such trips. The analyses of factors affecting mode choice for everyday leisure purposes and how individuals reason about reducing car mileage for leisure trips reveal that factors matter to different extent depending on types of persons and trips. The interviewees' descriptions of how reducing car mileage would be more or less possible resulted in the identification of four typologies, based on the two dimensions willingness to change and perception of feasibility. A segmentation based on these four typologies demonstrates that all kinds of measures are needed and helps identify policy measures that are relevant for and accepted by different groups of people. For example, the results imply that for the group with high willingness to change and low perception of feasibility a combination of soft and infrastructure 'pull' measures is appropriate, whereas the group with low willingness to change and high perception of feasibility needs a combination of both 'pull' and 'push' measures.

### **Paper 3**

Despite awareness of the negative consequences of car use, leisure trips are still often made by car. A better understanding of the potential for a transition to more sustainable transport behaviour requires more knowledge about the differences in car use between individuals and leisure trip purposes. As a basis for this, individuals were clustered into six car-oriented and five non-car-oriented leisure mobility segments based on data from a one-month app-based travel survey. The clusters differ substantially with respect to the cluster-forming variables including car trip characteristics, mode choice, and leisure trip purposes. The clusters also differ regarding spatial, sociodemographic, and socioeconomic characteristics, especially between car-oriented and non-car-oriented clusters. However, for self-reported data about priorities in life and basic human values there are no major differences between the clusters. One interesting finding is that car-oriented and non-car-oriented clusters make leisure trips to the same extent, indicating that both groups have a similar wish or need to travel for leisure purposes but that they choose different transport modes to get to their destinations. Also, there is great variety in car use even among the car-oriented clusters. Taking these differences into consideration, a variety of measures and economic incentives targeted towards specific mobility segments are needed to reduce car use for leisure trips.

### **Paper 4**

The COVID-19 pandemic has caused a rapid change in travel behavior for different types of trips, including everyday social and recreational leisure trips. People have used adaptive travel behaviors to cope with the new circumstances for activities and transport. Due to the Swedish strategy focusing on more voluntary restrictions, people have had reason to consider which trips and activities to skip and which to keep. The overall aim of the study is to explore and deepen the knowledge about adaptive behaviors used and seek to understand its possible implications for future travel behavior change towards sustainable mobility through the use of qualitative interviews focusing on everyday leisure trips. The results illustrate how people have used a range of adaptive behaviors to cope with the implications of the pandemic, with cancellation and change of transport mode being the ones most reflected upon by the interviewees. Further, the results reveal how the overall label “everyday leisure trips” in fact includes a variety of trip purposes that differ in terms of flexibility and importance and must thus be approached in different ways in transport policy measures.

## Paper 5

Previous research has shown that there are challenges in accurately describing leisure travel behaviour with travel survey data. Using app-based surveys can help overcome some of the known problems, but use of apps can also bring new challenges. In this paper, difficulties in measuring everyday leisure trips using travel survey apps are examined and explained. The challenges are discussed from two perspectives: perceived behaviour and revealed behaviour. The former includes difficulties in defining leisure trips and the latter measurement problems with trip chaining and assigning the correct number of trips and kilometres travelled for leisure purposes. The identified challenges are illustrated with data from an app-based travel survey. The findings show that automatic trip registration on long trips can be a problem with app-based travel surveys, while there is no need to complicate the assignment of trip purposes for the homebound trip in trip chains. Conclusions are that leisure trips are not clearly defined to fit individuals' perceptions of a leisure trip and that it is difficult to distinguish whether it is the people, place, or purpose that initiates a trip. These challenges contribute to leisure trips being underestimated, which have implications for infrastructure and land use planning. A suggestion is to add a new trip purpose in the data collection to capture service stops during longer trips.



# Introduction

## Spotlighting everyday leisure travel

Leisure travel is an essential part of our daily lives. This thesis focuses on everyday leisure trips for social and recreational purposes, including activities such as visiting grandma, going to the gym, taking a swim in the ocean, attending a concert, and going to a café for a nice “fika”. Such activities are desirable and important for our well-being (Brajša-Žganec et al., 2011). At the same time, they stand for a significant proportion of daily travel by car and thus contribute substantially to problematic greenhouse gas emissions (Department for Transport, 2021; McGuckin & Fucci, 2018; Trafikanalys, 2023). Reducing the kilometres travelled by car for leisure purposes can help mitigate climate change and play an important role in the transition to a more sustainable transport system. In this thesis, the spotlight is directed on everyday leisure trips to increase our knowledge about their magnitude and variability, and thereby better understand the baseline for reducing car use.

The variability of leisure trips is often used as an argument for travelling by car, since the car offers both a sense of freedom and a flexibility that is sometimes needed and at other times “just” convenient. Many find the car to be the most flexible transport mode of all, albeit in clear competition with the bicycle on shorter distances (Anable & Gatersleben, 2005; Thorhauge et al., 2020). This is one of the reasons the car is used for a great share of the kilometres travelled overall, and even more so for leisure trips (Baumgartner et al., 2022; Trafikanalys, 2023). A better understanding of when there is a need for the flexibility of the car can help identify trips that could be performed with other transport modes.

Everyday leisure travel for social and recreational purposes covers a wide range of activities that can be performed at various destinations, to which people travel using different transport modes. There is no standard definition of leisure trips in the literature. The lack of a common single definition makes it difficult to compare results from different studies (Mokhtarian et al., 2006), and also makes it important to clearly state which trip purposes are included when analysing leisure trips. In this thesis, the intention has been to include leisure trips of an everyday character. The definition



includes, but is not limited to, visiting family and friends, going to restaurants and cafés, entertainment and culture, outdoor activities, exercise/training/sports, other hobbies or club activities, shopping for fun, and participating in or accompanying children in their leisure activities. In the remainder of the thesis, the terms ‘everyday leisure travel’ and ‘leisure travel’ are used synonymously to describe the type of trips for social and recreational purposes that are included in the definition proposed here.

Despite limiting the scope to everyday leisure trips for social and recreational purposes, the choice of activities and travel behaviour to reach them are still diverse. To begin with, a large range of activities is included, all with their specific conditions. Travel behaviour to reach these activities varies regarding how often we travel, at what time, which destinations we travel to, and what transport mode we use to get there. The trips are also different in terms of other attributes such as whom we travel with and how much luggage we carry. Further, various leisure trip purposes are quite diverse in nature. Some are fixed in time and others fixed in space, whereas for other purposes start times and destinations are flexible. The chosen type of leisure trip is often seen as voluntary, but in fact the degree of voluntariness varies between different activities. This variability of everyday leisure travel will be explored in the thesis.

In addition to varying travel behaviour for different leisure trip purposes and trip characteristics, leisure travel also varies both between and within individuals. Personal and household characteristics affect travel behaviour, and thus travel behaviour varies from person to person. The term ‘interpersonal’ variability refers to this variation in travel behaviour between individuals and is commonly studied when analysing data from travel surveys for a single day. However, to study day-to-day variation in travel behaviour within individuals, termed ‘intrapersonal’ variability, multi-day travel survey data is needed to capture the wider spectrum of each individual’s leisure trips, even those that are not made daily (Chowdhury et al., 2020; Tarigan et al., 2012). Both types of datasets are studied in this thesis.

## Need for travel behaviour change

The car has great advantages for both society and individuals. It provides access to locations where we can perform all sorts of activities, including activities for social and recreational purposes. Some of these locations would be impossible, or at least much more difficult, to reach without a car. Unfortunately, the car also has many disadvantages to individuals, society, and the environment. In addition to the already mentioned contribution to climate change, where the car is responsible for a quarter of global energy-related carbon dioxide emissions (IEA, 2023), it also contributes to local

air pollution, makes noise, causes congestion, is space-consuming, and is subject to accidents (Banister, 2005). Car transport causes severe injuries and fatalities, both due to accidents and to emissions that are harmful for health (Elvik et al., 2009; Krzyzanowski et al., 2005). However, the extent of the adverse effects depends on the type of car, where electric vehicles can help overcome some of the problems. Car use further impacts our health negatively in that travelling by car means less travel with active transport modes such as cycling, and thus decreased levels of physical activity (De Hartog et al., 2010).

According to travel surveys from Sweden, UK, and USA, leisure trips are responsible for about 30 percent of the total number of kilometres travelled by car per person and day (Department for Transport, 2021; McGuckin & Fucci, 2018; Trafikanalys, 2020). The exact share depends on which trip purposes are included in the definition. There is ongoing debate about how to best deal with climate change, and many argue that technical solutions will solve the problem. For example, electric vehicles are making rapid progress and increase their share of the car fleet. Even though battery electric vehicles only made up a small share, about 6 percent, of the car fleet in Sweden at the end of 2023 (Trafikanalys, 2024a), the share of electric vehicles within new car sales is high, 38 percent in 2023 and somewhat lower (31 percent) in the first half of 2024, when subsidies were withdrawn (Trafikanalys, 2024b). Still, a growing body of literature states that technical solutions are not enough to reach climate goals (Berg Mårtensson et al.; Gössling et al., 2018; Åkerman, 2011). Transport behaviour also needs to change by switching to less polluting transport modes and/or reducing car mileage (Brand et al., 2019; IPCC, 2022; Kamb et al., 2021; Winslott Hiselius & Smidfelt Rosqvist, 2016). Also, reducing car traffic contributes to solving other issues as well, for example, problems related to congestion, urban space, air quality, and noise.

Reducing car travel for everyday leisure purposes is thus an important contribution in the transition to more sustainable travel behaviour, but changing behaviours is a challenge. According to Marsden et al. (2020) in a study on disruptive events, the dominant framing has been that transport is more difficult to change than other energy and carbon intensive sectors because mobility patterns are stable. However, the study showed that in the case of disruptive events, more adaptations of travel behaviour were used than what is usually assumed. This was further proved during the COVID-19 pandemic, which forced rapid and changing adaptations to the new circumstances that it brought about (Beck & Hensher, 2020; Bohman et al., 2021; de Haas et al., 2020; Molloy et al., 2021).

To be successful however, segmentation of both trip purposes and types of travellers is needed (Anable & Gatersleben, 2005; Haustein & Hunecke, 2013), since the trip purpose affect the motives for choosing to travel in a specific way and because different

groups are affected by and accept different types of policy measures. Previous studies have further shown that a small group is responsible for a great share of total emissions from transport (Leroutier & Quirion, 2022; Winslott Hiselius & Smidfelt Rosqvist, 2018). Segmentation can help in understanding if this is also the case for leisure trips. Either way, the magnitude of emissions originating from everyday leisure trips calls for a reduction of car use for such trips. However, given the importance of leisure trips for our well-being and the advantages the car has for such trips, changes must be made with consideration.

## Aim and research questions

The aim of this thesis is to contribute to the understanding of everyday leisure travel for social and recreational purposes by describing and problematising car use for such trips. More specifically, the aim is to increase knowledge about mode choice and further travel behaviour, the measurement thereof, and to understand its implications on car use reductions for leisure trips.

The three research questions presented below were asked to jointly contribute to achieving the overall aim of the thesis. To answer the research questions, five scientific papers have been produced. Table 1 illustrates which papers contribute to answering the different research questions.

- RQ1: How can everyday leisure trips be defined and measured?
- RQ2: What factors affect mode choice for everyday leisure trips and how?
- RQ3: How can everyday leisure trip characteristics guide car-reducing measures?

**Table 1. The connection between papers and research questions (RQ)**

An overview of in which papers the three research questions are answered.

Paper	RQ1	RQ2	RQ3
1	X		X
2	X	X	X
3	X	X	X
4	X		X
5	X		

The scope of the thesis originates in a desire to find relevant and effective policy measures to reduce car use for leisure trips, while acknowledging that there is first a need for more knowledge about such trips. Traditionally, less research has focused on everyday leisure trips than on commuting, school trips, and shopping trips (Ettema & Schwanen, 2012; Wu et al., 2020). Also, there has been limited discussion about policy measures relevant to leisure trips (Mattioli et al., 2016). This thesis contributes to the growing body of literature focusing on leisure travel and thereby fills existing research gaps.

## Outline of the thesis

This introductory chapter is followed by a *Background* chapter that provides an overview of the research context, starting with understanding travel behaviour from a broader perspective and then delving into leisure mobility. The chapter also gives background on the characteristics of leisure travel and ends with a section about reducing car use for leisure. Next, a chapter named *Definition of the thesis* introduces the disadvantages of the lack of a common single definition of everyday leisure trips and presents the definition used in this thesis.

The *Data and methods* chapter starts with an introduction of the research papers on which the thesis is based, and clarifies how the five papers are connected. Thereafter, the method design is presented and the empirical data on which the studies are based is described, as are the methods used to analyse the material. This is followed by a discussion of the impacts of selected data, and then the analyses of the material are explained. The chapter concludes with reflections on the research process.

Summaries of the results in each of the five papers are given in the *Findings* chapter. These results are then synthesised in the *Discussion* chapter addressing the aim and research questions of the thesis. The discussion is structured according to the three research questions. Finally, the *Conclusions* chapter lists the most important findings of the thesis and ends with a reflection on implications for the transition to more sustainable leisure travel.



# Background

## Understanding travel behaviour

Knowledge about travel behaviour is fundamental for transport planning and policy development, and for the evaluation of implemented measures. An understanding of the present and predictions of future travel behaviour is critical for addressing challenges such as congestion and climate change, while giving people equitable access to mobility (Lucas, 2012). Travel behaviour can be measured in several ways, for example through traffic counts on roads, counting boarding and/or alighting passengers in public transport, using mobile phone data, or with travel surveys. Each method by itself, or in combination with others, provides information about different aspects of actual travel behaviour.

To understand the underlying reasons for travelling in specific ways, however, one must also examine why people engage in certain activities at specific destinations and times. One important aspect of leisure studies is how people allocate time to activities, such as recreation, sports, media, and the arts. Research in leisure studies also explores the motivational, social, cultural, psychological, and economic factors that influence leisure behaviour (Blackshaw, 2013), and thus forms a basis for studying leisure travel.

A related field is that of tourism research, studying the movement of people beyond their usual environments. Lessons learned from tourism studies can potentially be transferred to certain aspects of everyday leisure travel, as leisure activities sometimes have similar motivations. For example, a recent study by Kamb et al. (2021) analysed the theoretical potential for a reduction of emissions due to changes in transport modes and destinations, as well as the readiness potential based on stated readiness to change travel behaviour. The results showed a theoretical potential of 67 percent reduction and a readiness potential of 26 percent reduction of emissions. About half of the readiness potential for reductions was due to changing destination, while only a small share was from changing transport modes.

## Desirable leisure trips

Participating in leisure activities is important for our health and well-being (Kuykendall et al., 2015; Pressman et al., 2009). It enhances the quality of life in terms of subjective well-being, overall life satisfaction, personal happiness, increased self-esteem, and meaning-making (Brajša-Žganec et al., 2011; Hamilton-Smith, 1990; Iwasaki, 2007). Engaging in leisure activities also improves physical and mental health, reduces stress, builds resilience, creates social relationships, and provides an arena for learning new skills (Brajša-Žganec et al., 2011; Hamilton-Smith, 1990). Although these advantages can also to some extent be achieved through leisure activities at home, many activities involve a leisure trip.

Despite the many positive effects of partaking in leisure activities, everyday leisure trips are often denoted non-mandatory in both research and policy discussions in contrast to mandatory trips to work, school, and for business (Loa et al., 2021). Sometimes the necessity of leisure trips is even questioned, in spite of their benefits and the fact that they make up a considerable share of the kilometres travelled in many industrialised countries (Axhausen, 2008). However, previous research has shown that leisure trips to a larger extent than mandatory trips are driven by pleasure and that they are therefore harder to give up (Holden & Linnerud, 2011, 2015). Further, behaviour change for leisure trips is more difficult to address because of how they express identity, personal values, status, and lifestyle (Anable, 2002). Since leisure trips are often governed by intrinsic rather than extrinsic motivation, focusing exclusively on extrinsic motivation can result in an underestimation of the demand for leisure travel and resistance to policies aiming for a reduction of passenger mileage (Mokhtarian et al., 2015).

Another token of the difficulty in affecting social and recreational trips is that even those who voluntarily refrain from travelling by car find it especially hard to do so for leisure trips (Florén Göransson, 2022; Isberg, 2021). For example, in a qualitative study by Lagrell et al. (2018), the participants stated that performing free-time activities without a car is associated with hassle and inconvenience. Also, others expect them to be able to drive to activities and they feel like a burden when having to ask for a ride, for example when their children participate in leisure activities. For trips to mandatory activities to work and school and bounded routines related to consumption, however, the voluntarily carless find their trips to be mostly well functioning.

One more circumstance relevant to understanding the possibility of reducing car use for leisure trips is that the same person with the same attitudes can act very differently in different contexts, for example in everyday life versus the “extraordinary” time when on holiday (Böhler et al., 2006; Prillwitz & Barr, 2011). Many who consider

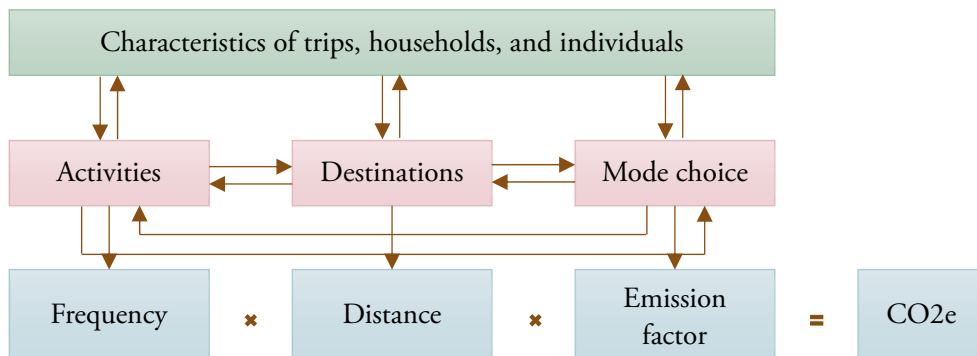
sustainability in everyday decision-making in the domains of food, purchase, waste, energy, and transport skip such efforts when travelling on vacation (Barr et al., 2010; Becken, 2007). If this difference holds also for everyday leisure trips versus commuter, shopping, and service trips, the challenge is not only to match the advantages the car has for leisure travel but also to counteract the fact that travellers have less indulgence with the disadvantages of other transport modes on such trips.

The desirability of leisure trips is finally demonstrated in that when commuting decreases, there is often a rebound effect resulting in more leisure trips (Lachapelle et al., 2018; Long & Reuschke, 2021). Time and money otherwise spent on commuting can instead be used for leisure purposes, and also the car becomes available for other members of the household (Holden & Linnerud, 2015; Kim, 2016). For example, a study by Shin (2019) demonstrates how time saved for commutes is offset by more or longer trips for shopping, family errands, or leisure. This is consistent with findings by Holden and Linnerud (2015) showing that there is a general desire to travel more for leisure purposes.

## Characteristics of leisure travel

To comprehend how to reduce car use for leisure trips, it is important to gain a good understanding of the characteristics of leisure travel. Figure 1 shows how a range of factors contribute to the extent of car use and related greenhouse gas emissions originating from leisure trips, as illustrated by the blue box in the lower right corner. These emissions are the product of the factors in the other blue boxes: how often we make leisure trips, how far we travel, and the emission factor for the transport mode used. These factors are, in turn, a result of the factors in the pink boxes: activities, destinations, and mode choice for leisure trips. Finally, the factors in the pink boxes both affect and are affected by several other factors: the ones in the upper green box. In the figure, they are briefly summarised as “characteristics of trips, households, and individuals”, but in reality, this box contains an array of factors including the geographical context. Also, the pink boxes are not only affected by the green box: they also affect each other.





**Figure 1. Schematic illustration of the characteristics of leisure travel**  
Factors that contribute to the extent of car use and related greenhouse gas emissions.

## The anatomy of leisure travel

Through previous research, there is extensive knowledge about commuting and a vast body of literature focusing on holiday travel, but fewer studies have dealt with social and recreational trips for everyday purposes. This to a certain extent has to do with the diverse character of everyday leisure trips, which has also contributed to less focus being placed upon them in transport planning (Anable, 2002; Tomasdotter et al., 2023). Leisure trips, in some respects, are less repetitive than trips to work, school, service, and shopping and they take place to many different, and sometimes less familiar, destinations (Anable, 2002; Schlich et al., 2004). Also, such trips are more spread out in time. The variation in travel behaviour is further enhanced by the activities themselves being diverse since preferences differ a lot between individuals (Melamed et al., 1995).

One attribute that distinguishes leisure trips from, for example, commuting and school trips is the joint character. Leisure trips often depend on the participation of others, either because they are jointly performed or due to meeting others at the destination (Dugundji et al., 2008; Ettema & Schwanen, 2012; Hills et al., 2000; Ohnmacht et al., 2009). In terms of time geography, this causes coupling constraints in deciding when, where, and for how long a person meets other individuals (Neutens et al., 2011). Therefore, the choice of activities, destinations, and transport modes depends on several persons, who all have different preferences and needs.

Another important characteristic is that trips to visit family and friends often have fixed destinations. This type of trip stands for a substantial share of all leisure trips, as demonstrated in a study by Tilahun and Levinson (2017) showing that nearly a third of all scheduled leisure time meetings take place at a residence. Overall, trips to visit

others or to perform activities together tend to be longer than trips to the average social activity (van den Berg et al., 2011). In contrast to the fixed destinations of social trips, however, for other leisure trip purposes travelling to new destinations can be a goal in itself (Stauffacher et al., 2005). Further, leisure trips are often seen as less fixed not only in space but also in time, which holds for some leisure trip purposes while not all leisure trips are time-insensitive (Hoffmann et al., 2020). On the contrary, trips to attend a gym class, eat at a restaurant with a reserved table, or go to the cinema all have a set start time.

### **Factors affecting mode choice for leisure trips**

In this thesis, even though both choices of activities and destinations are also studied, a certain focus is on mode choice for leisure trips. Much is already known about mode choice in general, and previous studies have focused on both objective and subjective factors affecting the choice (Scheiner & Holz-Rau, 2007; van Acker et al., 2011). Depending on the research approach, different combinations of factors have been taken into account, including individual, social, and infrastructure level factors (Javaid et al., 2020).

Previous research has proven that psychological factors such as attitudes, values, lifestyles, norms, and habits all correlate with mode choice (Gardner & Abraham, 2008; Hoffmann et al., 2017; Paulssen et al., 2014; van Acker et al., 2011; van Wee et al., 2013). Further, studies focusing specifically on leisure trips, for example, show that spatial characteristics affect mode choice for such trips and that car use is lower in dense areas with good public transport accessibility and shorter distances (Rubin et al., 2014; Sharmeen & Timmermans, 2014; van Acker et al., 2011).

Sociodemographic and socioeconomic factors also correlate with mode choice for leisure trips. For example, students are less likely and older people more likely to travel by car than by public transport for leisure trips (Sharmeen & Timmermans, 2014), even though as much as a quarter of older persons have the option to use and also use all modes (walking, cycling, public transport, and car) for everyday travel (Ryan, 2020). For young people, a common perception has been that there has been a tendency towards less car-oriented lifestyles in recent years. However, if this holds true, it does not apply to all groups (Magdolen et al., 2021). For example, a study by Hunecke et al. (2020) indicated that only the young generation in a cosmopolitan milieu has less emotional attachment to the private car. Further, men are more likely than women to use a car for social and recreational trips, but the differences are small (Limtanakool et al., 2006; van den Berg et al., 2011).

Finally, the trip purpose also affects mode choice (Al-Salih & Esztergár-Kiss, 2021; Lanzini & Khan, 2017; Ramos et al., 2020b). Among the different leisure trip purposes, social trips are often made by car even among those who often travel by other transport modes for other trip purposes (Van Eeno et al., 2022).

## **Behaviour theories**

Behaviour theories have often been used to understand travel behaviour by providing frameworks that explain and predict individual travel choices such as transport mode choice. These theories consider a range of psychological, social, and environmental factors. By providing knowledge about how travel choices are made, the theories offer insights into how to change travel behaviour and better understand which policy measures are most efficient in, for example, reducing car use for leisure travel. In this thesis, a combination of concepts from behaviour theories has been used to structure the understanding of factors affecting mode choice for leisure trips.

One of the most influential psychological behaviour theories is the Theory of Planned Behaviour (TPB) suggested by Ajzen (1991). The TPB in its original form, in extended versions, or in combination with other theories has been used extensively within the transport domain, including to study transport mode choice (Donald et al., 2014; Forward, 2014; Haustein & Hunecke, 2007; Nordfjærn et al., 2014). It describes how attitudes, subjective norms (perceived expectations from significant others), and perceived behavioural control together form an intention to perform a behaviour. The three constructs of the TPB have been demonstrated to explain and predict travel behaviour, as shown for example in a meta-analysis by Lanzini and Khan (2017).

A behaviour model that extends beyond the motivational factors in the TPB to include factors such as capability and opportunity is the Capability, Opportunity, Motivation – Behaviour (COM-B) model, introduced by Michie et al. (2011). It describes a system of behaviour, where capability, opportunity, and motivation interact to create a behaviour. One example of how the COM-B model has been used within the transport sector is a doctoral thesis by Liu (2017), in which a conceptual model based on the COM-B model showed that both capability, opportunity and motivational factors affect public transport mode choice in Taiwan.

Capability and opportunity factors have also been used in other theories. For example, the capability concept has since long been used in time geography, in which Hägerstrand (1970) showed how coupling, authority, and capability constraints affect travel behaviour. Another example is the capability approach, in which Sen (1995) defined capabilities as the ‘doings’ and ‘beings’ that people can choose to achieve.

Finally, the opportunity concept has for example been used in the Needs, Opportunities, Abilities (NOA) model (van Wee et al., 2013; Vlek, 2000).

Many studies conclude that travel behaviour such as transport mode choice is less of a reasoned decision than the constructs of the TPB and COM-B models imply, but also based on habit and past behaviour (Bamberg et al., 2003; Gardner & Abraham, 2008; Havlíčková & Zámečník, 2020; Sharmeen & Timmermans, 2014; Verplanken & Whitmarsh, 2021). In a systematic review of what cognitive mechanisms predict transport mode choice (defined as car use and non-car use), Hoffmann et al. (2017) showed that, for car use, habit was a strong predictor along the TPB constructs intentions, perceived behavioural control, and attitudes. In another study, Ramos et al. (2020a) concluded that driving habits were an important predictor for all trip purposes, including leisure trips. Therefore, habit is also an important factor to consider in the understanding of transport mode choice.

## Reducing car use for leisure

The possibility of reducing car use for leisure trips can be thought of in different ways. As presented above, an array of factors affects the extent of car use for leisure trips and our choices of activities, destinations, and mode choice can be explained by various factors in behaviour models. This is important input when analysing how to reduce car use.

A reduction in car use for leisure trips can be achieved by changing travel behaviour in numerous ways. Several previous studies have made attempts at categorising adaptive behaviours (Parkes et al., 2016; van Exel & Rietveld, 2009). The starting point has often been disruptive events, but the categorisations can also be used for changes over a longer time, such as adapting to the ongoing climate crisis. In one of the more recent studies by Marsden et al. (2020), adaptive behaviours were classified into seven behavioural adaptations: remodeling, rerouting, retiming, rescheduling, relocating, reallocating, and reducing.

To facilitate and accelerate the reduction of car use for leisure trips through either of the adaptive behaviours introduced above, different measures can be taken. For such measures to be efficient, segmentation into groups is a common procedure (Hauslbauer et al., 2022; Söderberg, 2021). Segmentations can be based on different combinations of attitudinal, spatial, sociodemographic, and socioeconomic variables as well as on travel behaviour itself (Haustein & Nielsen, 2016). Few previous studies have focused exclusively on leisure travel, but relevant examples exist. For example, Lanzendorf

(2002) and Ohnmacht et al. (2009) both showed that leisure mobility segments contribute to explaining the participation in travelling for different leisure trip purposes and the distances travelled for leisure in total (Lanzendorf, 2002) and by car (Ohnmacht et al., 2009) respectively. Other factors that explain part of the differences are spatial and sociodemographic characteristics.

Numerous studies have shown that small groups of people are responsible for large shares of the emissions. This is also the case for everyday leisure trips. Having considered the difference between total emissions and emissions per capita, however, it is also important to understand that not all types of leisure trips or groups of people are as easy to affect. Some groups do not have the right conditions for or are willing to change. Therefore, the greatest effective potential is not always found in the largest groups or for the groups with the highest emissions per capita. Also, some leisure trips purposes may be easier and others more difficult to affect.

# Definition of leisure trips

## Lack of a common single definition

From the onset of working with this thesis, the idea was to compile available information about definitions of leisure travel and then decide which definition to use in the thesis and related articles. However, early on it became clear that different definitions were used in different studies. This has previously been pointed out by, for example, Mokhtarian et al. (2006), who expressed concern about how this makes it difficult to compare results from different studies. Further, during the work with the thesis, it became evident that it was not as easy as choosing one definition, but that it was also difficult to differentiate between trip purposes and therefore impossible to make a single definition.

To understand why the definition of leisure travel varies, the definition of the word 'leisure' as it is presented in four reputable dictionaries has been explored. In the Longman Dictionary of Contemporary English Online, leisure is defined as "time when you are not working or studying and can relax and do things you enjoy". This definition is somewhat vague in that it does not say anything about other duties than work and studies. The definition in the Cambridge Dictionary, "the time when you are not working or doing other duties", explicitly adds other duties to the activities that are considered non-leisure. A third example, similar to the second one, comes from Dictionary.com which gives two alternative examples: "freedom from the demands of work or duty" and "time free from the demands of work or duty, when one can rest, enjoy hobbies or sports, etc.". Another three examples are given by the Oxford English Dictionary, examples that are a bit different from the other ones in that they do not mention work, studies, or duties but simply "the state of having time at one's own disposal", "time which one can spend as one pleases", and "free or unoccupied time". In summary, these definitions separate between non-leisure activities such as work, studies, and other duties, and free or unoccupied leisure time for relaxation and enjoyable things.

To make it clear to the reader, the definition of everyday leisure trips used in this thesis is presented in the next section. Insights about the definition of leisure trips also

emerged while working on the papers included in the thesis. These insights will be presented in the discussion chapter.

## Leisure trip definition in the thesis

In this thesis, the intention has been to include leisure trips of an everyday character. The intention of calling the trips ‘everyday’ is to exclude longer weekend and holiday trips, to the extent possible. This is not to be confused with weekdays versus weekend days since the studies in the thesis include all seven days of the week. Also, the exact boundary between everyday leisure trips and longer weekend and holiday trips varies between the studies, due to the structure of the datasets. In the national travel survey used for the analyses in Paper 1, holiday trips are a category of their own, while in the app-based travel survey used in Papers 3 and 5, such trips are included under other trip purposes. This means also longer holiday trips are included, as opposed to in the national travel survey and the qualitative interviews. However, in the app-based travel survey, one trip purpose was chosen for each stop. In the case of trip chaining, this means that a trip purpose is assigned to each part of the trip, and thus longer holiday trips are often split into several shorter parts. Finally, in the qualitative interviews used for Papers 2 and 4, the interviewees were instructed to think about leisure trips without a sleepover, in an attempt to make a simple distinction between everyday leisure trips on the one hand and weekend and holiday trips on the other. However, many of the interviewees still talked about trips with an overnight stay, although not including longer holiday trips but rather trips to visit family and friends, trips to holiday homes, and shorter weekend trips.

Next, the term ‘leisure’ can encompass a variety of trip purposes. A common approach in the literature is to separate between mandatory and non-mandatory activities, where mandatory activities include trips to work and school and business and study trips. Non-mandatory activities are in turn separated into maintenance activities, such as shopping and service trips, and discretionary activities, such as social and recreational trips (Loa et al., 2021). In the thesis, the term ‘leisure trips’ refers to discretionary trips, and includes but is not limited to, visiting family and friends, going to restaurants and cafés, entertainment and culture, outdoor activities, exercise/training/sports, other hobbies or club activities, shopping for fun, and participating in or accompanying children in their leisure activities. The trip purposes included are the same in the different datasets, with two exceptions. Shopping for fun is included in the qualitative interviews, and thus in Papers 2 and 4, since it was possible to give the interviewees an instruction to include such trips, but they are instead included under other trip

purposes in the quantitative datasets used in Papers 1, 2, and 5. The second exception concerns trips made to participate in or accompany children to their leisure activities. Such trips are included in the national travel survey (Paper 1) and the qualitative interviews (Papers 2 and 4), but do not have a label of their own in the app-based travel survey (Papers 3 and 5). Also, the categorisation when separating different leisure trip purposes into groups is not exactly the same, as can be seen from Tables 2 and 3.

**Table 2. Everyday leisure trips in the Swedish national travel survey, RVU Sweden 2011-2016**  
Specification of which activities the studied social and recreational trip purposes include.

National travel survey	Specification
Social trips	Visit or socialise with relatives and friends including private parties Participate in (follow at) children's leisure activities
Exercise and outdoor life	Sports, walking, excursion, sunbathing, swimming, fishing, dog walking
Entertainment and culture	Party, dance, museum, concert, cinema, sporting event, exhibition, lecture
Other recreational trips	Restaurant, café Hobbies, music practice, study circle, courses Association life, religious practice Other leisure activities

**Table 3. Everyday leisure trips in the three datasets**  
Comparison of the categorisation of social and recreational leisure trips in the different studies.

National travel survey	App-based travel survey	Qualitative interviews
Social trips	Visit family and friends	Visit family and friends Participating in or accompanying children in their leisure activities
Exercise and outdoor life	Exercise and outdoor life	Outdoor activities Exercise/training/sports
Entertainment and culture	Entertainment and culture	Entertainment and culture
Other recreational trips	Restaurant and café Hobby practice	Restaurant and café Other hobbies or club activities Shopping for fun



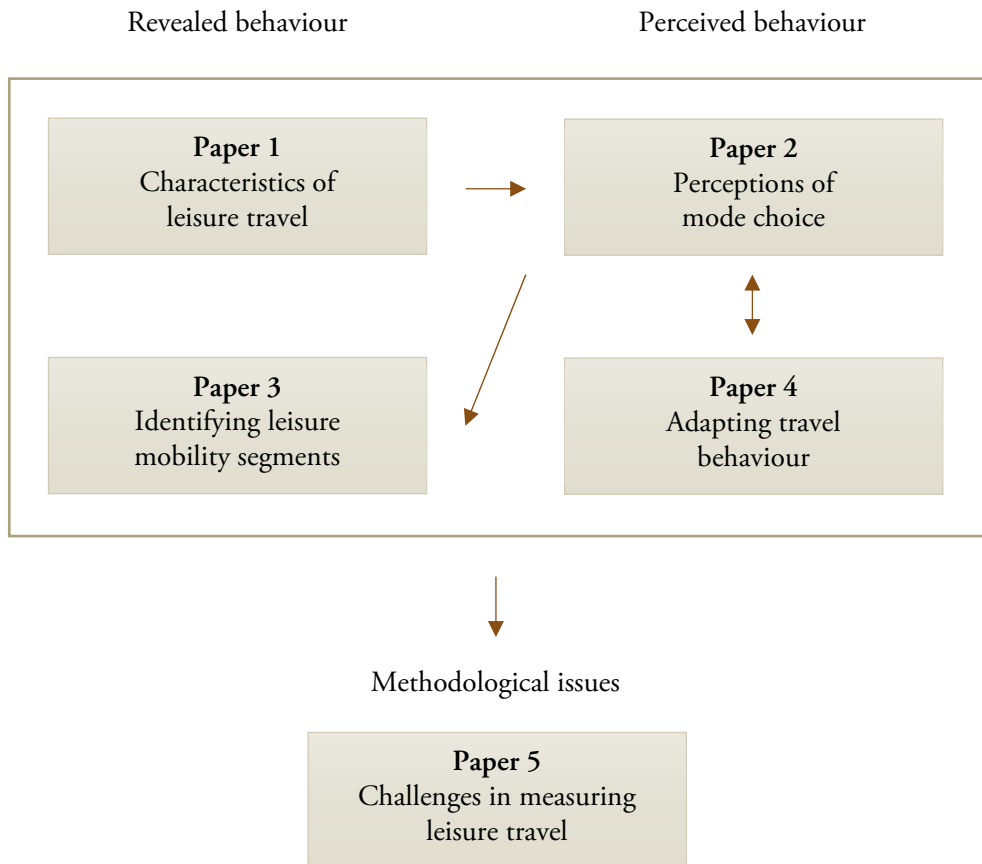


# Data and methods

## The sequence of the papers

In this thesis, leisure travel has been studied in two parallel strands. The first strand investigates travel behaviour that has been measured with quantitative methods and thus describes revealed behaviour. However, due to both measurement problems and difficulties in defining and separating between different trip purposes, it is not possible to measure such behaviour with complete accuracy. Further, quantitative data cannot give as in-depth knowledge as qualitative data about why people choose to travel the way they do. Therefore, the second strand uses qualitative data to deal with understanding the underlying mechanisms that determine leisure travel behaviour, in this thesis termed perceived behaviour.

The first paper describes basic characteristics of leisure travel behaviour based on travel survey data. Paper 1 creates an understanding of how the kilometres travelled for leisure are distributed over different leisure trip purposes, shows how leisure travel behaviour differs among societal groups, and demonstrates how trip characteristics vary between leisure trip purposes. As a complement to the revealed behaviour studied in Paper 1, there was a need to understand the underlying reasoning for this behaviour, and what such reasoning means for the possibility of changing to less car-oriented leisure travel. These questions were thus studied in Paper 2, in which a segmentation was made based on perceived behaviour. Paper 3 builds on Paper 2, but instead of perceived behaviour this paper again focuses on revealed behaviour in a segmentation based on such information. Paper 4 was added to seize the opportunity to learn from the ongoing COVID-19 pandemic, especially considering the changes people had to make and how they perceived such changes in leisure travel. Finally, while working on the first four papers, a number of methodological issues were raised, and these were explored in the fifth and final Paper 5. A schematic illustration of how the five papers of the thesis are connected is found in Figure 2. The arrows illustrate the order in which the papers were conceptualised.



**Figure 2. Connections between Papers 1-5**  
A schematic illustration of how the five papers of the thesis are connected.

The first four papers of the thesis also belong together in three pairs through the themes they cover. Papers 1 and 3 both seek to show the magnitude of leisure trips, for different trip purposes and different groups of people. Papers 2 and 4 are connected through how they investigate changes in behaviour in the past, the present, and the future. Finally, what Papers 2 and 3 have in common is that they reason about how the characteristics of different segments affect mode choice, and thereby the efficiency of potential measures.

## Methods

To answer the aim of the thesis, a combination of quantitative and qualitative approaches was used in a mixed methods design. Quantitative methods were used for the two papers investigating revealed behaviour (Papers 1 and 3) and for Paper 5 which problematises the use of app-based travel surveys to study leisure travel, while qualitative methods were used for the two papers delving into perceived behaviour (Papers 2 and 4).

### **A mixed methods approach**

For the thesis as a whole, a mixed methods approach was deployed, since combining quantitative and qualitative methods gives a more complete understanding of a research problem than if either approach is used alone (Creswell & Creswell, 2023). Analyses of quantitative data help describe travel behaviour for leisure purposes, and to identify hypotheses about why such behaviour occurs. However, to get an in-depth understanding of the underlying motivations for different behaviours and a basis to discuss the various layers of explanations for choosing to travel in a certain way, a qualitative study was deemed necessary. The qualitative data collection was performed in between the quantitative analyses. It used the results from the quantitative analysis in Paper 1 to enhance the design of the qualitative study. The findings from the qualitative Papers 2 and 4 then again served as input for the quantitative analysis in Paper 3.

Quantitative methods were used to describe measured travel behaviour and allow for statistical analysis of the material. An advantage of the quantitative approach is that it enables generalising the results into other contexts and, if sample sizes are big enough, performing analyses with statistically significant results (Andersson, 2012). However, one must be aware that the reliability of quantitative analyses depends on the quality of the data, for example when collecting data with surveys, a method with advantages such as high representativeness at a relatively low cost (Queirós et al., 2017). Another advantage of the quantitative approach is its objectivity, as its reliance on numerical data and statistical analysis reduces the risk of subjective bias (Mohajan, 2020). Still, even in quantitative studies, bias can occur as a result of, for example, the choice of analyses and when interpreting the results.

Qualitative methods were used to get a thorough understanding of motives, perceptions, and attitudes for individuals' choices between combinations of activities, destinations, and transport modes when travelling for leisure purposes. The aim of using a qualitative approach was to capture a wide variety of specific assessments,

knowledge that cannot be obtained through quantitative studies, rather than quantifying the perceptions of the whole population (Kelle, 2006). However, qualitative studies means that the researcher is deeply involved in interpreting the results, and therefore the researcher must understand how his/her biases and assumptions affect conclusions drawn when analysing the output from qualitative data collections (Alvesson & Sköldbberg, 2018; Noble & Smith, 2015). Ravitch and Carl (2020) introduce four values necessary to reflect upon to perform both ethical and valid qualitative research: criticality, reflexivity, collaboration, and rigour. These values are central since they influence and inform the whole qualitative research process. Also, it is important to remember that qualities that are crucial for quantitative studies, such as generalisability and large enough sample sizes to perform statistically significant results, are not the right measures for concluding whether results from qualitative studies are valid or not (Mason, 2018).

In summary, this thesis exploits the advantages of both quantitative and qualitative studies in a mixed methods design. While the quantitative research uses numbers to provide knowledge about how common different characteristics of everyday leisure travel are, including how they differ between groups, the qualitative research supplements insights about how the respondents describe these phenomena based on the quality of the material and therefore uses words rather than numbers.

### **Use of travel surveys**

The quantitative analyses in this thesis are based on two different types of travel surveys: the Swedish national travel survey, which is a traditional cross-sectional one-day survey, and an app-based multi-day travel survey. Information about travel behaviour, including activities performed, destinations travelled to, and mode choice, is commonly collected using travel surveys, especially when there is a need to know the purpose of the trip. Other methods to collect data, for example, traffic counts on roads, counting boarding and/or alighting passengers in public transport, and using mobile phone data, cannot provide the same detailed information about the trip purpose. This is one of the advantages of using travel surveys, but there are also disadvantages with both types of travel surveys used in the analyses.

In travel surveys with self-reported travel diaries, underreporting of less regular trip purposes is common. This is especially true for short trips, trips that start in the afternoon, and trips that are short in time, distance, or activity duration (Aschauer et al., 2021; Stopher et al., 2007). Further, social visits and other leisure trips are among the trip purposes that are most underreported, probably because they are less regular

than for example commuter trips, and thereby easier to forget. Using app-based surveys is one way of reducing underreporting (Thomas et al., 2018).

The most common method is to collect data for one single day per person (Ortúzar et al., 2011; Storesund Hesjevoll et al., 2021), which is for example the case for the Swedish national travel survey. This gives rich information about how the population travels and about differences between travellers and is termed interpersonal travel variation. However, one-day travel survey data cannot capture the variation in travel behaviour for an individual, which is especially important for leisure trips since such trips often lack regularity either in time or regarding the destination of the trip. To also get information about the difference from day to day or week to week for the same traveller, intrapersonal travel variation, data for more than one day must be collected (Buliung et al., 2008; Hanson & Huff, 1981; Kitamura et al., 2006).

Multi-day travel surveys are, however, not as common since they are costly, both when collecting data and for the participants due to the increased response burden. In traditional surveys, where the participants report on all trips in a travel diary, submitting data for multiple days means an effort both in time and in thought capacity when trying to remember all trips made. The use of digital tools can ease the response burden since the apps are at least partially automated (Gillis et al., 2023; Marra et al., 2019; Stopher et al., 2008). Travel survey apps automatically register all trips and can also give suggestions for transport mode and trip purpose, especially after some time when the app has learned from previous trips.

As mentioned above, app-based travel surveys can help overcome some of the problems with traditional travel surveys. For example, misestimation of trip lengths is common in self-reported data due to rounding of travel times (Stopher et al., 2007; Storesund Hesjevoll et al., 2021), a problem that can be solved with the automatic registration of trip lengths. However, the new technology can also influence data quality and previous research has, for example, pointed to problems of recruitment and representativeness (Silvano et al., 2020; Svaboe et al., 2023), and accuracy of location-logging and mode inference (Harding et al., 2021).

Using both types of travel surveys, the cross-sectional one-day survey and the app-based multi-day survey, for the analyses in the thesis means the results benefit from the advantages of both types of methods while acknowledging their disadvantages. Finally, the thesis has explored the challenges of both types of methods based on lessons learned while working on the analyses.

## The art of interviewing

Having considered the advantages and disadvantages of qualitative studies and chosen a mixed methods approach, the next step was to decide on which kind of qualitative data collection to include. In this case, one-to-one person interviews were chosen over focus group interviews. Whereas focus groups would have let the participants discuss, reflect upon and understand their motives in an even deeper sense, one-to-one person interviews had the advantage of giving more time to deepen the understanding of how repetitive mode choice for leisure travel is on the individual level, of the individual's motives for choosing certain transport modes, and of his/her possibility to reduce car use for leisure trips (Brinkmann & Kvale, 2015; Mason, 2018; Ravitch & Carl, 2020).

Empirical qualitative data for the thesis was thus collected through qualitative one-to-one person interviews in an explorative approach, following a guide with open-ended questions. The interviews were semi-structured, which means that there was a set structure that also allowed for particularly interesting statements to be explored through optional follow-up questions to the interviewees (Patel & Davidson, 2019). As a logical consequence, the time spent on different questions varied between the interviews. However, a number of pre-selected questions that were deemed particularly important were always answered.

Due to the COVID-19 pandemic, the interviews took place online instead of in person, which entails certain disadvantages. Efforts were therefore made to anticipate and counteract problems that may arise when conducting interviews online (Mason, 2018). The first few minutes of an interview are decisive to make the interviewees feel trust in the interviewer and want to share their thoughts (Brinkmann & Kvale, 2015). To establish good contact, the interviewer opened with some minutes of small talk before introducing the subject of the interview and reminding the interviewees that they were allowed to interrupt the interview at any point, should they want to. In online interviews, it is also important that the interviewees feel in control of the app used and accessories such as headphones before starting the interview itself. Still, conducting the interviews online may have caused some people to refuse to participate due to not being comfortable with the online format.

Both in the interview situation itself and when transcribing and analysing the results, there is a risk of bias. First, the interviewer inevitably influences the interview through the choice of questions and the way they are asked. Second, there is always a risk that the interviewees do not recall matters correctly, want to make themselves seem better than they are, or do not want to share certain information. Also, there can be a discrepancy between 'knowing' and 'telling', meaning the interviewees may have knowledge that they are not able to express very well in words (Alvesson, 2023). Finally,

the analysis involves subjective choices and interpretations, and there is also a risk of missing nuances in the original data. To reduce the risk of such bias, the interviews were recorded to be able to listen through the answers repeated times.

## Datasets used

To give a rich description of the studied research area, the analyses are based on three datasets with complementary qualities, two from travel surveys and one from qualitative interviews. The interview study was conducted as part of the thesis, while the two datasets from travel surveys were collected by others. In this section, the three datasets are described concerning study population, data collection methods, measurements used, and themes covered. An overview of the datasets is presented in Tables 4 and 5.

**Table 4. Overview of the three datasets**

Comparison of selected basic characteristics of the datasets used in the different studies.

Dataset	Method	Data collection	Duration	Period	Study area
National travel survey	Quantitative	Self-reported	1 day	2011-2016	Sweden
App-based travel survey	Quantitative	Semi-automatic	1 month	2021	Sweden
Interview data	Qualitative	Semi-structured	n/a	2020	Gävle municipality

**Table 5. Size of the three datasets**

Comparison of the size of the datasets used in the different studies.

Dataset	Participants	Leisure trips
National travel survey	48,628	39,911
App-based travel survey	472	14,474
Interview data	17	n/a

### National travel survey

The analyses that describe characteristics of everyday leisure travel by car in Sweden in Paper 1 are based on data from the Swedish national travel survey. This is a quantitative study conducted on a daily basis all year round, but where each participant only reports on his/her trips made on one single day. The database includes a total of 48,628 individuals and information about 39,911 everyday leisure trips. In this survey, the



participants are all aged 6-84 years and live in Sweden. Respondents were recruited through a representative sample. The dataset includes background data about the individuals, such as gender, age, and place of residence. This information was used to weight the data to represent the whole Swedish population between 6 and 84 years.

Data in the current round of the Swedish national travel survey was collected from 2011 to 2016. The survey was conducted through telephone interviews, with the support of a postal diary. This way, the interviewer could help the participants and thereby ensure that the most applicable trip purpose was registered. The survey further collects information about the number of trips and trip characteristics for each trip, such as trip length, date and time of the trip, and transport mode. In the Swedish national travel survey for this time period, there is also information about joint travel, in terms of the number of accompanying persons. This enables analyses of how often everyday leisure trips are made in the company of others and how often people are travelling alone. In later years of the survey, this information is no longer collected.

### **App-based travel survey**

The cluster analysis in Paper 3 and the quantitative examples in Paper 5 are both based on data collected with the travel survey app TravelVu. The database covers multiple days for each participant, which means it gives a more nuanced description of how each individual travels and can give information about both interpersonal and intrapersonal travel behaviour variation. The database includes a total of 472 individuals and information about 14,474 leisure trips. The participants in the app-based travel survey were primarily recruited among Swedish residents between 16 and 74 years of age. An invitation was sent to a random stratified sample of 40,000 persons and, since the overall number of participants who initially joined the survey was low, the recruitment was complemented through campaigns on social media (Facebook and LinkedIn). Also, the already recruited participants were encouraged to invite others to join the survey. The dataset contains information about socioeconomics, access to transport modes and priorities in life. Gender and age were used to weight the data to represent the whole Swedish population in this age span. When there was no information about gender or age, and when “other” was specified for gender, the weight was set to one. The geographical representation was considered satisfactory without adjustment.

For this survey, data was collected over two and a half months from September 2021 and onwards. A sample of about one month (26-28 days) was chosen for each participant. Five outliers were removed from the dataset due to unreasonably frequent trips or not having conducted a single leisure trip during the one-month period. The app is semiautomatic and collects information about travel behaviour for each trip,

including start and end time, transport mode, trip length, speed, route, geographical location, and trip purpose. It suggests a travel diary for each day based on positioning functions in the smartphone and experience from previous trips, the latter to reduce the response burden. The participants then adjust suggestions when wrong and add missing information about, for example, transport modes and trip purposes, and thereafter indicate that the travel diary is correct. The final step is a quality check made for each day separately. To ensure that the dataset is as correct as possible, only validated days are used in the analysis. It was up to the respondent to decide which purpose best described his/her trip. This means poorer possibilities to ensure that the most appropriate trip purpose is registered, than in the national travel survey conducted through interviews.

In addition to travel behaviour, the survey included questions about attitudes and values. The participants were asked to rate the importance of seven factors in their current life situation: live economically, live healthy, live environmentally friendly, save time, save energy (physical effort), simplify everyday life, and try new things. The survey also included questions about the importance of the Schwartz basic human values: self-direction, stimulation, hedonism, achievement, power, security, conformity, tradition, benevolence, and universalism.

### **Interview study**

The third study is based on a fundamentally different type of data collection, although similar to the national travel survey in the sense that both rely on self-reported data from the participants and thus their ability to correctly account for the leisure trips undertaken. The participants of the study were all aged 18 years and above and residents of Gävle, a medium-sized town which represents an average city in Sweden. They were recruited through a random sample from an address register of the whole population and contacted by phone with the help of a recruitment firm. Screening questions were asked to ensure that specific background characteristics, such as gender, age, and whether or not you travel by car, were captured. A total of 17 interviews were conducted.

The semi-structured interviews were conducted in November 2020 and lasted for about 45-60 minutes. Due to COVID-19, the interviews took place online. The video meetings were recorded to enable transcribing the interviews in detail afterwards. The recordings also allowed for analysing the mimics and gestures of the participants, but such a detailed analysis was not found necessary for the purpose of the study. Ethical review and approval were waived for this study, as no health conditions or other personal data specified in the Swedish Act Concerning the Ethical Review of Research

Involving Humans (2003:460) were asked for. Before the qualitative interviews, all interviewees consented to their participation in the research study, that the interviews were recorded and data stored in accordance with GDPR (General Data Protection Regulation).

In the interviews, there was a potential risk of biased interviews if it was too obvious that the overall aim of the study was to understand how to reduce car use for leisure travel. This could have made the interviewees with high car use feel questioned and report less car use to make themselves appear to travel less by car. Therefore, the information about the aim of the interviews given in advance was sparse. During the interviews, questions were asked that instead gradually led to reflections on reducing car use for leisure trips.

The interviewees were first able to talk freely about everyday leisure trips. First some time into the interviews, a definition was introduced to them. The participants gave an account of their leisure trips at normal times and included trips conducted all year round. For Paper 2, the interviews covered two themes, the first one focusing on factors stated to affect mode choice for leisure trips, and the second one on how the interviewees reason about their possibility to reduce car mileage for leisure trips. For Paper 4, the interviews covered another two themes, whether and how the pandemic has affected trips for everyday leisure purposes, and how the interviewees have perceived their changes and if they will stick to them after life is back to normal again.

## Impacts of selected data

Working with data collected by others limits the possibility of structuring and controlling the content of the dataset. Further, for the data collected as part of the thesis, the unexpected event of the COVID-19 pandemic had an impact on both the chosen method and the results.

### **Recruitment and participants**

For the national travel survey, participants were recruited through a randomised and stratified sample, but in the other data collections, the samples were not fully randomised. For the app-based survey, this was the effect of using crowdsourcing and ‘snowballing’ methods due to challenges in recruiting participants for the study. These methods were judged applicable since no significant differences in travel behaviour between random samples and crowd-sourced samples were identified in previous data

collections in Swedish cities. Finally, in the qualitative study, the sample was deliberately not fully randomised, since the goal was to cover as many aspects as possible in the study. Therefore, screening questions were asked to ensure capturing individuals with different characteristics. This is not a problem, since in this type of qualitative study with a limited number of participants it is much more important to capture different views of the studied phenomena than to achieve complete representativeness.

The number of participants differs greatly between the three studies. In the national travel survey, the sample size is large, with almost 50,000 participants. In the app-based survey, the number of participants is significantly lower, just under 500. However, due to the long data collection period, these participants have conducted a significant amount of leisure trips, about 15,000 compared to 40,000 in the national travel survey. Consequently, this survey also provides a rich dataset. Finally, in the interview study, the number of participants is 17 and thus much smaller. However, this is not an issue since the data is qualitative, and after these interviews thematic saturation was reached. This means the most recent interviews did not add any new aspects to the results (DeJonckheere & Vaughn, 2019; Kvale & Brinkmann, 2009).

## **Data collection methods**

Underreporting of trips is a well-known problem in travel surveys with self-reported data and is most probably applicable to both the national travel survey and the qualitative interviews used in the thesis. In the national travel survey, the number of trips and trip lengths both rely on self-reports, which means the respondents do not always recall correctly. This results in underreporting of trips since the respondents tend to omit short trips. Also, the respondents will round distances to the nearest integer. In the interviews, however, this problem does not refer to a quantification of trips but that different types of trips may have been forgotten in the interviews, which affects the understanding of, for example, mode choice and the possibility of reducing car use for leisure trips. The goal of the interviews was to get an understanding of leisure travel behaviour all year round but as the interviews were conducted in autumn, recalling travel behaviour during other parts of the year may have been a challenge. In the app-based survey, where information is collected semiautomatically, this problem is of less relevance.

In the app-based survey, on the other hand, the way the data is structured based on the automatic registration of a new trip purpose every time there is a stop is something to be aware of. More specifically, there seems to be a problem with how correctly trip purposes are identified on longer trips. Once you make a stop for lunch, shopping, or something else, a new trip begins. This is mainly a problem for trip purposes with many

distant trips, including Visit family and friends, Restaurant and café, and to some extent Exercise and outdoor life. Misestimations for example occur when there is a stop close to the destination on a long trip, since this stop divides the trip into a longer part assigned to the purpose of that stop and a shorter part assigned to the main purpose of the trip. In the national travel survey, where the interviewer was able to ensure that certain principles were followed at the trip purpose assignment, this was less of a problem.

### **Time of data collection**

The datasets used in the thesis were collected during different time periods. Data from the Swedish national travel survey was collected from 2011 to 2016. The reason more recent data was not used is that this data collection was paused during 2017 and 2018, and that the data from 2019 was not available for analyses at the time the thesis work began. In hindsight, this had unexpected advantages in that the data from the former time period includes valuable information about whether trips are joint or not. This information was not included from 2019 and onwards. Also, due to smaller sample sizes and declining response rates in later years, the older dataset is of higher quality.

Two of the data collections were carried out during COVID-19, which means that the pandemic may have affected the results of my studies. The app-based travel survey was conducted in autumn 2021, when the pandemic was still ongoing but the effects on travel behaviour were much smaller than earlier. The qualitative interviews were performed a year before, and thus when the pandemic had a greater impact. To ensure the focus was on normal times, the interviewees were instructed to describe how they used to travel before the pandemic. Still, there is a risk that the interviewees did not fully recall their normal travel behaviour. This has been taken into account while analysing the results. Another effect of the pandemic was that the interviews had to be performed online instead of in person. However, I perceive this as having many advantages as well. For example, the interviewees seemed comfortable sitting at the screen instead of meeting in person.

### **Analyses of material**

When choosing material and analyses for the thesis, methodological considerations were made. The choice of analyses affects both the results and the contribution of the thesis. Important considerations are presented below, and the advantages of the chosen analyses are explained.

## Quantitative methods

### *Descriptive analysis of travel survey data*

In Paper 1, descriptive statistics were used to describe leisure trips and create an overview of such travel from various perspectives. It was done by presenting averages, shares, and distributions for different trip purposes and societal groups. Such statistics cannot provide knowledge of causal relationships but can nevertheless point out combinations of factors that deserve further attention. It answers the fundamental question “what” rather than “why” (Mason, 2018), which was considered sufficient as a means to identify questions to delve deeper into in the remaining thesis work. In Paper 3, descriptive statistics were used to show similarities and differences between groups identified in the segmentation. Finally, descriptive statistics were also used in Paper 5, in this case to exemplify the challenges discussed in relation to measuring leisure travel with travel survey data collected with smartphone apps.

### *Cluster analysis of travel survey data*

In Paper 3, a cluster analysis was performed to identify groups of individuals who are similar to other individuals in the same group, but different from individuals in other groups regarding travel behaviour for leisure trips. Clusters that are homogeneous within and heterogeneous in relation to other clusters were constructed by maximising the distance between clusters and minimising the distance within each cluster (Backhaus et al., 2021; Manly & Alberto, 2016). For this, a non-hierarchical cluster analysis was carried out using the K-means algorithm in Python.

Results for up to fifteen clusters were compared. To choose the number of clusters, the criterion of interpretability of the clusters was used, which led to an 11-cluster solution. The number of individuals in each cluster varies from 85 in the largest to 8 in the smallest cluster. A cluster with only 8 participants is small. However, this cluster appeared already when going from five to six clusters and is thus stable. Also, with as few as five clusters, only small differences in trip purposes between the clusters appeared. Since these differences were deemed more important than avoiding the small cluster, a larger number of clusters was chosen. Further, to check the robustness of the cluster solution, a stability test was performed in which the analysis was repeated for a randomly selected half of the participants. A K-means cluster analysis was run, asking for 11 clusters. 78 percent of the participants in this half of the sample were assigned to the same cluster as in the original analysis. This exceeds 68 percent and according to Hauslbauer et al. (2022) (in turn, referring to Cannon (1992)), this means the cluster solution is regarded as stable.

Another aspect of the 11-cluster solution is that with so many clusters it becomes less straightforward to get an overview of the differences between the clusters and use them as a basis in policy design. Yet, this approach was deliberately chosen to be able to point to the details and make comparisons within two groups of car-oriented and non-car-oriented clusters, respectively. Fewer clusters would have been easier to manage but would not have given the detail sought.

Early in the process, a decision was made to focus on leisure trips by car in the cluster analysis. Therefore, the twelve variables used in the clustering process had an emphasis on such qualities. One variable represents how often each individual makes leisure trips, and three of them focus on car use for leisure trips. Another three variables, for comparison, show transport mode shares for public transport, bike, and by foot. Finally, five variables representing the share of kilometres travelled for different leisure trip purposes are included. Another choice was to focus on travel behaviour variables only and thus exclude variables such as attitudes and personal values from the cluster analysis. The reason for this was that clusters based on travel behaviour are easier to identify in “reality”, which is an advantage in understanding potential reductions of car use for leisure trips.

#### *Statistical tests*

To highlight significant differences in characteristics between the eleven clusters in Paper 3, statistical tests were used. The non-parametric Kruskal-Wallis test was used for the non-normally distributed numeric travel behaviour variables, since the assumption of normality was violated and thus the parametric one-way analysis of variance (ANOVA) test could not be applied (Ostertagová et al., 2014). For the categorical background variables, Pearson’s chi-squared test was used. The requirements of this test were fulfilled: the expected cell frequencies were 5 or more in at least 80 percent of the cells, and the sample size was sufficiently large (McHugh, 2013).

## **Qualitative methods**

#### *Thematic analysis of qualitative interview data*

In Papers 2 and 4, the interviews were analysed with inductive qualitative thematic analysis as described by Braun and Clarke (2006). The analyses were performed based on verbatim transcriptions of the interviews using the CAQDAS (computer-assisted qualitative data analysis software) software NVivo. All transcripts were read and re-read, and initial codes were generated based on ideas and concepts found in the text without following a pre-existing coding frame. Thus, a data-driven approach was used. The next

step was to focus on the broader level of the material and organise the different codes into main themes and subthemes. Finally, the coding and sorting of text segments in the transcripts were reviewed several times in an iterative process until a final satisfactory match was achieved.

During the analysis for Paper 2, a structure of main themes that were in line with concepts in the COM-B and TPB models emerged. This structure was chosen since it provided a clear context for the presentation of results. The identified subthemes were then sorted into the main theme categories. This means the analysis partly went from an inductive to a deductive approach, where several of the themes were expected to be found in the data based on theories and existing knowledge from previous research (Pernecky, 2016). However, since the subthemes were already identified, there was no major loss of data due to this structure. The limited number of subthemes that were omitted was deemed not to add particularly important information to the analysis. In a similar procedure, the analyses for Paper 4 build on an analytical framework with a categorisation of behavioural adaptations to disruptive events suggested by Marsden et al. (2020).

## Reflections on the research process

The work on this thesis started from a conviction that a greater focus on everyday leisure travel is needed, in research but also in policy and practice. At first, the idea was to reach all the way to suggest specific policy measures. However, as I started working on the thesis, it became clear that there was too much information lacking and that the research area would benefit from first increasing knowledge about the anatomy of leisure trips. Among all possible choices, the thesis set out to mainly contribute with a deepened understanding of the characteristics of everyday leisure travel, mode choice for leisure trips, and the possibility of changing travel behaviour towards reduced car use. During the work, it became apparent that various challenges of defining and measuring leisure trips affect our understanding of the above and therefore the scope was later expanded.

The first study was performed as a sort of data mining to guide the choice of which areas to focus on in the rest of the thesis. The results gave important insights into leisure travel behaviour and pointed to knowledge gaps. I noticed two things in particular: that more qualitative insights about transport mode choice for leisure trips were needed and that there was reason to delve into the differences between different leisure trip purposes.



After having identified that there was a need for qualitative data, I first planned to conduct a mixed methods study combining interview data and travel survey data from the same geographical area in the second paper. However, when initial analyses of the quantitative data revealed errors in the dataset and knowing that the extensive interview material itself would provide a good foundation for my analyses, I decided to focus solely on the qualitative data. Instead, I made sure to combine quantitative and qualitative analyses in equal shares in the thesis as a whole.

It was not decided from the start that the qualitative study would result in a segmentation. Instead, the division into four typologies in the second paper emerged during the analysis of the interview data. This segmentation then led to the idea of performing a similar segmentation in the third study, but this time based on quantitative data from an app-based travel survey.

The fourth paper was the result of a pandemic that could have been in the way of my studies but was instead taken advantage of. One of my interests was to better understand if and in what ways people can change travel behaviour for leisure trips. The changes made due to the pandemic itself and the recommendations to decrease both activities and travel contributed important insights on this matter.

Already in the first study, but above all in the third study, it became clear that there are challenges in defining and measuring leisure travel. Although this area was added at some point in the research process, it forms an important part of my work. Still, there is much more to explore in this area, and I believe these questions would have been enough for an entire thesis in themselves.

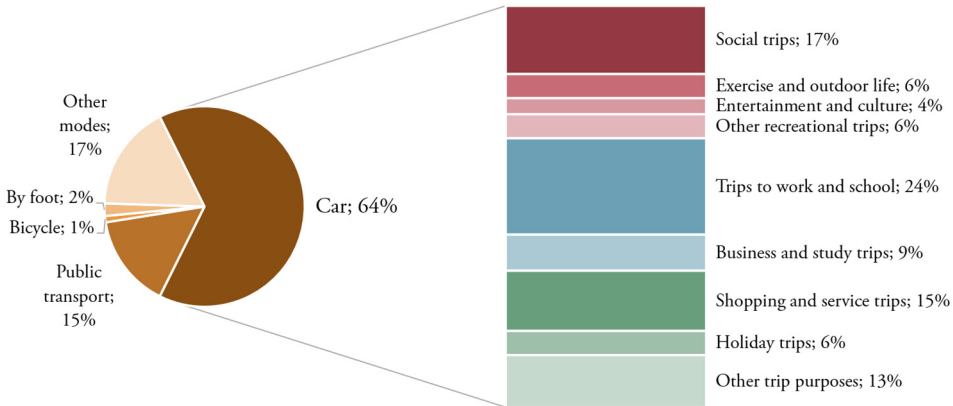
At the outset of this work, there was an almost infinite number of possibilities. How these boiled down to the studies and methods included in the thesis has been described above. The fact that these studies were prioritised means other studies and methods, consciously or unconsciously, were not chosen. In this way, I have influenced the outcome of the thesis. However, making such choices is inevitable, and even if I were to start over, I would still not have been able to include everything important and interesting in my thesis.

# Findings

## Paper 1: Characteristics of leisure travel

The aim of the first paper was to get a better understanding of the magnitude and characteristics of everyday leisure trips for different social and recreational purposes. The starting point for the analyses was that there is a lack of detailed knowledge about leisure travel and that such an understanding is required to comprehend the popularity of the car for this type of trip. In Paper 1, the identified knowledge gap is filled based on the Swedish case. The results of the paper reveal a set of interesting characteristics of everyday leisure travel based on data from the Swedish national travel survey, describing revealed travel behaviour.

A first simple, yet crucial result, displays the magnitude of everyday leisure trips. As shown in Figure 3, such trips stand for a third of all kilometres travelled by car and thus there is good reason to focus on finding measures to reduce them. Car is also the dominant transport mode for both social and recreational trips, with modal shares ranging from 59 to 76 percent of the total passenger mileage.



**Figure 3. Transport mode and purpose shares of passenger mileage**  
Transport mode shares along with the distribution for car kilometres over trip purposes.

One of the most important insights in Paper 1 is to what extent everyday leisure trips by car are of joint character. People on average travel in the company of 0.9 other persons on social and recreational trips, but only 0.2-0.3 other persons when travelling to work and school or on business and study trips. This fact is reflected in the results of Paper 1 showing that, due to the joint character of leisure trips, there are more differences in travel behaviour related to household characteristics than to individual characteristics. An interesting consequence of this is that, as opposed to trips to work and school and business and study trips, differences in car use between men and women are small, since they often travel together on leisure trips. On the contrary, the average distance travelled per person and day increases with household characteristics such as income, cohabitation, children in the household, and residence in rural areas. Further, the study shows that distances increase when two or more persons are travelling together. For the shortest trips (less than 5 km), the average number of persons travelling together is 1.7, whereas the corresponding number is 2.3 for the longest trips (100 km or more).

When searching for appropriate measures to reduce car use, it is of interest to know the distribution over different trip lengths. This study shows that, even though as much as one third of the leisure trips are shorter than 5 kilometres, trips in the shortest distance class only account for 3 percent of the passenger mileage for leisure purposes. On the contrary, trips in the longest distance class account for only 5 percent of the number of trips but as much as 42 percent of the passenger mileage for leisure trips. Thus, even though numerous trips are rather short, it is the longer trips that contribute more to the mileage travelled by car.

For leisure trips, there are distinct differences between weekday travel and weekend travel. Both social and recreational trips are on average longer on weekends than on weekdays, especially for exercise and outdoor life and for other recreational trips. On weekends, leisure trips are further more evenly spread out over the day with few starting early in the morning and, as opposed to on weekdays, there is no afternoon peak in the number of trips. On weekends, social trips further last longer into the evenings, but the same difference is not found for weekdays. This is important information in understanding whether public transport is an available option for leisure trips, since public transport services differ between weekdays and weekends as well as between daytime and evenings.

The largest share of car passenger mileage is due to social trips, responsible for half of the kilometres travelled by car for social and recreational purposes. Such trips are dominant during weekends. Several results point out that car use for social trips is common among more groups than car use for other trip purposes. For example, the difference in car use between high and low income groups is smaller for social trips than

for recreational trips, and thus trips to spend time with family and friends are more equally distributed over income groups. Previous research has further shown that social trips are often made by car even among groups that otherwise travel by other transport modes (Van Eeno et al., 2022).

In addition to learning about the characteristics of everyday leisure trips, it is also interesting to get an idea about the potential to reduce car use for such trips. The results of Paper 1 show that there is a potential in terms of leisure trips constituting a third, and thus a substantial share, of the passenger mileage travelled by car. Looking at car mileage instead, which is more closely related to emissions, this potential decreases somewhat due to the joint character of leisure trips and the fact that travelling together is more common on longer trips that contribute the most to the kilometres travelled. Nevertheless, trips for social and recreational purposes still stand for a considerable share of the total distance travelled by car in Sweden, and therefore reducing car use for such trips will make a difference.

Besides the results about how characteristics differ between everyday leisure trip purposes, lessons were also learned about measuring leisure travel with travel survey data. In the dataset used, information about whether people were travelling alone or together with others contributed to important insights about the joint character of leisure trips. This information, however, is not always available in travel survey datasets.

## Paper 2: Perceptions of mode choice

In Paper 2, the results of the first paper displaying revealed behaviour are complemented by an analysis of characteristics of everyday leisure travel based on perceived behaviour. Whereas the first paper describes leisure trips in quantitative terms, this paper focuses on qualitative aspects of leisure travel to get a more nuanced picture of their characteristics. The first aim of the paper is to take an in-depth look at perceptions of mode choice for leisure trips. A second aim is to get a better understanding of the possibility of reducing car use for everyday leisure trips. Accordingly, the first section of the results covers factors affecting mode choice and the second section reasoning about reducing car mileage. Finally, the analyses of Paper 2 gave important insights about the challenges of defining leisure trips.

## Factors affecting mode choice

The analysis of factors affecting mode choice for everyday leisure trips resulted in a division into six main themes: capability, opportunity, attitude, subjective norm, perceived behavioural control, and habit. The main themes were derived from concepts in the COM-B and TPB behaviour models, with the addition of habit. The results show that many different factors affect mode choice, a selection of which will be highlighted here. More specifically, one factor per main theme will be presented, except for the main theme attitude for which both flexibility and money saving will be highlighted.

Within the main theme capability, physical capacity especially affects mode choice for leisure trips due to the joint character of such trips. More people travelling together means the transport mode chosen must fit each and every person in the company. It is enough that one person does not have the balance to ride a bike or cannot walk long enough distances to use public transport for the car to be the easiest and perhaps only transport mode available.

The second main theme, opportunity, includes accessibility with different transport modes. Everyday leisure trips are often made to more distant locations, which may be difficult to reach both by bike and by public transport. Further, leisure trips are more often made on evenings and weekends when the public transport supply is less efficient.

Another factor that partly has to do with destinations is flexibility, one of the factors in the third main theme attitude. People have a strong desire for flexibility when it comes to leisure trips. They want to be able to choose freely when and where to travel, and also to change their plans to, for example, make unplanned stops along the way. The sense of freedom that comes with flexibility first and foremost has to do with being able to do whatever one wants whenever one wants, and not so much about being able to go to a certain place at a certain time. Most people find the car to be the most flexible transport mode, even though many find the bicycle flexible too and some highlight the flexibility benefits of public transport.

Money saving, also covered by the main theme attitude, is another factor that gets more weight due to the joint character of leisure trips. Whereas the car is also found expensive, public transport is seen as a less priceworthy option when travelling many together.

The fourth main theme, subjective norm, includes two types of norms, of which injunctive norms refer to the approval or disapproval from significant others to travel in certain ways. Such norms can affect transport mode choice both when travelling alone and when travelling with others. In the latter case, all must agree on which

transport mode to use, and the interviewees expressed how perceived pressure from fellow travellers often made them choose to travel by car. However, the opposite is sometimes also the case, that important others advocate sustainable travel and that the car is therefore not chosen.

One of many factors covered by the fifth main theme, perceived behavioural control, is luggage, which is particularly interesting when it comes to leisure trips. People bring all sorts of gear for their leisure activities: sports equipment, mountain bikes, sunbeds, cooler bags, etc. Interestingly, it does not take much luggage before it is perceived as too much to carry on the bus or bicycle. The interviewees referred to as small items as two bags or “larger quantities than a backpack”.

The sixth and final main theme is habit, for which the factor past behaviour has been selected for presentation here, because when travelling for leisure purposes we more often travel to new destinations than when, for example, commuting. The interviewees expressed how previous use, and thus knowledge, of public transport for other destinations made them feel more confident in choosing public transport even when travelling to unknown places.

### **Reasoning about reducing car mileage**

The analysis of the possibility of reducing car use for everyday leisure trips resulted in a segmentation into four typologies, depending on the two dimensions *willingness to change* and *perception of feasibility*. The results made it clear that the four groups differ substantially on these two dimensions, and therefore a variety of policy measures is needed to reach different groups of people.

The first group (high willingness to change, high perception of feasibility) is characterised by having a higher intention to voluntarily reduce car use than the other three groups. In contrast to the other typologies, they express strategies for how to change rather than what hinders change. They also have more positive attitudes to other transport modes and less positive attitudes to the car. However, for change to happen, the group still needs some kind of push to get enough motivation. Also, the proposed changes are perceived as easier to go through with when travelling alone.

The second group (high willingness to change, low perception of feasibility) has also complemented about change, but compared to the first group preparation for change is less common. This has to do with that, for this typology, the desire to make changes is dampened by perceived hinders such as e.g., carrying luggage or being troubled by cold or bad weather. Also, it is considered costly to travel many together by public transport, for example for a whole family to go by train instead of travelling by car.

The third group (low willingness to change, high perception of feasibility) highlights the importance of the car, both for practical matters and for the flexibility and freedom that the car offers. For this typology, personal needs seem to be more important than collective needs, and at the same time, they are often governed by descriptive norms in terms of thoughts about what others do. For example, they feel the right to travel by car because others do so, and that travelling by bus is not an option because others do not. Also, this typology expresses negative attitudes toward travelling by bus since it is often associated with hassle. Finally, statements from the third group make it clear that, for a decrease in car use to happen, major changes in external conditions are needed, such as “a doubling of fuel prices.”

The fourth and final group (low willingness to change, low perception of feasibility) is the typology that is furthest away from reducing car use for everyday leisure trips. There are two reasons for ending up in this group. The first reason is that one faces capability and/or opportunity constraints that are difficult to overcome, such as physical constraints or living in rural areas where distances are too long for cycling and public transport is not available. The other reason is that one is very car-oriented and therefore is neither willing to nor find it feasible to reduce car use.

The four typologies differ not only regarding the two dimensions upon which the segmentation is based but also in socioeconomic characteristics. The first two groups are characterised by being younger, having lower incomes, and a habit of travelling by many different transport modes. The third and fourth groups, on the contrary, are older, have higher incomes, and the car is often their primary transport mode.

An important result from this study, which has not yet been lifted, is that many of the interviewees stated that they had not previously considered making any changes to how they travel for everyday leisure purposes. On the contrary, there were many mentions of wanting to increase the overall number of leisure trips. This highlights that leisure trips are important for our well-being and therefore acceptance for altering such trips is low.

### **Insights about defining leisure trips**

While analysing the interviews, important insights were also made about the character of leisure trips concerning their definition. For example, leisure trips are often seen as more flexible than commuter trips. However, the results from the interviews highlight how flexibility varies with different leisure trip purposes, and even though some activities have a set time others do not. Further, leisure trips are often seen as discretionary rather than mandatory, while the analysis in Paper 2 has shown that some

leisure purposes may instead be seen as mandatory in the sense that they are very important for people's well-being.

### Paper 3: Identifying leisure mobility segments

In Paper 3, another quantitative analysis of revealed leisure travel behaviour was performed, this time through a cluster analysis in which leisure mobility styles were identified. The first overarching lesson from this study is that it was possible to identify a set of mobility segments with distinct features based on leisure travel behaviour. For each segment, the magnitude of car kilometres travelled for leisure purposes could also be estimated. In total, six car-oriented and five non-car-oriented leisure mobility segments were identified based on car trip characteristics, mode choice, and leisure trip purpose distribution.

As the cluster-forming variables had a focus on car use, there are great differences in car travel between the two groups of clusters. The car-oriented clusters have a substantially higher car share, 87 percent compared to 23 percent for the non-car-oriented clusters. The opposite goes for the public transport share, which is as low as 6 percent for the car-oriented clusters and as high as 50 percent for the non-car-oriented clusters. Further, the car-oriented clusters make three times as many car trips and travel 4.5 times as many kilometres by car for leisure purposes per day.

One of the most interesting results of the cluster analysis, when instead looking at travel behaviour for all transport modes, is that car-oriented and non-car-oriented clusters make leisure trips to the same extent. Both groups travel for leisure purposes on 43 percent of the days, and 47 percent of the trips are performed on weekends. Further, both groups on average make 1.1 leisure trips and travel a distance of 16 kilometres for leisure purposes per day. This shows that both car-oriented and non-car-oriented clusters have a similar wish or need to travel for leisure, but that they choose different transport modes for their trips.

Besides the differences and similarities between car-oriented and non-car-oriented clusters presented above, there is also variation among the car-oriented clusters. In all, the car-oriented clusters represent two thirds of the population but stand for as much as 90 percent of the kilometres travelled by car for leisure purposes. A group for which the distribution is even more skewed is Extreme car users, that account for a quarter of the car kilometres but only represent 6 percent of the population. On the contrary, the group that with their 17 percent represents the largest share of the population,



Infrequent car users, only account for 11 percent of the kilometres travelled, since they have the lowest car use among the car-oriented clusters (6.6 kilometres by car per day).

Some of the findings in Paper 3 validate results from Paper 1. An example of this is that the analyses in Paper 3 confirm the results showing that car is the dominant transport mode for leisure trips in Sweden, responsible for two thirds of the kilometres travelled for leisure purposes. Another example is that the share of weekend trips is higher in clusters for which social trips dominate, Infrequent car users and Visiting PT users, with weekend shares of 57 and 54 percent, respectively. This confirms results from Paper 1 showing that social trips are in clear majority during weekends. Some of the differences between the car-oriented and the non-car-oriented clusters can be explained by spatial, sociodemographic, and socioeconomic characteristics. As in Paper 1, no significant differences were found for gender. For age, the most apparent difference is that Extreme car users on average are older than the rest of the clusters.

As expected, the results further show that, according to self-reports on their type of living area, the car-oriented clusters live outside urban areas to a significantly higher extent, with the highest share (40 percent) for Extreme car users followed by Distant car users, Active car users, and Hobby car users (with shares ranging from 35 to 27 percent). On the other end, Flexible cyclists has the highest share of people living in urban areas with a wide range of services (89 percent) followed by the two public transport clusters (with shares of 82 and 71 percent).

The choice to base the cluster analysis on travel behaviour variables only resulted in just a few results showing differences between the two groups of clusters regarding priorities in life and basic human values. This means the results of the study give no clues about which measures to choose for different segments based on their attitudes and values. At the same time, focusing on travel behaviour alone makes it easier to identify target groups based on individual characteristics.

While working with the cluster analysis, another insight into how to define and measure leisure trips was made. The analyses showed that identifying the correct leisure trip purpose is difficult on longer trips. In this dataset, the share of kilometres travelled to restaurants and cafés is unusually high, and many such trips are long. An informed guess is that this has to do with the automatic registration of a trip purpose in the travel survey app every time there is a stop. On longer trips, this means that, for example, a lunch stop changes the purpose of the trip leading up to the stop to a restaurant trip, even though the true purpose of the trip was another one, for example visiting friends.

## Paper 4: Adapting travel behaviour

Paper 4, which builds on the same set of qualitative interviews as Paper 2, is a case study of leisure travel behaviour during the COVID-19 pandemic, ongoing at the time of the data collection. Again, the focus is on perceptions of leisure travel and more specifically on adaptive behaviours used to cope with the effects of the pandemic. Also, thoughts about whether any of the behaviour changes would last into the future were investigated among the interviewees. In addition to learning about changes in travel behaviour, the study also contributed to knowledge about the characteristics of different everyday leisure trip purposes.

The study showed that, with the pressure induced by the pandemic, people made substantive changes to their travel behaviour, however not without sacrificing some of the benefits of leisure travel. The interviewees used a range of adaptive behaviours, including cancellation, remodeling, retiming, rescheduling, relocating, and reducing. These results contradict the dominant framing that mobility patterns are stable and that the transport sector is therefore difficult to change (Marsden et al., 2020). At the same time, the apparent need for change due to a disruptive event such as the pandemic is not the case for other crises, such as the ongoing climate change. An important lesson from the pandemic, however, was that people were willing to adjust their behaviour not only for the sake of their own health and well-being but also for that of others, which can also be an advantage in the transition to more sustainable travel behaviour.

When it comes to perceptions about the changed behaviour, the interviewees especially expressed negative feelings about having had to cancel activities that give added value to life, such as trips to restaurants, entertainment, and shopping for fun. Such trips often combine more than one leisure trip purpose through a combination of social and recreational activities. These cancellations mean fewer trips downtown, to nearby cities, and shopping centres. During the pandemic, such trips were difficult to replace due to restrictions. The interviewees also expressed concern over not being able to perform social activities to the extent they were used to. Social trips, though, were easier to replace using adaptive behaviours such as, for example, relocating activities to the outdoors. Meeting family and friends outdoors was described as a nice habit that will probably last for a long time.

Remodeling was another adaptive behaviour used. Public transport was reduced in favour of travelling either by car or by active transport modes such as cycling and walking, in which case the range of destinations to where one could travel was reduced. Some of the interviewees reflected upon not making “unnecessary” trips in the future due to sustainability issues: how often, how far, and with which transport modes one can

travel. Others mentioned making fewer trips since the pandemic made them realise that it is good for their health to live a less stressful life and that they enjoyed spending more time at home together with the family. The study also showed that people find it possible to do more activities from home, but rather as a complement than as a substitute to “the real deal”. Yet, people can consider making fewer leisure trips, as long as they still have the freedom to make such trips in the highly valued flexible way.

During the interviews, lessons were learned about to what extent discretionary trips are perceived as unnecessary and whether destinations are fixed or not. Trip purposes that are both important to people and have fixed destinations are less replaceable. Such trips and activities include meeting family and friends at home and going to destinations that offer something special, e.g., concerts or sporting events, a special type of gym class, or a shop that cannot be found elsewhere. If these trips must also be addressed to reduce car trips as much as needed to meet climate goals, one must be aware that this will place great demands on measures that can meet their special needs.

## Paper 5: Challenges in measuring leisure travel

Insights from working with the first four papers led to the identification of a number of challenges in measuring leisure travel behaviour with the use of app-based travel surveys. Four such challenges were investigated in Paper 5, focusing on either problems of defining and differentiating between leisure trip purposes, a challenge of perceived behaviour, or measurement problems associated with trip chaining and assigning the kilometres travelled to the correct trip purpose, a challenge of revealed behaviour. The results provide knowledge about how to facilitate the filling in of travel surveys, which is crucial since response rates for this type of data collection are both low and declining (Svaboe et al., 2024). Further, a more correct understanding of the potential can be important when planning for a shift towards more sustainable leisure travel.

The first challenge concerned problems of distinguishing leisure trip purposes both from each other and from other types of trip purposes. The results reveal that, for a large share of the trips (10 percent of the car trips and 13 percent of the kilometres travelled by car), the respondents state “other” when choosing a purpose for their trip and that this caption, according to the free text answers, hides many leisure trips. It seems as if the options presented in the list of trip purposes are both too broad and too narrow to fit the respondents’ view of what constitutes a leisure trip. This results in that leisure trips, although being less underreported than in the traditional travel survey (Thomas et al., 2018), are still underestimated, which could be of importance when planning for this type of trip.

The second challenge examined difficulties in distinguishing whether it is the people we meet, the places we visit, or the purpose or activity performed that is the strongest reason for choosing to travel to a specific destination. Often, we travel for a combination of social and recreational activities. However, only one purpose can be chosen in the travel survey, which means respondents still must choose only one purpose and thus implicitly rank the different trip purposes. This can have implications when planning infrastructure and land use. On the other hand, if we do not need detailed knowledge, only finding out destinations will be enough and ease data collection.

The third challenge is about trip chaining for trips that include one or more leisure trip purposes. Trip chains with leisure trips are common, with the combination of leisure with shopping and service purposes being the most frequent. For trip chains, there are different ways of assigning a purpose for the homebound trip. A common method is to assign the same trip purpose as for the previous part of the trip chain, but using other methods is also possible. This could affect the distribution of kilometres over different trip purposes, and thus the correctness in assigning the kilometres travelled for each trip purpose. However, a comparison of three different methods revealed that the results of the different methods are similar.

The fourth and final challenge raises a problem that is specific to the current method of identifying a new trip in the app-based travel survey: the automatic trip registration on long trips. This could mean a risk of not assigning the kilometres travelled to the true purpose, in that a stop to pause or to eat and drink on a long trip will result in the kilometres leading up to this stop being assigned to another trip purpose than the upcoming destination. For car trips, a specific dimension of this problem is stops to refuel the car. If no changes are made to the automatically assigned purpose in the analyses, this means many of the kilometres travelled will have refuelling as the trip purpose, even though this stop is not a purpose in itself but the result of travelling a long distance for other reasons.

In summary, survey methods affect our understanding of the magnitude of leisure trips and thus also the potential to reduce car use for such trips. The results show that there is a need for further development of the app-based collection of travel data, both to give more accurate statistics and to ease the burden for the respondents. Some of the challenges are the same for traditional surveys and app-based surveys. Other problems, for example, some of the underreporting of leisure trips, are solved using app-based surveys, whereas new challenges, for example, the automatic trip registration on long trips, arise. An overall lesson is that planners and analysts must understand that leisure trips can be defined and understood in several ways.



# Discussion

## Advances in the travel survey method

The first research question covers challenges on how to define and measure everyday leisure trips. This includes separating leisure trips from other trip purposes, both in numbers and character, and distinguishing between different leisure trip purposes. Also, it deals with the utility of denoting some trips mandatory, and the extent to which different types of trips are fixed in time and space.

### **Changed view on mandatory trips**

The division into mandatory and non-mandatory trip purposes used in travel survey analysis reflects a society where a work activity was more or less synonymous with a commuter trip. However, the digitalisation has brought this clear connection to an end as it has become more and more common to work from home. In the context of the COVID-19 pandemic, it became clear that it was possible to make drastic changes regarding work-related travel. Further, when restrictions were lifted, leisure trips returned to normal levels quicker than other types of trips (Beck & Hensher, 2020). This gives reason to reflect on which trips should be considered mandatory, if any. Working is a mandatory activity, but the trip to work is no longer mandatory to the extent it used to be. The share of employees working from home is high in Sweden, along with many other countries in northern and western Europe. In 2023, just over 40 percent of the employees in Sweden had the possibility to work from home, and a third of them worked from home more than half of the time (Ekberg & Beijron, 2024). Yet, this does not apply to all professions. There are big differences between blue-collar work, tied to specific locations, and white-collar work, with a greater possibility to work from home. At the same time, research during the pandemic has taught that trips to visit family and friends are very important for our well-being, and, in that sense, they should perhaps count as mandatory. Instead of assuming that a commuter trip sets the framework for a day's travel, it may as well be a leisure purpose that initiates a trip and determines that one works at the office on that specific day.

In terms of trip purposes in travel surveys, the term duty in the definitions of leisure is often translated into shopping and service trips, usually denoted non-mandatory trips. However, for grocery shopping, escort trips, and visits to healthcare it is not a clear-cut distinction, since these trips are often necessary, and some must also be performed at a specific time. On other occasions, shopping and service trips can be seen as discretionary instead, for example when shopping for fun. Further, e-commerce and online healthcare can sometimes replace trips, even when it is necessary to fulfil the purpose itself. Despite these ambiguities, overall, the division into mandatory and non-mandatory maintenance and discretionary trips is still useful in travel survey analysis, since it captures some fundamental differences between the different types of trip purposes, such as time and destination of many trips. However, one must be aware that there is no binary division but that the characteristics of the different groups overlap in terms of how mandatory or necessary they are. Finally, characteristics that describe temporal and spatial flexibility, or the lack thereof, can occasionally give better clues on how to understand the ability to travel in specific ways, for example whether public transport is a viable option or not.

Leisure trips are often seen as less fixed in time and space than, for example, trips to work and school. This is sometimes seen as a reason they should be easier to change. However, results from this thesis have revealed that this is not the case for all sorts of leisure trips. Instead, social trips to visit family and friends at their residence, to which a third of all scheduled non-work meetings are made, have fixed destinations (Tilahun & Levinson, 2017). And, as introduced above, work trips are not always fixed neither in time nor space. Many professions offer the possibility to work from home, or at a business hub, and flexible working hours are common. Further, leisure trips can also be fixed in time. This is for example common for trips to gym classes, concerts, etc. There are also leisure trips for which a dissolution of fixedness on the contrary can make it more difficult to reduce car use. Non-profit club activities, including organised sports, have since long had a strong position in Sweden, but are undergoing a transformation due to a shift from the common to the individual, which results in an increased interest in flexible, individual, and self-organised activities (Book et al., 2022). In practice, leisure trips become less fixed in time and space, which means poorer opportunities for carpooling and other coordinated trips. It also results in more dispersed destinations, which makes it more difficult to provide the trips by public transport, yet at the same time opens for easier shifts to other destinations. Due to this variation, focusing on whether trips have fixed times and/or destinations rather than on activity types can at times be more useful when describing travel behaviour, including if and how car use can be reduced (Doherty, 2006).

## **Distinguishing everyday leisure from holiday**

This thesis focuses on social and recreational leisure trips with an everyday character. When searching for literature in research databases, it became clear that one simple, yet crucial, circumstance that makes this demarcation difficult is that the word 'leisure' is used for long-distance holiday trips as well as for everyday social and recreational trips. This means finding the relevant literature becomes tricky since numerous research articles focus exclusively on holiday trips. Another complicating circumstance is that there is no dichotomy, but rather leisure trips constitute a spectrum ranging from short everyday leisure trips, through weekend trips and trips to visit family and friends at their holiday homes, to long-distance holiday trips. This has led to many different ways of structuring these trip purposes in travel surveys. In the Swedish national travel survey studied in this thesis, for example, holiday trips are reported separately and in the British national travel survey, there is a specific trip purpose for day trips as well as for trips to a holiday base. Once people have arrived at their holiday destinations, trips for all sorts of purposes can be performed on-site. In other travel surveys, for example, the app-based survey analysed in this thesis, there is no specific response option for holiday trips.

Given the above, there is reason to contemplate whether it is important to distinguish everyday leisure trips and holiday trips and, in that case, to decide upon the boundary between them. Should the distance be decisive? Or the trip duration? Or how often one performs such a trip? Or does it have to do with whether one spends the night at a temporary accommodation? That the boundary is unclear was highlighted by the fact that the interviewees reported on certain types of trips with an overnight stay despite having received other instructions, especially for trips to holiday homes and when spending the night at friends or relatives. A reason this boundary is yet important is because previous research has shown that people are less concerned about sustainability when travelling for weekend and holiday trips (Barr et al., 2010), and thus different measures are needed to address the different types of leisure trips. However, considering how imprecise the boundary is and that it can be difficult for people to decide whether the trip they have made should count as an everyday leisure trip or a holiday trip, it seems reasonable to stick to the labels social trips and different types of recreational trips in travel surveys. Nuancing these trip purposes instead of adding holiday trips as a response option is worth considering, as well as collecting data about long-distance holiday trips in separate surveys. When analysing the data, though, one must be aware that the response options include both shorter and longer leisure trips, with and without overnight stays.



## **A mix of social and recreational purposes**

Another challenge in setting boundaries is how to distinguish between leisure trip purposes such as social trips on the one hand and different recreational trips on the other. Separating between purposes with different character is important since it gives clues on how to address such trips in transport policy measures to reduce car use. However, working with this thesis has taught that it is not easy to find one single purpose of a leisure trip, but that often a complex mix of several purposes lies behind the choices. For leisure trips, there is often more than one purpose, and they are often initiated by a mix of social and recreational activities. For example, in addition to a recreational activity such as going to a restaurant, another purpose can be to meet friends, in which case it is not clear whether the visit to the restaurant is most important or if meeting friends is. In the latter case, the destination can more easily be changed to another restaurant. Further, it is sometimes difficult to distinguish if we travel to a specific destination or just for a certain activity. Doherty (2006) has raised the idea to reconsider the usefulness of traditional activity types in the understanding of travel behaviour. Instead, more salient attributes may better describe complex travel behaviour. Such attributes included in his analyses were frequency, duration, involved persons, travel time, spatial flexibility, temporal flexibility, and interpersonal flexibility.

The lack of one single purpose for a leisure trip is particularly a problem when measuring and categorising leisure trips in travel surveys. It is difficult for the respondents to know the exact definition of the trip purposes they can choose from. Especially for leisure trips, the respondents often specify “other” as trip purpose, which was illustrated in Paper 5. This means such trips are trickier than, for example, trips to work and school to label. Also, it is usually only possible to choose one trip purpose, which makes it difficult to answer travel surveys since there is often more than one purpose to a leisure trip (Axhausen, 2008). This is important because it results in leisure trips being underestimated in travel surveys. Also, less information about the character of leisure trips means poorer possibilities to understand and affect destination and mode choice.

## **Insights into mode choice behaviour**

The second research question explored factors that affect mode choice for leisure trips and how the importance of such factors varies between groups. Overall, many factors speak in favour of the car, which is a challenge when aiming for a reduction of car use. However, knowledge about how factors matter for leisure trips in specific ways can point to opportunities for change.

## The highly valued flexibility

The thesis has revealed that flexibility is very important for leisure trips, and much more so than for many other trip purposes. This includes both trips to activities and the activities themselves, which move towards more flexible and individual forms instead of organised non-profit club activities (Book et al., 2022). One wants to be able to do whatever one wants, wherever one wants, and to go there whenever one wants. Being flexible is strongly linked to a sense of freedom, and both factors are highly valued by people doing leisure trips. However, some of the interviewees stated that it is more a question of knowing that extensive flexibility is possible than being able to go by car at any time. This implies that the flexibility of the car is not a crucial factor for each and every trip. Rather, it can be seen as a much wanted "option value" (Geurs & van Wee, 2004). Similar results were found for accessibility in Haugen (2012), showing that even though people find proximity to amenities very important, they do not necessarily choose the nearest option available when doing activities. How can then the feeling of wanting flexibility without having to choose the car every time be dealt with? Or put in other words: What can make it enough to have the car as an available option, but still choose other ways of travelling more often?

One way is to highlight the flexibility of the alternatives. Travelling by foot, bicycle, electric scooter, and public transport is often flexible too. In fact, many of the interviewees already found the bicycle to be the most flexible transport mode of all. Similar results were found in a study by Bissel and Becker (2024), where cargo bike sharing users rated cargo bikes superior to cars on flexibility. Further, being able to bring bicycles on the train is valuable, a service that is sometimes difficult to offer, especially during rush hour, but nevertheless important to increase the flexibility of multimodal trips.

Apart from being able to go wherever and whenever one wants, it is important for people to be able to make unplanned stops along the way and to change the route of the trip. In this context, the ability to have different origins and destinations for public transport trips is another type of flexibility to make more apparent to travellers. Also, knowing about the alternatives gives a better understanding of the flexibility of public transport, which was highlighted by the interviewees. The informed traveller can make better use of the different options that the public transport system offers.

Finally, it is important to remember that far from all leisure trips need to be flexible. For many activities, both times and destinations are fixed. For these trips, the "option value" flexibility does not need to be redeemed. If people choose to break car habits and travel by other transport modes for these trips, either through intrinsic motivation or through policy measures that evoke extrinsic motivation, much would be gained.

## The desire to make leisure trips not decisive

When exploring how factors that affect mode choice for leisure trips vary between groups, leisure travel behaviour for car-oriented and non-car-oriented segments were also compared. One interesting result from these analyses is that car-oriented and non-car-oriented segments make leisure trips to a similar extent, even though they use different transport modes to get to their destinations. The two groups also have a similar distribution of kilometres travelled for different leisure trip purposes and the share of trips performed on weekends is the same. Thus, the desire or need to make leisure trips is the same in the two groups. Spatial, sociodemographic, and socioeconomic characteristics explain some of the differences, but not all. Understanding other reasons for choosing the car is thus important. For leisure trips, for example, studying whether those who choose the car have greater need for flexibility, or if it is more a matter of different perceptions of which transport modes are flexible, can give important insights. A study by Thorhauge et al. (2020) gives interesting input to this question. First of all, the study confirms that travellers find both the car and the bicycle to be positively associated with flexibility. Their results further show that not only activity pattern complexity and temporal, spatial, social, and compulsory constraints but also perceived mobility necessities affect mode choice, and that perceived mobility necessities are positively correlated to both activity pattern complexity and constraints. The construct of perceived mobility necessities was introduced by Haustein and Hunecke (2007) as an extension of the Theory of Planned Behaviour (TPB) to directly account for perceived constraints of mobility-related consequences of the personal living situation, since the construct of perceived behavioural control mainly focuses on transport-related constraints. The addition improved the model fit when added as a predictor for transport mode choice. This confirms that personal living circumstances affect the need for flexibility.

## Implications for car-reducing measures

The third research question concerned how everyday leisure trip characteristics, in terms of both the extent and the diversity of such trips, can guide car-reducing measures. This question, obviously, is very broad as was the approach when investigating it in the thesis. It encompasses individual and household characteristics as well as trip characteristics.

## Match public transport supply with leisure travel needs

Everyday leisure trips are made throughout the day but compared to commuter trips there is no morning peak on weekdays and the afternoon peak starts later. This means many leisure trips take place at times when there is available capacity in the public transport system. At these times, leisure travellers can make trips without suffering from crowded buses, trams, and trains, a circumstance that many find aggravating, as was illustrated both in Paper 2 and in previous research (Börjesson & Rubensson, 2019; Haywood et al., 2017). Further, outside peak hours there is more room for carrying luggage on vehicles, also demonstrated in the thesis as a factor affecting the perceived feasibility to travel by public transport. Finally, if leisure travellers are attracted to public transport at off-peak hours, it does not only mean they get a comfortable trip without crowding but also that the public transport system can be used more efficiently. Since no additional vehicles are required, service improvements during off-peak hours can be a cost-effective option for attracting new travellers (Hansson et al., 2022).

Many leisure trips also take place during the weekends. Then, as well as later in the evenings, there is indeed available capacity, but at the same time, the public transport supply is normally less frequent. Therefore, it is important to pay attention to whether the supply matches the needs of leisure travellers in terms of departure times and destinations. Also, as demonstrated in a study of regional public transport by Hansson et al. (2022), making the service available with regular departures throughout the day increases patronage, not only in off-peak hours when the supply is improved but also during peak hours. The authors hypothesise that this is explained by increased flexibility for the passengers in terms of departure time options, and a sense of security when not knowing exactly when to make the return trip. An additional hypothesis is that regular departure times also increase the possibility to make leisure activities at off-peak hours.

The fact that the afternoon peak for leisure trips lasts longer into the evening raises concern about the perceived security of travellers. At times when it is dark and fewer people are on the move many feel insecure, which was for example highlighted in the interviews as one of the reasons people chose not to travel by active modes or public transport. Therefore, it is even more important to put an effort into creating secure environments on pedestrian walkways, bicycle paths, and public transport stops close to leisure destinations.

The dispersed destinations of everyday leisure trips are sometimes, for good reasons, highlighted as an explanation for having difficulties supplying them with public transport. Many leisure trips indeed take place to distant locations, in which case regular public transport service is not a good option. In recent research, much attention has

been paid to Demand Responsive Transport (DRT), as a means of offering public transport to less frequently visited destinations, and therefore a good option for some types of everyday leisure trips (Alonso-González et al., 2018; Zhao et al., 2024). However, far from all leisure trips have distant destinations. Many activities instead take place at, for example, city centres, highly frequented sports events, or concerts, in which case regular public transport is a good option. Also, many leisure trips are short, and for these trips travelling by foot or bicycle is a reasonable option for many. These types of destinations were mentioned by the interviewees as trips for which a reduction of car use would be possible.

Further, the destinations for social and recreational trips are far from always set in stone, and thus there is a possibility to change the destination to a similar one if there is motivation to do so. This was for example shown during the pandemic, when people chose to perform activities at new destinations to avoid crowding or to meet with friends and family outdoors, as was demonstrated in Paper 4. These results are in line with a study of Book et al. (2022) showing that respondents adapted to the pandemic by moving their sports activities outdoors. However, for such changes to happen on a larger scale, a change in social norms and/or incentives to reduce car use, such as increased fuel prices or parking fees, is needed in addition to the growing awareness of the need to act upon the climate crisis (Gössling et al., 2020).

### **Replace using the car to carry and store things**

Another distinguishing characteristic of leisure trips is that such trips often imply the transport of luggage or various equipment for the activities to be performed. Sports gear such as hockey equipment, skis, and mountain bikes, excursion accessories such as lunch, sunbeds and bath toys, pets, etc. The list goes on. Of course, this does not apply to all leisure trips, but for many trips solutions for carrying luggage are needed. For example, some of the interviewees mentioned cargo bikes as a possible alternative. Thus, by offering easier access to cargo bikes when needed, for example through cargo bike sharing services, some of the problems with carrying luggage can be fixed. In addition to bringing luggage from home, using a cargo bike would also enable the appreciated possibility of spontaneously buying things and directly bringing them home, instead of waiting for home delivery.

Often only smaller items of luggage are brought. However, as shown in Paper 2, people find it a burden to carry more than just a bag or a backpack when travelling by public transport. It is not only perceived as a burden for themselves, but also for others who must wait for them when bringing the luggage on the bus or train and give room for it onboard. The solution to this problem is twofold: On the one hand, there is a need for

better possibilities to bring luggage on public transport, and on the other hand, there is reason to work on changing prevailing norms regarding how much is reasonable to carry onboard a bus or train. At times, solutions for storing luggage while doing activities are also needed. Again, the car comes in handy. To challenge the car, it is important to remember that alternatives for carrying and storing luggage are needed.

### **Joint and social trips a delicate problem**

One of the most striking characteristics that makes leisure trips differ from other trip purposes is its joint character. It is both common to travel with others on leisure trips and to meet others for social events. In both cases, more than one person affects the trip: what to do, when and where to go, and how to get there. In some cases, this means the car is both convenient and sometimes necessary, due to capability constraints for one or more of the involved persons. At other times, there are no such definite limitations, but nevertheless circumstances make other transport modes less attractive. For example, travelling by public transport is not considered priceworthy when travelling many together, a difference that can be perceived as even greater for those who travel by electric vehicles. This is, however, not a strict constraint but something that can be affected by public transport planners. In some regions, there are already price reductions for joint travel. If not, this is a measure that can be used to attract more groups of travellers.

Perceived pressure from others is another factor that can affect how we travel for leisure. Such pressure can work both towards less car use and more car use. It can be exercised by significant others, such as friends and family, through injunctive norms, or by beliefs about how other people actually behave, so-called descriptive norms. The negative of such norms is when people choose to travel by car since important others or people in general do so. On a positive note, the pressure can also work the other way around. Friends and family may argue the merits of other transport modes. Also, noting that many others travel sustainably can be inspiring.

Social trips were among the trip purposes most commonly mentioned as difficult to give up in the interviews. The interviewees expressed thoughts about how some trips were perceived as more necessary than others, and that a decrease in non-necessary trips would be easier. Among the “necessary” leisure trips, social activities and recreational activities that give an added value to life were those who would be the hardest to give up. A proof that social trips are challenging to influence is that for such trips the car is often used also among those who do not otherwise travel by car (Lagrell & Gil Solá, 2021; Van Eeno et al., 2022). This can have many explanations: the strong desire for flexibility, carrying luggage, fixed destinations, the timing with many trips on evenings

and weekends, the joint character of social trips, etc. Further, social trips are very important for our well-being. In all, this means such trips may be among the hardest to affect. When planning measures to reduce car use for social trips it is thus important to consider their strong value, and at the same time recognise that such trips stand for many kilometres and must also be addressed. Even though it is not possible to switch the car for other transport modes for all social trips, some trips can be changed without too much effort. Also, it is the activities that will be missed, and not travelling in itself, which means in some cases it would be possible to perform the same activity at, for example, another place and thereby make it possible to choose another transport mode than the car.

### **Climate efficiency potential**

There are many aspects of climate efficiency potential when it comes to reducing car use for leisure trips. First, there is the magnitude. Two thirds of the kilometres travelled in Sweden are made by car of which one third is for everyday leisure purposes. This calls for targeting such trips, even though they are important for our well-being. Further, many leisure trips are short. About one third of the social and recreational trips by car are shorter than 5 kilometres. Travelling by bicycle could thus be a plausible option for many. However, the majority of passenger kilometres stem from longer trips. In fact, the longest distance class studied in Paper 1, trips that are 100 kilometres or longer, stands for as much as 40 percent of the distances travelled by car for leisure purposes. Instead looking at the vehicle mileage, which is more directly linked to greenhouse gas emissions, this number is reduced, since many travel together on longer leisure trips, on average 1.7 persons on trips shorter than 5 kilometres compared to 2.3 persons on trips that are 100 kilometres or longer. Thus, joint travel reduces the relative climate impact compared to public transport. Therefore, it is more important to address the trips with fewer persons in the car than the trips when many already travel together.

In addition to understanding potential from the perspective of magnitude of kilometres and emissions that can possibly be reduced, change must happen for this potential to be realised. In Paper 2, two dimensions that affect the potential for realisation were studied: willingness to change and perception of feasibility. Different measures are needed depending on how people score on these dimensions. For some, willingness to change and perception of feasibility are in line with each other, which results in either perceiving it as fairly easy or almost impossible to reduce car use for leisure trips. For the rest, there is a contradiction between the two dimensions, which results in a need for different types of motivation. Of these, the group that stands out as most difficult to affect is the one that is not willing to change despite not expressing much concern

about the feasibility. In this group, not only the instrumental function of the car but also symbolic and affective functions are highly valued (Steg, 2005). Further, this group is influenced by descriptive norms, how they perceive that people in general actually travel. Taken together, this means that for change to happen in this group extrinsic motivation is needed through major changes in external conditions. Such changes can either be made through significant improvements in alternative transport modes or by making it much more troublesome and/or expensive to travel by car. For example, a doubling of fuel prices was mentioned by the interviewees.

When changing behaviour, spillover effects can help the work and increase the potential for reductions. Previous research has shown that people who regularly use the car for commuting also more often travel by car for leisure purposes (Prillwitz & Barr, 2011). According to Tomasdotter et al. (2023), this suggests that measures aimed at reducing car use for commuting, such as requiring companies to establish travel plans for their employees, may have spillover effects on leisure trips, meaning car use for such trips is also reduced. Spillover effects can thus help accelerate behaviour change. Another type of spillover effect possible is from trips where behaviour change is easier, for example, short trips, trips to city centres, and trips to events, to other types of leisure trips.

A final aspect is how to correctly estimate the climate efficiency potential for leisure trips. In travel surveys, information about the number of persons in the car, needed to convert passenger mileage to vehicle mileage, is often missing. This means calculations need to be based on standard values instead of values from a specific survey. Further, difficulties in making clear distinctions between trip purposes affect our understanding of the magnitude of leisure trips. In Paper 3, it became obvious that the way the data from the app-based survey was analysed, trips to restaurants and cafés were much more common than in the data from the Swedish national travel survey. This has to do with the automatic registration of a new trip purpose every time there is a stop and affects the distribution of kilometres travelled over trip purposes. It is especially a challenge on longer car trips when stops that are related to the trip itself and not to the final destination are necessary, for example, to fuel up the car or have a coffee.





# Conclusions

The aim of this thesis was to contribute to the understanding of everyday leisure travel for social and recreational purposes by describing and problematising car use for such trips. Based on a synthesis of the results in five research papers, this thesis answers three research questions: (1) How can everyday leisure trips be defined and measured?, (2) What factors affect mode choice for everyday leisure trips and how, and (3) How can everyday leisure trip characteristics guide car-reducing measures? The main conclusions of the thesis are presented below.

For leisure travel, there is often more than one purpose, which makes it difficult to know whether a trip is initiated by the people we meet, the place we travel to, or the activity itself. A better understanding of the true purpose of a leisure trip would ease finding measures to reduce car use. App-based travel surveys are a useful tool when measuring travel behaviour, but this thesis has shown that there is room for improvement regarding the classification of different leisure trip purposes.

The joint character of leisure trips and the fact that many leisure trips are for social activities have implications for the possibility of finding acceptable car-reducing measures. Different needs in the group of travellers, fixed destinations due to visiting family and friends, and the fact that social trips are important for our well-being all make it a challenging task. More effort should therefore be put into targeting trips when fewer people travel together, for which the climate efficiency potential is also greater.

Flexibility is highly valued when travelling for leisure purposes, including for times, destinations, and the need to carry and store luggage. Although the car is often seen as the most flexible transport mode, both cycling and travelling by public transport are also attributed many advantages. Making the flexibility of other transport modes more apparent is thus important to attract more people to make a switch away from the car.

Willingness to change and perception of feasibility are two dimensions that affect the possibility of reducing car use for everyday leisure trips. Depending on how high or low people score on the two dimensions, different types of measures are needed for change to happen. Thus, a variety of measures aimed at different segments of the population should be implemented, some focusing on solving practical hindrances and others focusing on changing attitudes and norms.

The conclusions above have demonstrated that, due to the varying characteristics of everyday leisure trips and leisure travellers, there is no “one size fits all” solution when finding measures to reduce car use for leisure trips. Instead, a variety of measures is needed to be relevant and effective for different leisure trip purposes and groups of travellers. Further, due to the importance of leisure trips for our well-being, changes must be made with consideration and for some trip purposes, less change might have to suffice. It is important to stress that it is not a question of “all or nothing”, in terms of never travelling by car again. Especially for the larger groups that account for many car kilometres without being high emitters, changing transport mode for some trips will also add up to a significant change. Most travellers are already multimodal, so what this means is choosing to walk, bike, or travel by public transport on another couple of trips, and maybe even skip a trip every now and then. In this way, it is possible to both contribute to mitigating climate change and still be able to enjoy the benefits of the car, for example in terms of its flexibility, when most needed.

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Department of Technology and Society  
Faculty of Engineering  
Lund University  
ISBN 978-91-8104-376-1  
ISSN 1653-1930

