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Take a hike: Spatializing *allemannsretten* and transportation accessibility for outdoor recreation in the Greater Stavanger Region, Norway

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ABSTRACT

A special connection between people and their environment is legally recognized in Norway as *Allemannsretten*, the right to enjoy a large part of Norwegian nature. Scholarship on leisure mobility, spatial planning, and transport geography recognizes the intrinsic value of this spatial connection. As people travel for outdoor recreation, equitable access to recreation is a goal for just transport systems and must be achieved as these systems are digitalized and electrified for low-carbon transitions. The aim of the article is to identify the impact of transportation accessibility on outdoor recreation habits in the Greater Stavanger Region, Norway's third-largest metropolitan region. With car-centric development since the 1970s and ambitious automobility-reduction targets, transportation accessibility for outdoor recreation is a key indicator of challenges to overcome in mobility transitions, yet features marginally in public debate. In focusing on popular outdoor day trips and based on multisited interviews with both car owners and non-owners, the authors identify oversights in accessibility, spatializing the issue of local destinations in relation to urban transport transition. They conclude that policymakers must address specific gaps to make transport systems desirable and inclusive, and that a spatial lens can be used to problematize and advance just low-carbon transitions.

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Introduction: *allemannsretten*, an urban climate plan, and access to the great outdoors

The institution of *allemannsretten* – everyone's right to roam and enjoy a large part of Norwegian nature – is deeply rooted in Nordic culture, as highlighted by the fact that most Nordic countries have laws relating to every person's right to access nature (Boman et al. 2013); in this context, nature is defined as uncultivated land that people are free to roam and enjoy recreationally. In Norway, the legal right to roam has been safeguarded for over 65 years following the enactment of the Outdoor Recreation Act of 1957, which recognizes the natural bias towards outdoor recreation and protects the right to access and spend time in the rich natural environment (Ministry of Climate and Environment 1957). As people are moving further away from nature and into expanding urban settings, it is more important than ever to ensure that nature is accessible to all who wish to experience it (Cox et al. 2017). While the value of urban green spaces is undeniable, many outdoor enthusiasts desire more variety in the landscapes they visit, as well as clear separation between their everyday life in an urban dwelling and the unfettered environment that can be found outside city limits (Boman et al. 2013). Studies show that contact with nature impacts health in the areas of physical activity, stress reduction, and social cohesion (Hartig et al. 2014; Venter et al. 2021). The outdoor environment can influence how physically active people are and in what activities they engage. Nature has the ability to provide an escape from daily stressors and offer restorative qualities such as picturesque scenery and feelings of openness and freedom. A hiker in Scandinavia will find that social interactions are at an all-time high, as

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people greet each other on the trails, especially when compared to exchanges in urban settings.

One of the most important goals of urban planning is providing a high level of livability and ensuring that inhabitants have all their needs met within a close vicinity or places otherwise easily accessible. The scale at which spatial connections are studied is important, as in more densely populated cities spatial relations may be better studied at a neighborhood level, whereas studies of cities that are less densely populated and more spread out may benefit from the employment of a regional scale during research (De Jong & Ottens 1997; Stessens et al. 2017). Stavanger, which is recognized as a medium-sized European city, is the third largest urban area in Norway, and the city is the fourth most populated in the country. The Greater Stavanger Region comprises 13 municipalities, including Stavanger, Sandnes, Strand, Sola, and Randaberg. Compared to Nordic capital cities such as Oslo or Stockholm, Stavanger city center is not as densely populated, and the region's inhabitants are spread out in more rural areas. Citizens regularly move around between the different municipalities, tending to live in the smaller municipalities but working in Stavanger city center and the technology corridor stretching between Stavanger and Sandnes, including Norway's largest industrial park, Forus. Thus, for this case study, it is logical to consider a regional perspective instead of just one municipality or the city center of Stavanger.

The Greater Stavanger Region is located on Norway's southwest coast and offers a bevy of outdoor recreation activities and destinations located within 100 km of Stavanger city center. The region is well known among Norwegians and tourists for its year-round activities, including hiking, skiing, climbing, and surfing, which makes it an ideal location to gather information regarding transportation accessibility and outdoor recreation. Research shows that climate change is impacting access to these activities in diverse locations (Rauken & Kelman 2012), with increasing seasonal variation (Pröbstl-Haider et al. 2021) and scope for adaptation in proximity to cities (Lopes et al. 2022), and hence an understanding of access to outdoor activities is particularly timely given the risk of near-future changes. The city of Stavanger also serves as Norway's energy capital and has ambitious goals to be a leader in smart city development, thus making it a suitable focal point. In 2016, the city created a Smart-City Roadmap that recognized the need for better infrastructure and efficient mobility solutions. Between 2015 and 2020, Stavanger was part of "Triangulum" alongside Manchester and Eindhoven, a project that aimed to deploy smart city solutions that would integrate energy, mobility, and information and communication technologies (ICT) in city districts in order to reduce energy use and greenhouse gas emissions while enhancing the quality of life for residents and promoting economic development (Stavanger kommune n.d.). Stavanger aspires to reduce greenhouse gas emissions by 80% by 2030 compared to 2015 levels and aspires to be free of fossil fuel use by 2040 (Stavanger kommune 2018). As noted in the Climate and Environmental Plan 2018–2030 (Stavanger kommune 2018), Stavanger also intends to make it easier to perform everyday errands without cars, and to facilitate better public transportation services within the region.

Transportation is one of the top priorities highlighted in Stavanger's Climate and Environmental Plan 2018–2030. In 2018, it was found that c.52% of the city's greenhouse gas emissions were caused by road traffic (Stavanger kommune 2018, 13). Objectives for transport include cutting direct emissions entirely from the region's transport sector by 2040 and increasing passenger transport by foot, bicycle, and public transportation methods to 70% of all passenger journeys by 2030 (Stavanger kommune 2018, 16). However, there is no explicit mention in the Climate and Environmental Plan 2018–2030 of making the transportation services more inclusive for all users; indeed, the plan treats all users as an undifferentiated mass at a higher level of aggregation. The plan highlights incentives for owners of zero-emission cars, including free and reduced tolls, and better charging opportunities for electric cars. While the city acknowledges a need to facilitate and maintain more pedestrian and cycling routes, it does not recognize where that need comes from, nor does it identify the citizens who would benefit most from the services. The Climate and Environmental Plan 2018–2030 plan does not differentiate between the opportunities of car owners and non-car owners in their ability to travel, perform everyday chores, and engage in activities that are not directly related to weekday employment and education responsibilities. Minimal attention is given to movements that occur during evening or weekend hours, or to the accommodation of, for example, last-mile services and better incorporation of micro-mobility methods, which are becoming more common in daily transport practices. However, the plan does note that Kolumbus, the main public transport provider for Rogaland County (and whose administrative center is Stavanger), is committed to making transportation without a car seamless, but no roadmap is provided for how either the municipality or company plans to achieve this goal.

The aim of this is study is to identify the impact of transportation accessibility on outdoor recreation habits

in the Greater Stavanger Region through the analysis of spatial relationships between urban residents, nearby nature-based recreation destinations, and the modes of transport that allow people to reach these locations. We employ the empirical data to examine what improvements could be implemented in the public transportation system in order to provide greater ease of access to popular outdoor recreation destinations for residents, especially those without cars, for a more just transition from private vehicle usage to public transportation and active mobility.

In the next section we explore existing literature on nature-based leisure activities and transport accessibility to contextualize our study of the Greater Stavanger Region. We also draw on interviews with local Stavanger citizens regarding outdoor transportation patterns and convenience. The interview process and theoretical framework are subsequently elaborated within the methodology and methods section. Thereafter, we present our empirical analysis, which includes both descriptive findings and our interpretation of the wider significance of the case study. A more abstract discussion follows, featuring generalized implications with regard to equitable access to identified recreational locations and goals for just transport systems within the larger picture of decarbonization. Finally, we present our main conclusions and suggest steps forward for the addition of more inclusive transportation methods in the Greater Stavanger Region in relation to Stavanger's ambition to become a leading smart city while still retaining the Norwegian connection to nature.

Literature review: equitable access to peri-urban nature destinations

When looking at the future of transportation systems, the leisure travel practices of residents are often overshadowed by their typical weekday intra-urban commutes or long-distance travel holiday patterns. Leisure trips are paradoxical in the sense that they are a societal practice but inherently dependent on the subjective values and lifestyles of individuals. To create inclusive and holistic transportation systems and infrastructure that support more than just employment and education needs, it is essential to understand how people move around within their communities and local surroundings, as well as the activities they participate in during their personal time. Furthermore, with the increase in outdoor activities, especially in the wake of the COVID-19 pandemic (Venter et al. 2021), there is an emergent need to foreground access to nature in transport studies and systems.

Transportation services and mobility routines combine greater social practices with individual ways of living. During an interview with Benjamin Sovacool in 2016, geography professor Matt Watson stated: "Practices sit at the center of it all, and what happens in terms of rhythms, routines, and recursive reactions has significant implications for the system as a whole" (Sovacool & Hess 2017, 712). However, focusing only on societal norms means that people who do not fall into the majority will inevitably be left out and will fail to benefit from services that are meant to serve the outliers just as much as those who do fall within the normative behavior patterns (Giddens 1991; Mouzelis 1993; Sovacool & Hess 2017). To plan and implement efficient public transportation services, individual needs must be given equal weight to communal needs. By analyzing the individual within a transportation scenario, it will become apparent that not everyone has the same mobility needs and that a robust public transportation system is required to provide services that prioritize individual necessities just as much as communal patterns. In line with identifying societal and individual transport patterns, this study is situated between two fields of transportation research: (1) local, nature-based leisure travel motivations and benefits; and (2) equitable accessibility for recreational pursuits in urban planning.

The discussion relating to urban dwellers and their access to green space often unfolds at a scale focused on neighborhood settings with an emphasis on pedestrian accessibility. Within the context of this article, green spaces are distinct from outdoor recreation destinations: green spaces are public park settings or spaces for people to relax, gather, and hold community events within their neighborhood; by contrast, outdoor recreation destinations are used for outdoor sport activities, including hiking, camping, climbing, cycling, and surfing. Furthermore, the spaces that exist either on or further away from the city limits also provide important benefits for urban residents.

Recreational and nature-based tourism is an important cultural ecosystem service that provides non-material benefits such as cognitive development, feelings of belonging, physical well-being, and cultural connections (Arnaiz-Schmitz et al. 2021). Furthermore, the social-ecological relationships that people cultivate with their local environments can impact an individual's sense of self, their process of self-realization, and their relationship with their larger community (Næss 1987; 1993), which further emphasizes the need to study patterns of leisure activities at a local level. Building upon the importance of culture in urban planning, studies conducted in Nordic countries have found that the

majority of the residents frequent forests, nature reserves, wetlands, lakes, and other peri-urban green spaces and that they acknowledge the high social value of incorporating these spaces into urban planning structures (Venter et al. 2021; Elbakidze et al. 2022).

Peri-urban spaces, where the urban and rural spaces intersect, often provide intangible landscape values, including unique ecological aesthetics and recreational opportunities for urban residents within a reasonable distance from greater metropolitan areas (Vejre et al. 2010). These opportunities matter to urban residents and contribute to their preferences for landscapes and leisure activities, as exhibited in studies that utilized participatory plotting to identify place values from residents (Brown & Eckold 2020) and spatial mapping techniques, including GIS (Venter et al. 2021). For instance, a study conducted in 2003 focusing on visitation to woodland areas 10 km outside Helsinki, Finland, found that over 80% of respondents felt that green areas made a 'very important contribution to the quality of the environment' and provided benefits including outdoor recreation, contact with nature, and mental health support (Tyrväinen et al. 2007). Additionally, the responses reflected that natural green areas with local wildlife were more appreciated than specially designed and constructed neighborhood parks, as they allowed for greater opportunities for activity and aesthetic value along with a feeling of freedom and space. The annual Swedish national travel survey (*nationella resvane-undersökningen*, RVU Sweden), collects data on trip characteristics, including trip purpose, mode of transport, and distance, as well information about the travelers. Between 2011 and 2016, outdoor recreational trips accounted for 6% of total passenger milage inclusive of all modes of transport for respondents. For people who utilized private vehicles, outdoor recreational trips covered an distance of 12.8 km on weekdays, while that average increased to 22.5 km at weekends. When determining the transport mode share for exercise and outdoor recreation trips, private cars made up 60% of the transport mode share for exercise and outdoor recreation trips, walking accounted for 21%, and public transport was only utilized for 10% of the travel. Some identified causes for these percentages were cost, schedule, and household characteristics (Strömblad et al. 2022).

The relationship between urban residents and their local environments was further supported during the COVID-19 pandemic and associated lockdowns. In Oslo, it was found that peri-urban forests had a sharp increase in mobility: prior to the lockdowns in Oslo in March 2020, forest spaces on the perimeter of the city accounted for 9% of visits by those using the Strava app for smart phones and other smart devices in the area; following the lockdowns, the use of the forest spaces increased to 23% of recreational activity (Venter et al. 2021). During the pandemic, the forests outside the city not only offered cultural and aesthetic value, but also acted as a green haven wherein people felt they could escape the spread of the virus. Considering the incalculable benefits that peri-urban spaces provide, it is essential to ensure that people have the ability to visit them when deemed necessary.

The topic of accessibility is broad and can be studied and interpreted in myriad perspectives; accessibility is often measured through land-use, transportation, and temporal constraints, and the individual component. Land-use accessibility examines the occurrence and spatial distribution of opportunities within an identified area. Transportation accessibility focuses on how individuals travel between destinations utilizing various modes of transport and assessing the utility of each method. Temporal accessibility investigates the availability of opportunities based on time dependencies. Individual components consider the traits that influence a person's needs, abilities, and opportunities, which may influence their capacity to access different modes of transport (Geurs & van Wee 2004). The above-described approaches to accessibility deliver high-level, quantifiable findings that do not necessarily account for the out-of-rhythm needs that people experience.

Swedish geographer Torsten Hägerstrand's space-time framework examines accessibility from the viewpoint of the individual while simultaneously incorporating spatial and temporal constraints within the individual's life-path. He states that under normal circumstances, people are bound to their communities but that "the car-owner, because of his random access to transport, has a much greater freedom to combine distant bundles than the person who has to walk or travel by public transportation" (Hägerstrand 1970, 15). The personal car has drastically changed the perception of transportation in fundamental spatial and temporal workings. Pot et al. (2021, 2) define perceived accessibility as the "potential to participate in spatially dispersed opportunities." While numerical data may suggest that transport opportunities are abundant and convenient, the experiences and perceptions of the users may not always align findings that are suggested by calculatable metrics. When people have experienced transportation by private vehicle, which often involves a direct trajectory utilizing the shortest time, other modes of transport can be experienced or seen as cumbersome and inefficient.

The local built environment can have a substantial impact on how people access nearby peri-urban spaces

and recreation activities. A study focusing on car dependency in the Greater Oslo Region and Greater Stavanger Region found that the desire to engage in outdoor recreation activities "often induces activity patterns leading to car-dependency among households who would otherwise be able to carry out their activities without car travel" (Cao et al. 2019). Furthermore, the same study found, for both regions, a causal relationship between the increase in car ownership and the further away residents were living from the city center. Thus, transport infrastructure tends to contribute to the perception that a personal vehicle is necessary to reach spaces further outside urban areas.

It is important to acknowledge that people who live in urban areas want to explore and recreate outside their neighborhood boundaries. Furthermore, as societies strive to increase accessibility while lowering their climate impacts, incorporating more solutions that encourage people to travel locally and utilize low-carbon public transport will be essential to enable low-carbon transport energy transitions.

Methodology and methods: case background, data collection, and scope of study

We take a practical approach to outdoor recreation travel. In this approach, mobility is a daily practice, which includes both commuting and leisure travel. Within mobility studies and structures, the former is given priority over the latter, creating systems that are skewed towards weekday business-hour activities and leaving practices involving local leisure transport largely overlooked (Ettema & Schwanen 2012). In this article, we apply a corrective emphasis by focusing on leisure travel. Specifically, we examine outdoor recreation travel for day-trip leisure tourism in the Greater Stavanger Region.

The study context

The Greater Stavanger Region has a mix of urban green spaces and peri-urban natural environment locations that make it an ideal area to study transportation patterns of urbanites in relation to outdoor recreation. It is also a popular destination for tourists who want to experience nature, which provides an additional layer to examine how services that are geared towards locals differ from transportation services aimed at people on holiday. The region's main public transport provider, Kolumbus, operates buses, trains, and ferries throughout the 13 municipalities. As within many cities, the hub of these public transportation services is the city center and other relatively densely populated areas. With increasing distance from the city center, the bus routes become more irregular, both in schedule and physical availability, with users having to travel longer distances to reach a bus stop that is serviced with less frequency than in populous areas. This is reflected in the massive car dependence in Rogaland County, where in 2019 (i.e. prior to the COVID-19 pandemic), total car trips comprised 2744 million km compared to 3344 million km across all modes of transport (in 2021, these increased to 2783 and 3403 million km respectively) (Statistisk sentralbyrå n.d.).

Spatially, existing transport routes feature some clear gaps in access to several popular destinations by public transport. These include the beaches south of Stavanger city, the county arboretum, and popular hiking destinations for leisure day-trips. In a commissioned survey,[1] Kolumbus found that for trips indicative of leisure travel (i.e. outside regular commutes), only 5% of respondents (in a representative sample with n = 2804) used buses 5–7 times weekly, only 5% used them 3–4 times weekly, and only 14% used them 1–2 times weekly; this was a shockingly low level of usage given that less than 25% of the population used the most basic form of public transport for their non-commute trips on a weekly basis . By contrast, the corresponding figures for car use for non-commuter trips were 30% (5–7 times per week), 25% (3–4 times per week) and 22% (1–2 times per week), amounting to 77% in total.

Extant literature cautions that historical urban planning processes and infrastructural path dependency has led to Stavanger having a car-centric layout in terms of its spatial morphology (e.g. Haarstad & Oseland 2017). Despite ambitious efforts to invest in and promote active and public transport modes, there is evidence that much of Stavanger's urban transport transition efforts do not extend to challenging the dominance of automobility as a core tenet of the system (Haarstad et al. 2022). These established trends have led us to focus on the split between car and non-car users, where our application to day-time leisure travel is a novel contribution related to this case. Indicatively, for Stavanger Municipality, in 2019 (i.e. the year prior to the COVID-19 pandemic), of an average of 3.1 person trips per day, 24% were on foot, 9% by bicycle, and 54% by car (of which the driver accounted for 45%), while only 12% used public transport (bus or local train) and 1% was unknown (Stavanger kommune 2023, 40). The corresponding percentages for

[1]The unpublished report, 'Befolkningsundersøkelse for Kolumbus 2022', was produced for Kolumbus by Opinion, Norway's largest analysis agency.

Nord Jæren (comprising the municipalities of Stavanger, Sandnes, Sola, and Randaberg) in Rogaland County were 21% by foot, 8% by bicycle, and 60% by car (of which the driver accounted for 50%), while only 9% of trips were by public transport, and 3% were unknown (Stavanger kommune 2023, 41). This is a very low modal split for public transport, less than 10% of all trips and 5–6 times less than car trips.

Data collection

We undertook multisited fieldwork by seeking out residents of the Greater Stavanger Region who identified as outdoor enthusiasts, and we conducted 24 semi-structured interviews with car owners and non-owners to understand accessibility differences for outdoor leisure activities between people with cars and those without. To identify quantitative trends, the first nine questions of the interview were the same for all participants, regardless of the status of car ownership; these questions included the frequency of outdoor recreation, types of recreation, destinations, daily routines, challenges with outdoor recreation, and public transport habits. The remaining questions were dependent on car ownership to provide more qualitative insights, based on the participants' experiences of mobility in relation to leisure activities. Hikers were approached at two popular outdoor recreation destinations, the trailhead at Dalsnuten, in Sandnes Municipality, and Preikestolen, in Strand Municipality, both within about one hour's driving time from Stavanger city center. The hikers were asked to share their experiences of transportation and how that impacted their ability to get outside the city. We spoke with people in a variety of situations, including single people, couples, families with children, and dog owners, to get a broad purposive sample of outdoor enthusiasts and to hear about how their different lifestyles and transportation choices impacted their outdoor recreation experiences. A total of 13 were found in person on the hiking trails.

Both Dalsnuten and Preikestolen can be reached by using public transportation services. However, currently no buses take travelers directly to the trailheads at those places. Thus, a walk of c.2 km is required to reach Dalsnuten along sections of road used by cars, while a further walk of 8 km is required from the last bus stop to the start of the Preikestolen trail. Despite taking public transport and surveying the nearby bus stops during peak times for outdoor recreation, including weekends and holidays, the respondents found at the hiking destinations were predominantly car owners. It soon became evident that another method was necessary to find non-car owners. We posted in thematically relevant local Facebook groups, looking for people who identified as outdoor enthusiasts and who might be interested in sharing their regional travel experiences in reaching their outdoor destinations. The resulting 11 respondents (1) reached out to the researchers through private message after seeing these posts, (2) were contacted by the researchers through private message after "liking" the posts on social media, or (3) contacted the researchers after hearing about the study from a previously interviewed respondent who had passed on our contact information. An additional expert interview was conducted with a representative of the Stavanger turistforening (part of the Norwegian Trekking Association, DNT) – to identify and understand the organization's relationship with Kolumbus. This interview further supported our emergent finding that public transport service routes largely overlook popular outdoor recreation places, and that people without cars need to be more innovative in order to engage in activities in the natural environment.

By going to popular outdoor recreation spaces in person and conducting ethnographic field studies we were able to delve into the everyday reality of these spaces and observe at first-hand the groups of people who were physically in the spaces on any given day (Blommaert & Jie 2010). Furthermore, the experience of utilizing public transport to reach some of the more popular destinations supported claims from non-car owners that these undertakings are more tedious and cumbersome, resulting in what feels like a lack of access. The determination to proceed with semi-structured, open-ended interviews came about from the necessity to grasp fully how access to transportation impacts a person's ability to access different spaces around the study region.

The fieldwork took place as part of a larger research project – Responsive Organising for Low Emission Societies (ROLES), based at the University of Bergen and University of Stavanger in the period 2020–2023 – focusing on the transition of medium-sized European cities to low-emission societies. As part of the project, a workshop focusing on transportation in Stavanger was facilitated in the city center and included participants from different municipal offices, urban planners, employees of Kolumbus, and regional residents, to discuss Stavanger's transportation needs and current trajectory. The workshop provided insights into the current state of transportation in the Greater Stavanger Region and where improvements could be made, especially in the case of providing transportation services to enable access to leisure activities. Participants identified a clear need for better integration of services outside weekday business hours, so that people could

continue to move about freely and without service interruptions, including reduced schedules and reduced access to destinations. While not explicitly focused on outdoor recreation, the topic arose in the discussion with participants who commented that the ability to reach outdoor destinations throughout the region, including beaches, popular hiking trails, and even dog parks, remained consistently unmet by the then current services offered by Kolumbus.

Limitations

Upon beginning the data collection process, the first five interviewees at the two hiking destinations were given the option of speaking in either English or Norwegian, depending on their preference. After a discussion between ourselves, the researchers, it was decided to proceed with the remaining interviews in English. The first reason for this change was so that both of the interviewing researchers could understand the information, as one was less conversant in Norwegian than the other, a native speaker. Another consideration that arose was that transcribing the interviews in Norwegian required an additional step of translating them into English, which was time-consuming. Lastly, we found it more beneficial to conduct the interviews in English to help prevent information from being lost in translation from Norwegian to English.

An interesting finding that distinguishes interviews with car owners from those without is the length of the interviews. The average length of interviews with car owners was 11 minutes; the longest interview lasted almost 18.5 minutes, the shortest lasted just over 6.5 minutes. The difference in interview length may be attributed to several factors. One reason could be that all but one of the car owners were approached randomly and interviewed while out walking on a trail. By contrast, there was more flexibility in the interviews with most of the non-car owners who were sourced online. The interviewer and interviewee were able to decide on a suitable time and place for the interview. This meant that both parties were able to align the interview time with their schedules in a better way. The longest interview with a car owner was scheduled to trial the interview guide questionnaire, which may account for its longer duration. However, a possibility worth considering is that non-car owners were more engaged in the interview process, as they felt they had a greater stake in the study, given that part of our findings showed disparity between car and non-car owners in terms of ease of access to hiking destinations due to fairly poor and uneven coverage by public transportation services.

Finally, we acknowledge that our data are based on a limited sampling of outdoor recreation enthusiasts. While we attempted to engage with a wide range of participants from various backgrounds and life stages, they denoted only a small representation of the total population of Stavanger. Consideration was given to the possibility of conducting additional interviews, but after analyzing the first-round results it was found that the data were largely consistent between the two groupings (car owners versus non-car owners) in terms of their ability to access outdoor recreation destinations. Additional considerations accounting for the homogeneity of the target interview audience suggested that saturation was achieved and accurately represented the lived experiences of the respondents. Furthermore, a sample size of c.25 interviews (i.e. 24 interviews with car owners and non-owners, plus 1 interview with an expert) is supported by numerous studies that consider saturation for qualitative studies (Mason 2010; Dworkin 2012; Hennink & Kaiser 2022). While it is likely that additional interviews or surveys would have bolstered the data, there was a low likelihood that the information would strongly deviate from what had already been collected as the basis for analysis. To that end, our conclusions are reflective of the data collected and thus illustrative of the Greater Stavanger Region but cannot be inferred as a complete reflection. Notwithstanding this, the interviews still provided meaningful insights through the individual interviewee's experiences within the region.

Empirical analysis: societal divides and links to gaps in urban transport services

At the start of the project, we anticipated that transportation would have a great impact on how residents were able to access outdoor destinations, but we did not know exactly how much. As expected, we found that people who owned private cars had greater flexibility and were able to participate in outdoor recreation activities with more ease compared to residents who did not have cars and relied on either public transport or friends who owned cars. According to Duncan (1977), analysis of aspects such as frequency, forms, and location of recreation contributes to multivariate, multilevel data structures, which are more frequently utilized in behavioral research.

Frequency

We first asked the respondents how often they engaged in outdoor recreation activities in an average month. With this information, we found a clear correlation

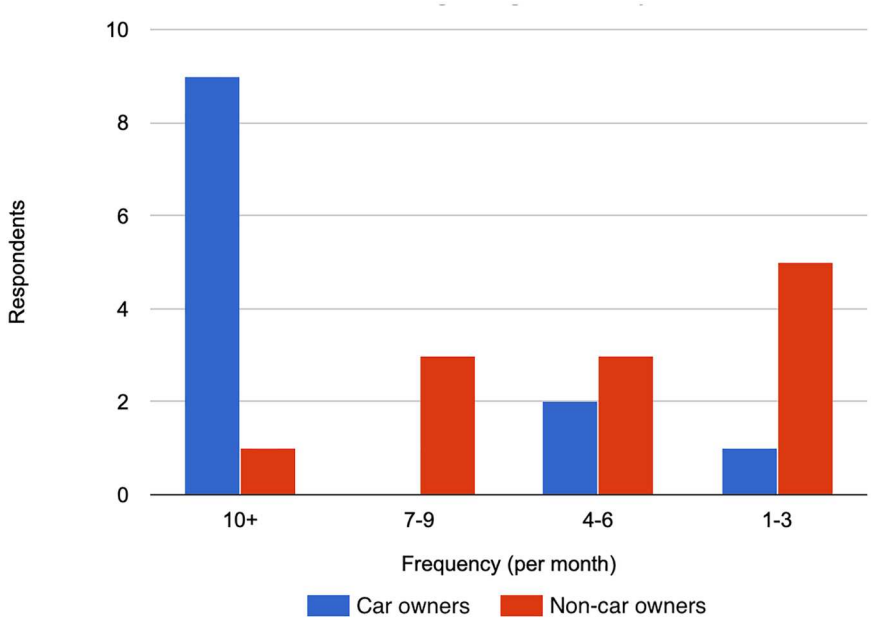

Fig. 1. Frequency of car owners' and non-car owners' outdoor recreation in the Greater Stavanger Region, Norway

between car ownership and the frequency with which people could engage in recreation outdoors, as shown in Fig. 1. With regard to frequency, based on the sample we found that car owners had greater perceived accessibility to get outside their home and participate in outdoor recreation. The majority of car owners (9 out of 12) stated that they participated in outdoor recreation more than ten times per month. By contrast, only one non-car owner stated that they participated in outdoor recreation more than ten times per month. When asked about their routines, both car owners and non-car owners expressed that they had a fair amount of flexibility, which made it easy to set aside time for getting out into nature. Such flexibility was severely reduced for non-car owners, as they were dependent on bus schedules or the availability of friends with cars if they wanted to participate in outdoor recreation outside the populous areas outside the center of Stavanger. For example, travelling to the popular hiking trail at Dalsnuten from Stavanger city center would only take c.30 minutes by car, but taking that same route by public transport would add an extra 60 minutes just one way. For a person with a car, the round trip would be one hour, whereas for people without a car, the trip would take at least three hours, depending on route times and scheduled integration of transfers.

Forms of recreation

It is important to understand the activities in which people participate because it can impact transportation needs. Hiking and jogging tend to involve less equipment, which correlates to less logistics planning for traveling. Outdoor activities that require more equipment, such as surfing, skiing, or boating, require additional space and transportation needs. While the types of activities people choose to engage in are likely attributed more to personal preference than to car ownership, or the lack thereof, it is probable that having access to a car allows for a greater ease of access to a wider range of outdoor activities. For the second question in the interviews, we asked respondents to list their top three outdoor recreation activities. Hiking/walking was found to be the top of the list of outdoor recreation activities for both car owners and non-car owners. In relation to transportation needs, hikers do not need additional space, and thus hikers in the study region would have required only basic forms of passage to get from their starting point to the trailheads.

Various activities other than hiking/walking, such as jogging/running, climbing, cycling, and skiing, were mentioned across the two groups. Among car owners, jogging/running, cycling, and skiing were found to be the most popular activities after hiking/walking. Among non-car owners, jogging/running, climbing, and cycling were the next most popular activities after hiking/walking. Much like hiking/walking, jogging/running does not require equipment that would necessitate additional space or logistics considerations.

Figure 2 depicts the most popular outdoor activities among the respondents; it is interesting to note that skiing and boating were only identified as a main outdoor recreation activity by those who owned cars.

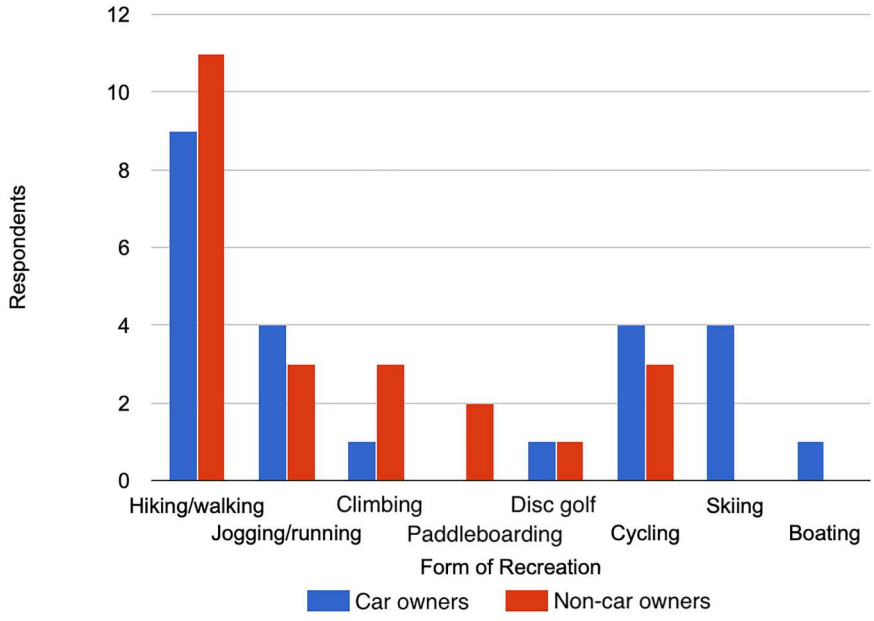

Fig. 2. Forms of outdoor recreation in the Greater Stavanger Region, Norway

Skiing requires additional equipment that is cumbersome and not easily transported on public buses; even trains in Norway usually only have one carriage that will accommodate skiing equipment, so as not to impose on other travelers. Skiing also requires traveling a distance of 100 km to reach the nearest skiing location in Sirdal Municipality in the county of Agder, and to the west of the study region. While some non-car owners mentioned later in their interviews that they had an interest in skiing, they were unable to travel to Sirdal easily due to a lack of accessible transportation options; that accessibility was in relation to both costs and schedules of hiring private companies such as Skibussen. With regard to boating activities, public transport providers do not provide services for transporting private boats. The activity of surfing/paddleboarding was listed as a top form of recreation by two non-car owners, and both activities require equipment that is bulky and not easily transportable. The surfing respondent stated that due to the lack of buses going to the beach his car-owning girlfriend drove him when he wanted to surf. By contrast, the paddleboarder was able to walk to the water from her home and carry her board.

Locations and range

Between both car owners and non-car owners, the municipality of Sandnes, specifically the small coastal village of Dale, was the most popular for outdoor activities. Over half of the respondents (eight car owners and eight non-car owners) talked about hiking and climbing opportunities in that area. Sandnes city center has a mobility hub called Ruten that makes it convenient for travelers to transfer between trains and bus routes. There are also parking opportunities for drivers who may want to take a bus to reach their final destination. However, only one bus route to Dale exists, which makes accessing the village highly inconvenient without a private vehicle. On weekdays, the bus to Dale runs 12 times per day, beginning at 06:20, with the last bus leaving at 21:43; but at weekends and during holidays, the number of runs is reduced, both in frequency and time; the bus only runs six times per day on Sunday and within a smaller time span. This, coupled with highly variable weather patterns, means that there are less opportunities to take public transport on days that people are more likely (and able) to participate in longer-lasting outdoor recreation activities.

We found that car owners tended to stay closer to where they lived when planning their outdoor activities. Three non-car owners said that they regularly visited lakes located near Stavanger city center due to the ease of public transportation to access those locations. However, most non-car owners mentioned that they preferred to explore destinations further away from the city center.

Car ownership

We were curious to know whether any of the car owners would be willing to give up their car or what it would take for them to consider living without a private vehicle. None of the 12 car owners said they could live in Stavanger without a car. One respondent

stated "Regarding not owning a car […] one must move to Oslo […] it is very difficult to make public transport in a way that covers all roads and frequently enough. If they had managed that, we would have done it!" Another respondent identified the new Kolumbus car-sharing service as a step in the right direction but admitted that he still would not live in Stavanger without a car. Other car owners stated that they used the public transportation services for commuting, but that they needed their cars for activities other than for daily errands, such as for transporting larger items and traveling longer distances that were less convenient with buses, or because they did not have reliable public transportation services where they lived. The finding that car owners living in Stavanger could not imagine their lives without their own vehicles merely highlights the shortcomings of the current state of transportation amenities. Following one interview, a non-car owner had an appointment to look at a used car for sale because she no longer wanted to rely on her friends with cars, and public transportation was not meeting her needs to participate in leisure activities.

Additional challenges

All but one non-car owner stated that transportation (either access to transportation, schedules, or route availability) was the main challenge they faced when it came to engaging in outdoor recreation in the Greater Stavanger Region. Many non-car owners stated that taking public transport to get to local outdoor recreation destinations was not viable and instead they looked for friends with cars or car-sharing opportunities. The one non-car owner who did not identify transportation as his top challenge said that there was a lot of potential for improvement in providing transportation services to outdoor recreation spots, but personally he did not find it to be a huge inconvenience. By contrast, only three car owners cited transportation as a challenge, saying that they would like to have cheaper public transportation with more route options so that they did not always have to use their car. Most car owners said that either they did not experience any challenges with accessing outdoor recreation activities or they cited personal factors such as motivation or outdoor equipment as the main barriers to overcome. When asked whether transportation created an additional logistical burden, most of the car owners responded with a statement along the lines of "No, when you have a car, it is never a challenge like that."

Many respondents stated that they used Kolumbus services for their daily commuting needs, with a high level of success. However, these services became less reliable with increasing distance from the city centers. Many interviewees cited the lack of buses running to the beaches and would like those destinations to be better incorporated into bus routes; one couple who lived near a beach stated that they had to own a car due to the lack of public bus routes within a reasonable distance from their house. Another consideration that respondents brought up in a few interviews pertained to the availability of public transportation services outside normal working hours. This finding aligned with the views expressed during the workshop on transportation. People were more likely to have the freedom to engage in outdoor recreation during the times when they were not working or attending university, which tended to be during weekday daytime hours. However, during weekends and holidays, the public transportation service schedules are reduced, and some routes are not even in operation. For people without cars, it became even more challenging to access local destinations that were not easily accessible within walking distance.

Kolumbus has been introducing more services, such as car-sharing and e-bikes, but these services are not flawless. When talking about her first experience of the Kolumbus car-sharing service, one respondent recalled that she had booked a car via the Kolumbus app in order to reach a more remote outdoor climbing area, but when she and her husband went to collect the car they found that it was parked 3 km away from the listed location. When they reached the car, which was a electric car, they found that it was not charged and there were no alternative vehicles available at the time. As a result, they ended up waiting for over two hours to access a different car. With regard to the e-bikes, users acknowledged that they were convenient for short-distance travel within a few kilometers from the city centers, but the lack of charge points did not make them viable transportation options for last-mile access in areas with even fewer charge points.

An issue that was brought up by both groups of interviewees was the seasonal private transportation companies that offer routes to outdoor destinations. One car owner stated that one way to improve transportation to such places was to lower the prices for the services, which were much higher than a normal day pass issued by Kolumbus. One respondent lamented that "there are not even simple and affordable options to get to the main ones like Preikestolen […] the only option as a student is to pay an extra fee for the private bus to get me there." Another respondent pointed out that "the main reason could be the business aspect."

Essentially, people without access to a car were being priced out of access to some places.

Inclusion

An interesting theme of the study on which this article is based was inclusion; this was found on two levels, namely infrastructure and social interaction. The majority of non-car owners that were interviewed were non-Norwegians who had moved to Norway within the past five years for either education or work. By contrast, most car owners were older Norwegians with very established occupations and lifestyles. It is unclear from the sample whether this finding reflected wider population patterns or whether this was merely happenstance. However, despite the differences in nationality or life phase, the fact that most car owners stated that they did not face any challenges to accessing recreational activities outside supports our finding that these activities are easier for car owners whereas non-car owners are inherently marginalized in an automobility-centric system that actively promotes access to nature. The transportation infrastructure in the Greater Stavanger Region is very car-centric and thus more inclined to benefit Norwegians who can afford to own cars; car ownership rates have a high national average and in this respect Norway ranks 25th among countries worldwide, with 635 privately owned cars per 1000 people (ACEA 2022). There are innate structural biases towards car owners, as demonstrated by parking lots at popular outdoor destinations that accommodate visitors with private vehicles. Compared to people who do not own cars, people who travel by bus are not even able to travel to most of the region's trailheads or beaches. As can be seen from the case of the hiking trail at Dalsnuten, there is also a lack of safe paths for walking between the nearest bus stops and the trailhead, which puts pedestrians more at risk of being hit by cars.

From a social aspect, the Norwegians who were interviewed did not comment much on the collective aspects of outdoor recreation. While they were more likely to exchange greetings on a trail than when in more urban settings, they tended to spend they recreation time alone or with one other person, usually their partner. By contrast, non-Norwegians cited social inclusion as a challenge to spending recreation time in Stavanger; they mentioned that they considered outdoor recreation a social opportunity, as well as having positive health benefits, but they found it difficult to make friends with Norwegians. One non-car owner went as far as to say that he did not find Norwegians inviting and felt that his only option to spend time outdoors was to do it alone. A few other non-Norwegians mentioned that there was some difficulty in integrating into Norwegian society, and that it took time for them to make friends, particularly in terms of people with whom they could participate in outdoor activities. This was further compounded when it came to making friends with Norwegians who owned cars, especially in the wake of the COVID-19 pandemic, when sharing small spaces with even closest loved ones was perceived to come with high risks. It is likely that the finding is not exclusive to Stavanger or to Norway as a whole, as integrating into unfamiliar societies typically takes time. Conversely, it cannot be assumed that the feeling of alienation is wholly experienced by all immigrants in Stavanger or Norway. However, it is an interesting observation, in that hiking is generally perceived to be the time during which Scandinavian social interactions with strangers reach their peak and yet so many non-Norwegians in our study felt excluded, either due to the temperament of Norwegians or due to the availability of transport (or lack of it).

Perhaps unsurprisingly, the digital hiking infrastructure in Norway is more inclined to benefit Norwegian speakers. Fortunately for non-Norwegian speakers, the Kolumbus app is available in English, but most of the respondents identified the Norwegian Trekking Association's website, UT, as their most used resource for finding and navigating local hikes. The app is in Norwegian with no in-app opportunities to translate into other languages. For people who are still learning the language, it can make the service more frustrating to use and be demotivating when planning trips.

Discussion

Our empirical analysis reveals that while everyone living in Stavanger may have the right to access nature in theory, not everyone has the same practical capability to explore the natural environment just outside the city freely. At the same time, residents who happen to live closer to the popular destinations are overlooked in terms of having access to convenient public transport options. An interviewed couple who lived near the beaches in Sola stated: "We just really need a car […] There isn't any [public transport] […] there isn't any that goes where we want to go and not at the time we need to use the transportation." The couple also emphasized the importance of their car and stated if they wanted to use public transportation for routine activities they would need to move. While their claim can be attributed to a range of factors, the availability of transport has a direct impact on where and how far people are able to travel. There is a clear divide between those who are differentially impacted by gaps in urban transport service provision, based on entrenched systems of automobility,

with individuals relying on public transport finding themselves systemically excluded from day trips to nature spots that cars owners found easy to access.

We support the claims made by Wolch et al. (2014) and Cox et al. (2017) that studies of urban green spaces concentrating on the distance between residents and their local green spaces have tended to overlook that people desire variety in the places they visit and how such spaces influence their outdoor recreation activities. Hence, the needs of these urban environmental subjects may well fall outside wider trends related to extra-urban day-trip leisure travel. Even though many of these studies have considered transportation, they have usually looked at green spaces that are within reasonable walking distance of more densely populated areas. When considering such a small range, it is easier to separate the influence of transport systems from the everyday practices of people and miss how interwoven the relationship is between humans and the infrastructure around them. However, when the emphasis is solely placed on distance to urban green spaces, city planners tend to overlook many other factors that influence how people access green spaces, such as socioeconomic status, demographic features including gender and age, and ethnic and cultural differences that tend to be prominent within different neighborhoods throughout cities (Suárez et al. 2020), as well as individual motivations for accessing such spaces. This information needs to be included in urban planning schemes to provide better access and services to urban residents, as well as contribute to more robust transportation infrastructures. Thus, the scale of analysis has considerable implications for "silences" in extant literature on urban transport service provision and its gaps and forms of social exclusion. Our approach to consider peri-urban nature destinations, which nonetheless is an important part of residents' lives, especially in Scandinavia, demonstrates the generative nature of an approach that is explicitly aware of spatial scales and their social importance.

In studying urban transportation within the context of *allemannsretten*, a fundamental aspect of Norwegian culture, we found a contradiction in Norway's championing of social inclusion and equality. Taking that one step further, there is a lack of equity when it comes to providing access to outdoor spaces. In the Greater Stavanger Region, nature is reserved for those who have cars, and resources are not fairly allocated to those without the means or desire to own their own vehicles; however, this system only maintains a status quo that further enables social difference and exclusion. As seen from our interviews, people with cars usually had very few suggestions on how to improve transportation infrastructure, while people who did not own vehicles identified gaps in services and offered suggestions for improvements. One respondent who did not own a car acknowledged that it might not be profitable to have bus routes running to local hiking destinations, but part of that might be due to a lack of knowledge on the part of potential users. He argued that lack of passengers might simply be due to people not knowing they could access popular outdoor spots by using public transportation services, and he suggested increased marketing of which bus routes could take people to different outdoor destinations, in order to encourage people to utilize public transport. Additionally, multiple interviewees pointed out that there were no public transportation services that took people to the more popular destinations such as Preikestolen or Kjerag; they inferred that this was likely due to private coaches aimed towards tourists that were providing the services and bring more revenue to the municipality, but this inherently excluded residents who wanted to access the local destinations but either lacked the means or desire to pay upwards of NOK 300 (c. USD 30). They wanted better integration of these popular hiking spots within the public transportation service; they suggested expanding routes to these destinations during the weekends and holidays, when people are more likely to have time to engage in outdoor recreation.

A few respondents spoke about the possibility of introducing shuttle buses that would take people directly to the trailheads of popular hiking trails from mobility hubs such as Stavanger bus terminal or Ruten. As and when the digital services are expanded, one feature could be the ability to book the shuttle buses to ensure that they only run when needed. This would present an opportunity for the Greater Stavanger Region to utilize the ICT strategies that were developed and applied during the Triangulum project. ICTs are capable of generating large amounts of data that can be utilized to create solutions for urban and territorial challenges. ICTs are also capable of identifying patterns in urban activity, such as shopping or leisure preferences, which can be incorporated into city planning strategies to meet mobility needs more effectively (Castillo Luna 2021). It is essential that the Greater Stavanger Region, and by extension its public transportation service provider, builds an efficient transportation system that is adaptable to the increased mobility requirements of the urban residents. After all, the purpose of transportation services is to ensure that passengers can reach their destinations and to fulfill that objective individual passenger goals need to be included in planning (Ivanov et al. 2020). With the continuous improvement of digital tools that allow for data aggregation and feedback mechanisms, this will become more possible than ever before, as long as the tools are employed efficiently.

There is also a need for better assimilation between the different types of mobilities. With regard to Stavanger's

Climate and Environmental Plan 2018–2030 (Stavanger kommune 2018), the municipality aims to increase passenger transport on foot, bicycle and public transportation; but public transportation services do not effectively incorporate bicycles. People with bicycles or large scooters have to pay the price of a child's ticket to bring their means of transport on the bus. On many buses, the space reserved for bicycles is simultaneously purposed for passengers with mobility impairments and people with walkers (walking frames). If a cyclist is already in that space and someone gets on the bus who has a pram, stroller, or wheelchair, the cyclist will often get off the bus to free up that space for someone who is perceived to have greater need. This seems counterintuitive when considering that it is likely that such means of transport are being brought onto the bus to compensate for a lack of last-mile services to the user's final destination. One of the respondents said: "I know you're allowed to take a bicycle on the bus and on the train but […] I feel like I'm not allowed for some reason when I do it." At least for bicycles, there is the possibility for the addition of attaching cycle racks to the front of buses, which could help make cyclists feel more welcome to use public transportation and free up space within the bus for people who may require additional room.

Conclusions

Stavanger has an ambitious goal to be climate-neutral by 2030, and a large component of this plan involves reshaping the transportation landscape, which extends beyond merely physical infrastructure considerations. This process involves understanding users' diverse mobility needs, with the aim of building a system that contributes to the well-being of all residents, but special attention should be given to those who may be less privileged and would benefit the most from more comprehensive public transportation services. By focusing on transportation accessibility through a spatial lens, we view it in a manner that is more consistent with people's transport practices, needs, and desires. Our qualitative study has been able to reveal disaggregated, contextualized insights that are not evident from larger surveys that primarily deal with aggregate data at higher spatial scales and do not offer adequate insight into nuanced aspects such as leisure travel. The main concern that we shed light on is forced car dependence for those residents who wish to access nature, a preference deeply embedded in Norwegian society. Large urban regions, not limited to the Greater Stavanger Region, need to work towards meeting these needs and desires in the transition towards low-carbon transport systems, and to move beyond car-centric transportation systems. Urban and transport planners within the Greater Stavanger Region have the added responsibility of incorporating important social aspects into the systems they are building, including Norway's values of inclusion, equality, and *allemannsretten*. As such, greater emphasis on a more robust public transportation system that connects residents to the nature surrounding their city would offer a better quality of life and uphold these principles that are so deeply engrained in Norwegian culture. Without such proactive policy measures, Stavanger is unlikely to realize its ambitions, as part of the Europe Union's mission for climate-neutral cities, of drastically increasing the share of public transport trips and reducing the share of car trips.

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Disclosure statement

No potential conflict of interest was reported by the authors.

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