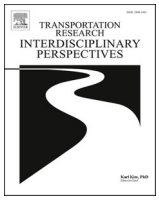
Transportation Research Interdisciplinary Perspectives 37 (2026) 102029

Contents lists available at ScienceDirect

Transportation Research Interdisciplinary Perspectives

journal homepage: www.sciencedirect.com/journal/transportation-research-interdisciplinary-perspectives



Sufficient mobility and access within limits: Research agenda for bringing together corridor frameworks and transportation research

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ARTICLE INFO

Keywords:
Climate change mitigation
Decent living standards
Transport policy
Planetary boundaries
Sufficiency

ABSTRACT

Recently developed frameworks that explicitly define boundaries of sustainability, such as "a safe and just space" or "consumption corridors," are key for achieving good lives for all within ecological limits and have been explored in multiple influential studies. However, these "corridor frameworks" have rarely been explicitly applied to mobility and transport, and there is a need for more work in this direction. In this article, we provide an overview of the corridor frameworks and their links to four main strains of mobility and transport literature: sustainable transport, transport poverty, accessibility, and tourism and long-distance travel. The literature traditions have meaningful links to the corridor frameworks, but their approaches to social and ecological justice are largely disparate and disconnected. Existing studies rarely consider explicit ecological ceilings, and when ecological impacts are considered, the focus is usually on efficiency or relative improvements. Transport poverty and accessibility literature provide a meaningful contribution to defining social floors, but they largely neglect ecological ceilings and consumption maxima. Considerations of floors and ceilings are rarely explicit or are based on unquestioned assumptions of necessity and excess. Explicit ecological ceilings and social floors in mobility have been defined at national or global scales, but there is a need for more work on locally-specific thresholds that are distributively and procedurally just. We highlight the need to more comprehensively apply the corridor framework to transportation research and suggest a research agenda with seven main directions.

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https://doi.org/10.1016/j.trip.2026.102029
Received 25 August 2025; Received in revised form 24 April 2026; Accepted 25 April 2026
Available online 4 May 2026

1. Introduction

The early 21st century is marked by ecological crises resulting from human activity, with climate change being the most prominent. In this context, "strong sustainability" approaches have been developed, which emphasize ecological limits rather than the maintenance and growth of economic capital. More recently, several frameworks have emerged that consider two boundaries of sustainability: ecological limits (or 'ceilings') and a social foundation (or 'floor') regarding human well-being. We refer to these approaches as 'corridor frameworks'. The 'corridors' have a metaphorical sense and refer to a conceptual space that delineates such levels and forms of consumption that allow meeting human needs without compromising human well-being or the environmental boundaries of Earth's ecosystems.

Most human activity requires the mobility of passengers or goods, which still significantly relies on the burning of fossil fuels, making the transport sector one of the main contributors to greenhouse gas emissions (GHG). Transport is also required for a myriad of human activities and access to opportunities, which makes it essential for social inclusion and human well-being. As such, the need to chart a path between limiting ecological damage and ensuring that social standards are met, highlighted by corridor frameworks, is a pressing challenge for the transport sector.

This tension is apparent in the controversies surrounding sustainable transport policy, whereby measures to reduce ecological damage are sometimes challenged on grounds of social justice. It is perhaps most visible in disputes related to measures to limit the use of the most polluting transport modes in urban areas, such as street space reallocation and vehicle access regulations. However, while urban mobility and associated conflicts tend to draw the most attention, the environmental and social risks and harms related to long-distance travel and tourism are becoming increasingly evident. Having more poorly understood links to social inclusion and human well-being than local travel does, long-distance mobility accounts for a large and growing share of transport GHG, despite being very unequally distributed.

The transport sector accounts for a large share of the socio-ecological challenges that corridor frameworks aim to tackle. Yet there is still too much disconnect between these two research strands. While corridor frameworks have mostly been applied at a cross-sectoral level, there is a need for domain-specific approaches, including one focused on transport and mobility. Several research traditions in the transportation literature tackle specific issues that are relevant from a corridor framework perspective. However, significant conceptual and empirical work is needed to make them align with this perspective. Although in recent years studies have been published that attempt to bridge these gaps, there is still a need for a clear and coherent research vision and agenda, which takes stock of the existing sectoral research on these topics, as this article aims to do. We contribute to interdisciplinary transport research in two main ways.

Firstly, we bring together four research traditions that are usually considered separately in transport literature: accessibility, sustainable transport, transport poverty, and tourism and long-distance travel. We provide a critical analysis of their explicit and implicit assumptions, as well as overlooked analytical gaps. Despite much research existing in each of these fields, they typically focus only on challenges within their own fields. This results in various social and ecological challenges being assessed in isolation. Thus, the focus of this paper is to connect disparate traditions to assess their strengths, shortcomings, and overlaps in light of the corridor framework.

Secondly, we introduce a highly interdisciplinary and integrative theoretical framework of consumption corridors to transport research. Using this framework, we demonstrate how the aforementioned traditional approaches could be linked and developed in line with the assumption of the corridor frameworks. The latter have been developed and applied across many different fields of study and disciplines, including economics, sociology, geography, and urban planning. This makes it well-suited to a novel, interdisciplinary approach to researching transport and mobility. We provide an overview of how existing mobility, accessibility, and transport research connects to the corridor frameworks – explicitly or implicitly – and highlight the disconnected lines of research that would benefit from cross-pollination. In the conclusions of the paper, we highlight the importance and challenge of explicitly addressing the social and ecological dimensions of justice in mobility and transport research. By linking these various key traditions to the corridor framework, we highlight the gaps within and between these disciplines. This paper, therefore, adds a novel overview of how these fields can be linked to address key mobility and transport challenges, and provides a novel agenda for future transport and mobility research.

The article takes the form of a research agenda for an emerging field of study and an expert overview of its connections to established traditions of mobility and transport research. Our primary aim is to connect creatively, rather than systematically review, the currently disconnected strands of literature. This approach enabled us to include relevant publications without limiting them to a narrow set of search terms. While recognizing the relevance of freight to the current social and ecological challenges, we focus on passenger transport and adjacent fields of mobility and accessibility.

The article is structured as follows. We first introduce the corridor frameworks in Section 2. We then undertake a non-systematic review of four major strands of mobility-related research, focusing on passenger transport, and describe their relation to corridor frameworks in Section 3. The traditions included in the review are spatial accessibility (section 3.1), sustainable transport (section 3.2), transport poverty (section 3.3), and tourism and long-distance travel (section 3.4). In section 4, we review existing applications of corridor frameworks in the mobility, accessibility, and transport domains. Section 5 includes a research agenda for applying corridor frameworks and social-ecological justice in mobility research. We conclude the paper in Section 6.

2. Corridor frameworks

Several frameworks that consider human well-being and ecological limits as boundaries of sustainability have recently emerged in the literature. Prominent examples are doughnuts (Raworth, 2017), safe and just corridors or operating spaces (Gupta et al., 2024a; Rockström et al., 2023), and consumption corridors (Fuchs et al., 2021) (Fig. 1). These frameworks (from now on, corridor frameworks) consider the economic system (and sub-systems, such as mobility provisioning) to be embedded in society, which is embedded in the environment, where ecological limits to extraction and pollution exist (Røpke, 2004). They maintain that the basic needs, or social foundations that allow a prosperous and healthy life, should be met for everyone (Sahakian et al., 2021). To this end, they define social and ecological boundaries within which a sustainable and well-functioning system must remain and draw on upper and lower limits to assess the socio-ecological implications of institutions and policies. It overcomes a common limitation of other sustainability assessments in which ecological pressures are measured in terms of relative improvement and efficiency (Lorek and Fuchs, 2019).

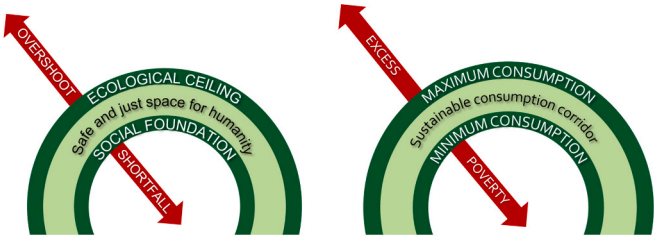

Fig. 1. Simplified charts presenting the idea behind the corridor frameworks. Left – the safe and just space for humanity, right – consumption corridors.

While efficiency improvements and gradual reduction of absolute impacts are important means of reaching safe and just operating spaces, the corridor frameworks provide useful benchmarks for end goals of such transitions. Using these benchmarks may lead to qualitatively different transition pathways and policies. For instance, while vehicle fleet electrification in countries with renewable electricity reduces the carbon intensity of transportation and provides relative reduction of emission levels, reaching 1.5°C warming-compatible emission levels also requires large reductions in car fleet size, which necessitates different policies (Dillman, 2021).

The upper limits are usually conceived as ecological ceilings, although they might also refer to maximum consumption in social terms. The ceilings have been defined in multiple ways, such as pressures on the Earth System that do not exceed planetary boundaries (Rockström et al., 2009), excessive or luxury consumption that cannot be generalized to everyone (Cass et al., 2022; Gough, 2020), or other thresholds established in a participatory manner (Fuchs et al., 2021; Guillen-Royo, 2020). Corridor frameworks thus take a limitarian approach to justice (Robeyns, 2022) wherein they seek to reduce excessive consumption and production. Millward-Hopkins and Fisch-Romito (2025) usefully distinguish between overconsumption that is individually useless, socially unfair, and environmentally unsustainable.

The lower limits provide a social foundation based on a sufficientarian approach to justice, seeking to provide at least minimally decent living conditions to all people. The social foundation has been defined using various indicators, including human needs satisfaction (Fuchs et al., 2021; Gough, 2020), minimum access or decent living standards (Millward-Hopkins et al., 2020; Rammelt et al., 2023; Schlesier et al., 2024), and globally available social indicators, such as life satisfaction or life expectancy (O'Neill et al., 2018). Sufficiency is an overlapping concept, defined as "a set of policy measures and daily practices which avoid the demand for energy, materials, land, water, and other natural resources, while delivering wellbeing for all within planetary boundaries" (Calvin et al., 2023).

Safe and just operating spaces or corridors originate from Earth system sciences and planetary boundaries (Rockström et al., 2009), later expanded to include considerations of justice and well-being (Raworth, 2012; Rockström et al., 2023). Consumption corridors have origins in sustainable consumption literature and define consumption maxima in a variety of ways beyond just the ecological ceiling. Consumption corridors are primarily salutogenic, focusing on how to achieve good lives for all within collectively set limits (Sahakian et al., 2021). They emphasize the importance of collective and democratic methods of establishing boundaries, using, for example, participatory methods (Fuchs et al., 2021; Guillen-Royo, 2020). The corridor frameworks share the similarity of a 'double negative' approach to sustainability by explicitly defining what is unsustainable (Feitelson and Stern, 2023).

An important recent development in connecting the safe limits of Earth's resilience with the social floor is the concept and quantification of Earth system boundaries, which would be both safe and just (Rockström et al., 2023). 'Just' entails minimizing the differentiated exposure to significant harm to humans from Earth system change and delivering at least minimum access to food, energy, water, and infrastructure (including transport). It also considers the redistribution of resources, risks, and responsibilities so that minimum access can be provided without trespassing safe boundaries and doing so in a way that ensures procedural and epistemic justice, i.e., including different sources and types of knowledge and establishing the means in inclusive, fair, and transparent processes (Gupta et al., 2023, 2024a). These recent advances brought the "safe and just space" framework closer to consumption corridors and answered the calls for understanding thresholds as politically and democratically defined "societal boundaries" (Brand et al., 2021).

Besides providing tools for measuring (un)sustainability, corridor frameworks have also inspired studies on processes, pathways, and economic models that could lead to a good life within limits (Bärnthaler and Gough, 2023; Fuchs et al., 2021; Roberts et al., 2020) or those that lead to the opposite direction (e.g., Brand-Correa et al., 2020). Doughnut economics proposes cooperative, circular, regenerative, and distributive economics, and criticizes the neoclassical mainstream (Raworth, 2017). Corridor-inspired studies explain differences in socio-ecological performance using concepts from heterodox economics, such as provisioning systems, which are defined as related elements transforming resources to satisfy human needs (Fanning et al., 2020). Using examples from the transport sector, Brand-Correa et al. (2020) explain how human needs are satisfied with ever-increasing material and energy requirements – a process of need-satisfier escalation. Such escalation is related to embedding energy- and resource-intensive practices in societies, creating dependencies (e.g., car dependence (Mattioli et al., 2020) and flight dependence (Schmidt et al., 2025)) and lock-ins. The analyses usually emphasize the dual importance and intertwining of production and consumption. However, most studies to date focus on consumption, with only a few considering "production corridors" (Bärnthaler and Gough, 2023).

3. Main strands of mobility, accessibility, and transport research and their relation to corridor frameworks

Each of the four strands of research that we address here focuses on different aspects that are crucial for applying corridor frameworks to mobility, transport, and accessibility. At the same time, each of the fields is somewhat limited in scope and has important blind spots, which we discuss hereafter and summarize in Fig. 2.

3.1. Accessibility

Spatial accessibility is a rich, diverse, and (at times) confusing concept widely used in academia, industry, and planning to understand how easily different opportunities can be reached. Accessibility can be considered the "science of opportunities", providing a human-centered and holistic approach to describe how a mobility system facilitates access for individuals to meet their daily needs (Appendix A, I.1).[2] Hansen (1959) introduced the widely-used definition of accessibility as "the

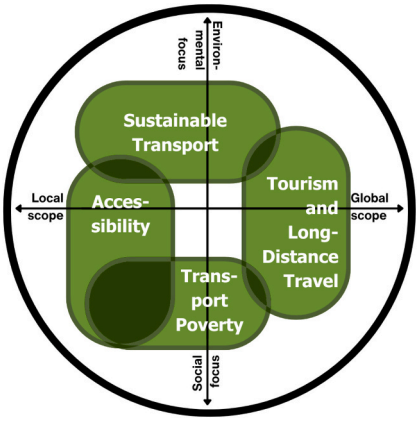

Fig. 2. Reviewed strands of mobility research, their main focus, and overlap.

[2] Henceforth, throughout the paper, we include references to specific cells in the table in Appendix A in brackets. In each section we refer to the corresponding part of the table. For example, in this section (3.1), we refer to the part about Accessibility, and the research questions and directions that were originally typical of this tradition (I), those that have recently guided it (II), those that should guide it if we are to apply corridor frameworks and social-ecological justice to mobility research (III), and the common challenges and questions associated with this approach (IV).

potential of opportunities for interaction". Various definitions and ways to operationalize accessibility have emerged since, and there is a vast body of literature that employs different perspectives and approaches to measure accessibility (see overviews by Geurs & Van Wee, 2004; Handy & Niemeier, 1997; Páez et al., 2012; Willberg et al., 2024; Wu & Levinson, 2020).

It is important to distinguish accessibility from mobility. While accessibility describes the potential to reach places, mobility is the realization of access. In broad terms, researchers use accessibility measures that can be categorized into location-based indicators and person-based indicators that analyze accessibility at the individual level, considering different constraints (e.g., time budget, opening hours, traffic) on individual's possibilities to participate in specific activities (Geurs & Van Wee, 2004; Hägerstrand, 1970; Kwan, 1998; Miller, 2007, 1991). It connects accessibility to the social floor dimension of corridors, since participation in activities is a prerequisite for satisfying multiple human needs and enabling well-being.

Furthermore, accessibility is an essential component in many geographical processes characterizing the linkages between people, transport, and land use that can be used for explaining, for instance, location decisions of people and services, transit-induced gentrification, incomes, property prices, and investment decisions (Cervero, 2005; Wu and Levinson, 2020). Thus, accessibility can be used as a tool for designing fair transport systems enacting integrated land use and transport policies (Martens, 2016) and is deeply intertwined with various scientific domains focusing, for example, on sustainable transport (Section 3.2) and transport poverty (Section 3.3).

Three important shifts have occurred in the accessibility literature. The first shift, from mobility/efficiency planning to accessibility planning, meant a shift in perspective from means (i.e., mobility) to ends (i.e., reaching destinations where opportunities are or need-satisfying activities are performed) (Cervero, 2001) (I.2). The second is an increased emphasis on transport justice with accessibility at the core (Martens, 2016). This shift is characterized by various distinct empirical approaches dominated by disparity analyses (e.g., Bocarejo et al., 2012; Deboosere and El-Geneidy, 2018; Golub and Martens, 2014; Liu and Kwan, 2020; Moreno-Monroy et al., 2018; Páez et al., 2013), which compare the levels of access between different population groups or areas with distinct characteristics (II.1). This shift has also brought an increase in studies employing a sufficientarian approach considering normative minimum accessibility thresholds, thus aligning with the idea of the social floor of the corridor frameworks (Allen and Farber, 2019; Lucas et al., 2016b; Martens, 2021; Willberg et al., 2024) (II.2).

The third emerging shift is the expansion of accessibility measures beyond social factors, by incorporating environmental factors and travel costs other than time or distance (e.g., emissions, energy consumption, exposure to pollution, noise, monetary costs.) into the analysis using a utility-based full cost accessibility framework (Cui & Levinson, 2018, 2019) assessing their thresholds in line with corridor frameworks (Willberg et al., 2024) (II.3, III.2). Recent studies investigate accessibility in relation to exposure to air pollution, noise, greenery and extreme weather conditions (Ahmed et al., 2024; Da Schio et al., 2019; Higgins et al., 2019; Jiang et al., 2021; Willberg et al., 2024; Zhao et al., 2018) (II.4) or evaluate the impacts of certain policy measures on accessibility and environmental costs (Avogadro et al., 2021; Lahtinen et al., 2013; Song et al., 2017; Tenkanen et al., 2024) (II.5). However, few have considered the societal impact of specific environmental policies constraining accessibility such as carbon budgets (Kinigadner et al., 2021, Kinigadner et al., 2020, Kinigadner et al., 2019; Mahmoudi et al., 2019) (III.1, III.2).

3.2. Sustainable transport

Sustainable transport has become a catchphrase both within and outside of academia. Despite its popularity and some efforts to define it more narrowly (Næss, 2020), it lacks a clear and widely-adopted definition and is used to encompass a wide range of environmental, economic, and social issues in literature, policy, and industry. In practice, it typically centers around reducing environmental impacts (De Vos, 2024). As transport is often viewed by policy makers and organizations as a means to connectivity, trade, and economic growth (e.g., United Nations, 2021) (I.1), sustainable transport is commonly addressed as low- or zero-carbon transport, which is achieved through the mass roll-out of technological innovations and infrastructure (e.g., United Nations, 2021). In this vision, transport demand continues to grow, but it is decoupled from carbon emissions through improved efficiency (I.2).

Critical social science perspectives on sustainable transport, however, focus on how social, economic, and political structures contribute to high transport emissions (Creutzig et al., 2016; Haas & Sander, 2020; Mattioli et al., 2020; Wiedmann et al., 2020). This perspective contrasts with traditional transport planning and policy practice, which prioritize maximizing travel time savings and traffic flow speed (Banister, 2008) (II.1). It calls for greater consideration of environmental and social concerns, in addition to economic evaluation. To some extent, sufficiency is included in sustainable transport through the Avoid-Shift-Improve (ASI) paradigm (Creutzig et al., 2016), recommending packages of policy measures to reduce the need to travel (avoid), the shift of travel activity to transport modes with lower environmental impact (shift), and the development of technological innovation and sustainable energy sources (improve) (Banister, 2008; Næss, 2020) (III.3). This research concludes that behavioral change, rather than technological change alone, is required – something that is more controversial in public debates (Næss, 2020).

The precise measurement of different environmental impacts of transport is not typically the main focus of sustainable transport research. The literature primarily focuses on short-distance and urban travel in car-dominated transport systems in the Global North, policies that reduce car use, and their public acceptability (I.3, I.4). While explicit limits to environmental impacts are typically not put forward, they are sometimes implicitly considered when the aim is to reach certain targets, e.g., emission reduction. While this research has not traditionally considered excessive transport, there is increasing attention on the disproportionate contribution of high emitters' transport emissions to climate change (e.g., Brand & Boardman, 2008; Shaw et al., 2024; Wadud et al., 2022) (II.2). The growing attention on long-distance and air travel (see Section 3.4) can also be interpreted in this way.

When social justice aspects are included in sustainable transport approaches, the focus shifts from mobility to accessibility (Section 3.1). It emphasizes equity, affordability, public participation and co-design (Banister, 2008) (II.3). Additionally, it underlines intergenerational justice issues (Næss, 2020) and highlights the benefits of sustainable transport for human health (De Vos, 2024) (II.4). In recent years, the concept of equity, as well as a more careful consideration of the theory and criteria that should guide the distribution of mobility benefits, has been introduced to transport research (Lewis et al., 2021). However, sustainable transport research generally stops short of defining 'social floors' in terms of minimum or just mobility and accessibility levels – as does research on transport poverty (see Section 3.3) (III.1–3).

While environmental sustainability has drawn more attention, the nexus of social and ecological goals within sustainable transport highlights both synergies and tensions. Researchers emphasize, for example, the health and accessibility benefits of redesigning urban forms and layouts in a less car-oriented way, as in the 15-minute city concept (Willberg et al., 2023; Woodcock et al., 2007) (II.4). Notably, encouraging active travel is seen as key to mitigating the negative health consequences of sedentarism (De Vos, 2024). However, it has been claimed that sustainable transport measures such as low-emission zones and congestion charges can have negative effects on low-income households (Blandin et al., 2024; Eliasson, 2016; Caulfield et al., 2020). Likewise, investments in the sustainable public transport infrastructure have attracted increasing attention as a potential trigger of

transit-induced gentrification (Bardaka et al., 2018), also in relatively regulated welfare states like Finland (Meriläinen et al., 2024) (III.4). Some criticize sustainable transport approaches for glossing over these tensions and hiding behind an apolitical façade (Kębłowski & Bassens, 2018). While there is a need for quantitative evidence and distributional analyses that could further illustrate how such sustainable measures differentially affect social groups, care must be taken when framing the findings in terms of "winners and losers", as this tends to tacitly assume that the status quo is fair and equitable, which is typically not the case (Martens et al., 2019). Rather than looking at who gains or loses relative to the status quo, such assessments should look at the effects on need satisfaction or other aspects of the social floor. There is also a need to further develop policy evaluation methods and measures that simultaneously consider environmental, social and economic impacts (Agyekum et al., 2025), as well as conflicts between these impacts and the outcomes for different social categories.

In summary, the vague definition of sustainable transport allows for the term to be used to describe a large range of issues and solutions. The ecological ceilings are rarely defined, and few studies explicitly consider the consequences of sustainable transport policies on the social floors. In sustainable transport research, socio-technical change has been traditionally conceptualized with a rather reductionist model whereby "public acceptability drives political acceptability" (Banister, 2008, p. 76) and sustainable transport policy aims to maximize the former (I.4). More recent research has criticized this for ignoring the more complex realities of governance and policy making (Marsden and Reardon, 2017) as well as the broader political economy context (Mattioli et al., 2020) (II.1). As a result, there is a split between mainstream economic and more radical systemic change approaches.

3.3. Transport poverty

Transport poverty is a broad term used to refer to multiple inequalities related to transport. Since 2000, research on such inequalities has grown rapidly (Lowans et al., 2021; Lucas, 2019; Pérez-Peña et al., 2021) (I.1). Concepts adjacent to "transport poverty" include "transport-related social exclusion", "transport disadvantage", and "transport vulnerability" (Mattioli et al., 2017; Simcock et al., 2021; Lucas et al., 2016a). A more explicitly normative and broader strand of research is found under "transport justice" (Martens, 2021), "transport equity" (Lucas et al., 2019; Pereira and Karner, 2021), and "mobility justice" (Verlinghieri and Schwanen, 2020). Overall, this literature is where social equity issues related to transport have been debated most directly and explicitly.

Social issues are prominent in this literature, with authors typically emphasizing how limitations to travel activity can hinder social inclusion and need satisfaction (I.2), which connects to the social floor dimension of corridor frameworks and overlaps with research on accessibility (Section 3.1). Early transport poverty research overlooked or took the 'justice' dimension of transport-related inequalities for granted – something that was criticized in the later literature (Grossmann et al., 2022; Lucas et al., 2019; Mattioli, 2016). Research on 'transport justice' and 'transport equity' has responded by adopting an overtly normative approach, explicitly setting out standards of fairness (II.1).

This literature makes three key criticisms of traditional transport policy and planning (Martens, 2021). First, it calls for including equity as a separate dimension of every transport evaluation, so that all the benefits and costs are analyzed in terms of their distribution (Lewis et al., 2021) (II.1). This contrasts with the utilitarian and mainstream economics perspectives that dominate the transport sector (e.g., cost-benefit analysis) and favor 'efficiency' and aggregate utility maximization. Distributional equity is in line with doughnut economics, which criticizes both the fundamental tenets and the disproportionate policy influence of mainstream economics. Second, it argues for making equity the goal of transport planning to maximize and fairly distribute access to services and opportunities (II.2). It is in line with sustainable transport research (Section 3.2), and contrasts dominant approaches that aim to maximize travel activity (often by car) and to minimize travel time and congestion. In this context, transport poverty and equity researchers rely on sufficientarian and egalitarian distributive justice approaches (Beyazit, 2011; Lucas et al., 2016b; Martens, 2016, 2021; Pereira et al., 2017; Pereira and Karner, 2021). The third claim of the recent literature in transport poverty and equity is to go beyond distribution and include the question of just recognition, representation, and participation of different social groups, which often stands behind (re)producing distributive injustices (Verlinghieri and Schwanen, 2020) (II.3).

Overall, transport poverty and equity research focus less on the environmental impacts of transport. It perhaps reflects a 'division of labor' within transport studies, as concerns for ecological impacts dominate sustainable transport research (Section 3.2). However, there have been interactions between transport poverty and environmental justice research, even in the early literature (e.g., Lucas, 2006). More recent conceptual frameworks argue that there are both benefits and (environmental) burdens from transport, and that both should be distributed fairly (Lucas, 2019; Lucas et al., 2016a; Pereira and Karner, 2021). This two-sided, socio-ecological approach is not yet prevalent in the literature, however. Similarly, this research strand overwhelmingly focuses on the achievement of minimum travel activity or accessibility levels in the transport sector (III.1), often sidelining justice questions raised by 'excess travel' (see Accessibility, III).

Transport poverty and equity research tends to overlook the dynamic processes creating transport-related inequalities. These include the 'suburbanization of transport poverty' (Allen and Farber, 2019) and household relocation pressures due to increasing housing and transport costs (Li et al., 2018). The lack of a comprehensive understanding of environmental injustice and its processes means that there is only little transport poverty research on the unequal impact of policies on socio-economic groups and individuals (Mattioli et al., 2017), the uneven impact that social groups have on the environment and other people (Gosztonyi et al., 2023; Boeing et al., 2023; Barnes et al., 2019), and the disparity in participation in (environmental) policy-making (drawing on Laurent, 2011) (II.3, II.4). Despite this, tensions between social and ecological policy goals have received some attention (e.g., Grossmann et al., 2022; Lucas et al., 2001; Lucas & Pangbourne, 2014), such as in studies on the affordability of car use and vulnerability to fuel price increases (e.g., Mattioli et al., 2017) or analysis of the dual benefits for vulnerable populations and the environment of improving public transport provision (Lucas, 2006) (III.2, III.3).

These debates closely resonate with those in sustainable transport research, where similar dynamics emerge in the unequal distribution of the social costs and benefits of environmental measures. Bringing insights from transport poverty research into dialogue with sustainable transport debates can help to develop a more comprehensive understanding of how transitions towards low-carbon mobility may both reproduce and mitigate existing inequalities and injustices.

3.4. Tourism and long-distance travel

The bodies of research on long-distance travel (LDT) and tourism are largely disconnected from the fields described so far, as well as from each other, despite considerable thematic overlap. Tourist activity is broadly defined as traveling outside one's usual environment and staying overnight (UNWTO, 2008). Despite this inclusive definition, tourism literature predominantly focuses on travel for leisure purposes. Sustainable tourism is a subfield of literature and practice that aims to balance the economic, social, and ecological impacts of tourism (I.1). However, it often focuses on activities in the destination, excludes travel to the destination, and is strongly connected to the tourism industry (Hall, 2010). Transportation studies usually distinguish LDT by spatial distance with varying thresholds, such as 50 or 100 km, and typically concentrate on the determinants of LDT-related distances, modes, and

environmental impacts (Mattioli and Adeel, 2021) (I.2).

Air travel is one of the activities with the disproportionally high climate impact per trip and high emission-reduction potential (Ivanova et al., 2020; Olson et al., 2024; Wynes and Nicholas, 2017), which suggests its place above "consumption maxima" (III.2). Some studies relate flying emissions to sustainable per capita emission levels (Akenji et al., 2021), and the future of aviation has been analyzed relative to the overall remaining carbon budgets in mitigation scenarios (Åkerman et al., 2021). An ecological ceiling for the climate impact is thus applied in this context. However, aviation is often "allowed" to grow emissions while other sectors reduce them, and the assumptions of the social necessity of this growth are rarely questioned or explored (Lund et al., 2023). Other important sources of ecological pressures include LDT by car, the provision of road infrastructures that contribute to land fragmentation, and leisure practices associated with car travel, such as second homes (Næss et al., 2019).

Several studies estimate tourism's contribution to the global carbon footprint at 5–8%, depending on system boundaries (Gössling and Peeters, 2015; Lenzen et al., 2018). Much of tourism's carbon footprint results from travel, predominantly by planes and cars. In many high-income countries and urban areas, the share of LDT in travel emissions exceeds 50% (Aamaas and Peters, 2017; Wadud et al., 2024), highlighting its importance (I.3). Gössling & Peeters (2015) discuss assessing tourism's ecological impacts in the context of planetary boundaries but do not propose any sector-specific thresholds (III.1, III.2). Tourism participation and air travel are highly unequally distributed (Gössling and Humpe, 2020; Lenzen et al., 2018; Oswald et al., 2020) and widely considered luxury activities for the more affluent (I.4). It might thus appear that social floors and consumption minima do not apply to tourism and LDT. However, two existing lines of research provide background for considering them as part of the social floor in corridor frameworks.

Firstly, LDT plays an important role in regional connectivity, maintaining social ties, and providing social opportunities (e.g., seeking jobs, traveling for education, migrating). Researchers have recently started applying the notion of transport poverty and minimum access to LDT (Warnock-Smith et al., 2023) (II.1). Remoteness, orography, and insular character of some regions – particularly in large countries – increase their dependence on aviation and maritime transport, in turn increasing their dependence on fossil fuels. The assumption of air travel necessity for regional development and public services has led multiple national governments and the EU to subsidize air connections to remote regions (Silva et al., 2021). Maucorps et al. (2025) apply the concept of inter-regional mobility poverty to assess social and economic risks associated with new climate policies for the EU's outermost regions, in the context of regions' reliance on tourism for employment and income. Other studies highlight how such tourism dependency creates vulnerabilities and conflicts with provisioning for local needs (Higgins-Desbiolles, 2022). In general, reliance on air connectivity and tourism for social provisioning amplifies tensions between ecological ceilings and social floors at the regional scale.

The considerations of poverty and necessity in the LDT context typically do not rely on explicit theories of human needs or definitions of necessities, and few other studies do so explicitly. Some studies highlight how the geographical spread of social networks contributes to the risk of social exclusion (Cass et al., 2005) and increasing levels of GHG emissions required to maintain social ties (Mattioli, 2016) (III.1). Guillen-Royo (2022) applied a human need theory to explore the well-being consequences of replacing domestic flights with remote contact or train trips for leisure and visiting family and friends (III.3, III.4). Ullman & Aultman-Hall's (2020) qualitative interviews show evidence of negative impacts from "unmet demand" for LDT. From the need theory perspective, travel is primarily a need satisfier rather than a need in itself, implying that the same needs may be satisfied with higher or lower travel activity levels. Guillen-Royo et al. (2024) apply this notion to explore the links between flight-intensive practices and well-being in the air travel literature and identify knowledge gaps (III.1, III.2, III.4).

Secondly, tourism connects to the social floor through the need for leisure and rest from work (II.2, II.3). The social right to rest and leisure is widely recognized, and enabling workers' participation in vacations has been an important policy in both socialist and capitalist countries (Barton, 2005; Koenker, 2008). Annual vacations away from home have been included in setting minimum income standards in the UK (Davis et al., 2024). Social tourism considers tourism a necessity and seeks to improve access of disadvantaged groups with financial or other interventions (McCabe and Qiao, 2020). The United Nations World Tourism Organization has promoted expanding the rights to leisure to a universal right to tourism (UNWTO, 1999). However, this claim is criticized due to environmental concerns and the fallacious conflation of tourism and leisure (Gascón, 2019).

Some of the studies that link tourism and well-being provide insights into tourism/LDT consumption minima (III.1). De Bloom et al. (2017) highlight the restorative benefits of leaving one's everyday environment compared to staycations. Studies also report the generally positive effect of vacationing on subjective well-being (Nawijn and Peeters, 2010) (II.2). However, tourism studies predominantly adopt well-being concepts that focus on pleasure, personal growth, and meaningful experiences (Filep, 2014; Filep and Laing, 2019; Vada et al., 2020). While these approaches are relevant for the social floors in the sense that they concern human flourishing, they lack a sufficientarian concern of the theories usually applied in corridor studies, such as human needs and capabilities (Gough, 2015; Lamb and Steinberger, 2017). The questions of sufficient, necessary, or excessive consumption of tourism and its role in satisfying basic human needs remain mostly unexplored (III.1).

4. Existing applications of corridor frameworks in mobility-related research

There are still relatively few studies that apply corridor frameworks and similar approaches to the mobility domain. It has recently begun to change with studies that account for both ecological ceilings and social justice considerations. Dillman et al. (2021) introduce a safe and just framework for urban mobility by considering various drivers and pressures related to the ecological ceiling, such as transport emissions and the impacts of transport systems on biodiversity, land use change, and freshwater systems, as well as the social floor that includes accessibility, mobility, and exposure to transport externalities. Gupta et al. (2024b) put forward a framework for "transport system within earth system boundaries", estimate a 'transport floor' and an upper boundary (based on the findings of previous research), and propose six policy principles for remaining within that space.

Focusing on accessibility, Willberg et al. (2024) note that ensuring current levels of access often depends on high levels of mobility, contributing to social inequalities and environmental exploitation. They propose a framework for just accessibility within planetary boundaries that combines the sufficientarian and social equity concerns (minimum accessibility thresholds) with the planetary boundaries and ecological ceilings concerns (maximum accessibility thresholds). They also propose expanding current accessibility measures to include more comprehensive social and environmental dimensions, assessing the ecological pressure of access and related socio-spatial disparities and gaps, assessing whether minimum accessibility thresholds are reached within planetary boundaries, and implementing normative actions that enable the change towards a socially and environmentally sustainable future in accessibility.

Moghaddam et al. (2022) use the doughnut concept to compare active modes, public transport, and shared autonomous vehicles in terms of gender, racial, and economic inequalities in access to education, jobs, healthcare, and security. Their comparison, although largely theoretical, shows that active transport is likely to be the mode with the lowest risk of contributing to such inequalities. Rau & Mögele (2025) examine how voluntary immobility—defined as a reduction in the

"consumption of distance"—can support the development of sustainable consumption corridors. They highlight tensions between social and environmental goals, as well as concerns that immobility could also reinforce existing patterns of privilege and disadvantage.

Rode (2023) calls for a "fairness and sufficiency turn in urban transport" and proposes including both social and environmental impacts in transport analyses and policies. He discusses how to construct metrics for car use budgets based on space consumption, which would be easy enough to understand, communicate, and apply (Rode, 2024). Similarly, Millonig et al. (2022) proposed the concept of national, regional, and individual fair mobility budgets, using CO_2 emissions as the ceiling and satisfaction of basic mobility needs as the floor. They analyzed the social and technical challenges of implementing and monitoring such budgets, taking into consideration, i.a., significant differences in accessibility and willingness to change mobility habits. Krajzewicz et al. (2024) and Arhipova et al. (2024) developed applications for spatial mapping and visualization of budgets using various European cities as pilot environments, making corridor-related mobility budgets more accessible to planners and decision-makers.

Multiple studies suggest indicators and thresholds that characterize lower and upper boundaries of sustainable mobility provision, summarized by Dillman et al. (2023b). Examples of ecological ceiling indicators and their thresholds include a material footprint of 2 t/cap/year (Lettenmeier et al., 2014), energy footprint of 5.6 kWh/cap/day (Holden et al., 2013), or greenhouse gas emissions compatible with staying within the 1.5-degree global warming trajectory estimated as 0.45–0.83 tCO_2eq/cap/year for a 2030 target (Akenji et al., 2021; Dillman et al., 2023b) or 0.24–0.62 tCO_2eq/cap/year for a 2035 target (Hot or Cool Institute, 2025).

Several studies propose a threshold for minimum access to mobility as 3500–4500 pkm/cap/year or around 11 pkm/cap/day (Gupta et al., 2024b; Holden, 2007; Rammelt et al., 2023), which would require 0.36–0.56 tCO_2/cap/year with the current technologies, energy modal shares, highlighting how narrow the space between the social floor and ecological ceiling is. Millward-Hopkins et al. (2020) propose a decent living standard of 5000–15,000 pkm/cap/year, varying based on population distribution, and the Hot or Cool Institute (2025) proposes a sufficiency benchmark of 4,200–8,000 pkm/cap/year. What is included in these thresholds varies between studies. Arnz et al. (2025) propose a framework for quantifying minimum mobility needs, based on personas with different resources and capabilities, built environments and transport infrastructures, and social-institutional backgrounds. They arrive at a wide range of values: 1500–15,000 pkm/cap/year for the Swiss case and 1800–2500 pkm/cap/year for the Mauritius case. Other social floor indicators include distances to public transport stops or destinations providing essential services, monetary spending on mobility relative to income, and levels of exposure to air pollutants, noise, or traffic injuries (Dillman et al., 2023b).

Empirical applications of corridor frameworks range from individual-level assessments at an urban scale to global country-level comparisons. Czepkiewicz et al. (2024) conducted a study in two Polish metropolitan areas, delimiting a space between self-reported satisfaction of transport needs and the CO_2 emission thresholds compatible with 1.5-degree targets. They identified the social and built environmental conditions of such defined mobility sufficiency. Dillman et al. (2023c, 2024) analyze the past trajectory of Iceland's mobility system, concluding that it came close to achieving a safe and just space but failed due to ecological overshoot. Dillman et al. (2023a) conducted a first global analysis of socio-environmental performance of mobility systems in 150 countries using multiple social and environmental indicators with thresholds, and found that no country reached the safe and just space in the domain.

In this section, we focused on studies that explicitly apply a corridor framework. Yet the framework can also be used to reinterpret the issues and outcomes of other studies and transport policies. One example is research on Low Emission Zones (LEZs, see also Section 3.2). LEZs aim to prevent overshooting environmental ceilings in the form of air pollution, primarily NO_X, which often exceeds WHO and EU limits in large urban centers. Evidence shows these policies can be effective (Chamberlain et al., 2023). However, because access is typically regulated on the basis of average engine emissions, total NO_X emissions over time — a function of average emissions and mileage — are seldom considered. Vehicle size is also rarely addressed, even though 'cleaner' vehicles are often significantly larger, with environmental and social consequences such as higher risks for pedestrians.

Assessing the social impacts of LEZs and explicitly defining the social floor helps identify those who gain or lose from these policies not just relative to the status quo, but also in terms of their need satisfaction. On the one hand, concerns often focus on low-income households who depend on older cars that may be banned or charged, and whose mobility needs may therefore be more difficult to satisfy (e.g., Charleux, 2014). Those who rely on such cars — and cannot afford a newer vehicle or fees — may fall below the social floor in terms of an insufficient level of accessibility (De Vrij and Vanoutrive, 2022). On the other hand, current air pollution already harms low-income groups disproportionately, including non-car users (Fairburn et al., 2019). The overall balance, therefore, depends critically on the socio-spatial distribution of households with different levels of resources. Finally, perceptions of air quality, effectiveness, and fairness often diverge from outcomes measured by pollution levels or income distribution (e.g., Rashid et al., 2021). Consequently, the success of demand-management policies such as LEZs depends heavily on public and political perceptions, as well as on how the policy is framed, debated, and consulted upon (Selmoune et al., 2020). The corridor framework is well-suited to addressing these complexities, not only in research but also in how transport policies are designed and implemented.

5. Future research agenda

Our brief overview of the existing research highlights the disconnect between multiple strands of research and their only partial and fragmented relation to strong sustainability and social-ecological justice. Still, only a handful of studies directly apply corridor frameworks to mobility research, and those that do often use different terminologies (even for very similar concepts) and overlapping, yet distinct perspectives. Below, we propose a seven-point research agenda for applying corridor frameworks in transport, mobility, and accessibility domains, which considers and defines explicit upper and lower limits of consumption; recognizes tensions between social and ecological goals, and the potential to reconcile them; and investigates conditions and pathways that enable sufficient mobility and access within limits, while considering multiple aspects of justice. Appendix A provides an operational roadmap to this agenda, as Columns III and IV formulate key research questions and tasks that need to be addressed, indicating the steps required to move from conceptual framing towards the development of applied outputs in future research and policy. As before, we refer to the applicable sections of the table in-text.

5.1. *Social floors and consumption minima*

Any effort to apply corridor frameworks in mobility would do well to integrate and build upon existing theories and indicators of transport poverty, transport equity, and accessibility, as recently done, e.g., by Dillman et al. (2023b) and Willberg et al. (2024). Importantly, such efforts should consider sufficient access rather than only analyze disparities (IV.1), and measures should directly refer to the ends of mobility and its social outcomes (e.g., enabling participation in meaningful and need-satisfying activities) rather than means (e.g., travel distances or trip numbers) (IV.2). Similarly, studies that operationalize social floors as decent living standards should go beyond implementing them as uniform per capita travel distance thresholds (Gupta et al., 2024b; Rammelt et al., 2023), especially when assessing social shortfall (IV.3).

Differentiating the threshold by the level of urbanization or population distribution is a welcome development (Dillman et al., 2023a; Kikstra et al., 2021; Millward-Hopkins et al., 2020), but more factors could be accounted for (IV.4). The disconnect between the means and ends of mobility makes it challenging to define minimum thresholds, and yet this is what is required to define "social floors" in the mobility domain (Dillman et al., 2023a; Virág et al., 2022). Future studies should apply and extend the method proposed by Arnz et al. (2025) to quantify minimum mobility needs in various local contexts and using new data sources. There is also a potential and need to engage local communities in deliberative processes that define locally-appropriate need satisfiers and minimum standards of mobility and accessibility in combination with expert assessments, following the "dual strategy" proposed for consumption corridors (Gough, 2020) or participatory frameworks based on Max-Neef's human scale development (Guillen-Royo, 2020; Max-Neef et al., 1991) (IV.5). There is also a need for work on incorporating the minimum thresholds and related deliberative processes into existing policy frameworks, such as Sustainable Urban Mobility Plans (SUMPs).

Going forward, developing a better theoretical and empirical approach to the definition of minimum consumption levels in mobility is a key challenge, as attested by recent attempts to define "minimum mobility standards", "fair mobility budgets", and "sustainable mobility guarantees" (Millonig et al., 2022; Millonig and Rudloff, 2025; Rode, 2024; Shibayama and Laa, 2024) (IV.1). These efforts would benefit from being informed by, and couched within, the corridor frameworks approach. Connecting mobility and activity participation to human needs and flourishing, and implementing adequate measures in empirical studies, is required for meaningful applications of corridor frameworks in the mobility domain. This perspective would also enable recognizing that immobility or immotility might be an asset and that human needs may be, to some extent and under the right conditions, satisfied at low mobility levels (Czepkiewicz et al., 2024; Ferreira et al., 2017; Guillen-Royo, 2020; Rau and Mögele, 2025). Studying conditions that enable it is another important future research direction (IV.6).

5.2. Ecological ceilings and consumption maxima

Social scientists have only recently begun exploring the issue of excessive mobility consumption (Cass et al., 2022). Firstly, there is a need to apply explicit ecological ceilings in mobility-related research at various aggregation levels, rather than only considering relative improvements (IV.3). In contrast to climate, translation of other types of planetary boundaries into thresholds and distributive principles is also underdeveloped (Rockström et al., 2023) (IV.7). Secondly, there is a need to explore other notions of excess and limits in the mobility domain (IV.8; see also Transport poverty, III.2-3, LDT and tourism, III.1-2). For example, Rode (2024) proposed ceilings related to square meters of used parking space relative to the total space available in car use budgeting. Future studies could also explore the burdens that high levels of mobility (e.g., heavy car use, frequent flying, long-distance commuting) have on the wider society (e.g., air pollution, noise, traffic accidents) and on travelers themselves (e.g., in terms of time, money, physical health, stress, or exhaustion), how these burdens accumulate, spillover to other life domains, and overlap with various dimensions of poverty (Guillen-Royo et al., 2024) (IV.9). Thirdly, future research should investigate what risks and negative social consequences might result from imposing consumption maxima and how to mitigate them. In particular, there is a need for more empirical and conceptual studies that assess the effects of various restrictive policies (e.g., Low Emission Zones, car-free neighborhoods) on transport poverty, gentrification, and the distribution of transport burdens (e.g., air pollution) (IV.10). Fourthly, there is a need for the development of policy frameworks and instruments guiding the fair allocation and enforcement of mobility consumption maxima, such as, for example, limits on GHG emissions, car ownership and size, or long-haul flights and airport capacity.

Finally, the research could address the question of what types and levels of accessibility are excessive (Accessibility, III.3). For example, infrastructure is very carbon-intensive. Still, beyond a certain level of development, its impact on the satisfaction of needs is limited despite further emission-intensive investment (Virág et al., 2022) (Accessibility, III.5)). Providing excessive accessibility to certain places and social categories well beyond sufficiency levels may make fitting into the safe space very unlikely and compromise the chances of making it sufficient elsewhere and for other people, raising justice issues (Accessibility, III.4, III.6). There is thus an urgent need for research exploring obstacles and possibilities of a transformation toward a society aiming at a sufficiency level, not a general increase in accessibility and availability of opportunities. It also requires assessing across cities and regions how accessibility should be distributed to meet both minimum and maximum levels of access, and evaluating obstacles and opportunities for societal transformations that secure basic accessibility, availability, and choice while preventing excessive levels of these entities (Accessibility, III.1).

Prioritizing sufficiency would question prevalent policies that aim at maximizing accessibility. These are pursued to improve growth and economic competitiveness through large-scale transport infrastructure investments or by more compact, distance-reducing urban development. However, the desirability of enhancing accessibility itself is rarely questioned. The quest for fast accessibility to an increased range of opportunities is related to what Rosa (2013) has termed "the acceleration of society" and its main economic, cultural, and socio-structural driving forces. Increased accessibility and availability are integral parts of the growth spiral on which the capitalist economy depends: More accessibility is required to provide more availability of opportunities, which is believed to create higher consumer demand, which depends on and enables increased production, which generates more profit and capital accumulation, which is necessary to sustain economic growth (Accessibility, III.5, III.7). However, growth in consumption in already wealthy countries can hardly be compatible with environmental sustainability and global solidarity.

5.3. Downscaling to regions, sectors, and individuals

Applying explicit ecological ceilings in mobility research would require downscaling planetary boundaries or reduction targets (IV.3). Available studies emphasize that boundaries are initial estimates and should be disaggregated and adjusted to local conditions. Still, their operationalization is challenging (Bai et al., 2024). While doughnut and corridor frameworks have been applied to regions (Dearing et al., 2014), cities (DEAL, 2020), or the transport sector (Dillman et al., 2021; Gupta et al., 2024b), researchers typically acknowledge the limitations associated with establishing ecological ceilings and social floors in a given context. How to develop and allocate shares of remaining ecological budgets is an ongoing debate with myriad ethical and political implications. Further, while basic needs can be established as a non-reducible finite number of satisfiable quantities to define a social foundation, determining what is the minimum amount of consumption required to satisfy a need is a challenging, contextually dependent question.

Further challenges with downscaling relate to considering the variability of people's life situations, abilities, perceptions, experiences, values, resources, and other characteristics that influence their mobility needs and skills (IV.4). Conceptually, this can be explored using the notions of motility (Kaufmann et al., 2004), the integration of accessibility with capabilities approach (Vecchio and Martens, 2021), and partly by the notion of perceived accessibility (Lättman et al., 2018; Pot et al., 2021). Empirically, it requires integrating top-down and bottom-up approaches (Vecchio and Martens, 2021), different methods and data types (Pucci and Vecchio, 2019), including surveys, qualitative approaches, geospatial analyses, visualization techniques (Krajzewicz et al., 2024), or agent-based models of the travel behaviour of different 'personas' (Arnz et al., 2025), ideally in iterative, multi-stakeholder, and deliberative processes of defining thresholds, limits and budgets, and

experimenting with their application (IV.5). There is a need for work on designing and testing policy instruments that define and allocate ecological ceilings or other consumption maxima (such as 'personal carbon allowances' (von Wright et al., 2022) or 'car use budgets' (Rode et al., 2025)) in ways that ensure sufficient access for people in diverse circumstances and are procedurally and distributively just.

5.4. Including long-distance travel and tourism

So far, corridor-inspired analyses and conceptual works in mobility have mostly concerned urban mobility (Dillman et al., 2021), ground transport (Dillman et al., 2023a), and accessibility (Willberg et al., 2024), with comparatively less emphasis on long-distance travel or tourism. Location-specific definitions of ecological ceilings should ideally include long-distance travel and tourism, which requires overcoming challenges related to their allocation to territorial units (e.g., Boussauw & Decroly, 2021), and splitting the ceilings between long- and short-distance travel scopes and trip purposes (IV.11).

The current, flight-intensive practices in affluent countries are impossible to generalize to the rest of the world within ecological limits. However, it does not mean that no form of long-distance travel or tourism could be included within corridors. Future research should concern the role of tourism and LDT in meeting human needs and flourishing (Timmer and Van der Deijl, 2023), and create the theoretical and empirical groundwork for establishing the social floor in this domain (LDT and tourism, III.1). It could, for example, complement the existing research on long-distance travel poverty (Warnock-Smith et al., 2023) with need-based poverty thresholds and conduct empirical studies on the role of different tourism practices and different levels of travel activity and accessibility in well-being and need satisfaction.

A related research avenue relates to LDT accessibility, particularly aviation (e.g., Karam et al., 2022) and interpreting it from perspectives of equity, justice, and sufficiency (Accessibility, III.1, III.3). Access to airports is one of the factors explaining air travel levels (Bruderer Enzler, 2017). Improving aviation accessibility may thus stimulate air travel, contribute to its entrenchment in societies, and make demand reductions more challenging (Yoo et al., 2025) (Accessibility, III.5; LDT and tourism, III.2). For example, rapidly expanding social and professional networks create ties and obligations whose maintenance meets the criteria of basic needs (e.g., visiting close family) (Mattioli, 2016). When these networks are increasingly maintained using air travel, the tensions increase between social and ecological aspects of justice. For example, recent migrants might be disproportionately affected by aviation taxes (Büchs and Mattioli, 2024). Social-ecological perspectives on long-distance mobility might thus be instrumental in recognizing and resolving such conflicts. There is a need for more studies exploring synergic satisfiers (i.e., ways to enhance well-being while reducing ecological impacts), particularly in leisure and maintaining social ties over long distances (Guillen-Royo, 2022; Guillen-Royo et al., 2024) and policies supporting such synergies (LDT and tourism, III.1–4). There is also a need for research on the growth of highly excessive forms of LDT (e.g., private jets, space tourism) and strategies to curb them before they get further entrenched in societies (Markard et al., 2023) (IV.12, LDT and tourism, III.2 and 5). Examples of corridor-oriented policy instruments that warrant further work include sufficiency-based caps on airport capacity, personal allowances and taxes targeting excessive flying (e.g., frequent flyer levy), and social tourism programs that provide access to beneficial leisure activities with small footprints.

Future research should also consider the role of LDT, including air and maritime transport, in social provisioning in remote and insular regions, and assess the economic and social risks of climate policies in transportation. These considerations should have sufficiency in mind, rather than simply maximizing access to opportunities at long distances or minimizing travel times. Future studies should assess the necessary or excessive character of tourism practices and LDT infrastructures and search for ways to achieve flourishing through alternative means, such as trips to nearby locations or without travelling (LDT and tourism, III.2, III.4). There is also a need for studies on economies and provisioning systems based on local resources, with reduced dependence on fossil fuels and foreign tourism, particularly in the case of remote and insular regions that rely on aviation. In areas where alternatives for aviation are feasible, there is a need for sufficiency-oriented work on providing viable rail connections over very long distances (e.g., on a continental scale) and across different national governance and management structures.

5.5. A broader perspective on justice

Justice is at the heart of corridor frameworks. The growing calls for the establishment of boundaries and corridors result from the unjust exploitation of resources that are valuable to current and future generations, often at the cost of lives and livelihoods of communities at the world's periphery. While justice-related analyses have recently flourished in the transport and mobility literature (Lewis et al., 2021; Martens, 2016; Sheller, 2018), ecological and social aspects are not always considered simultaneously (Grossmann et al., 2022) (IV.13). Corridor frameworks highlight multiple relationships between the 'safe' and the 'just' and vectors of justice, including interspecies, intragenerational, and intergenerational (Gupta et al., 2023).

While distributive justice is central to the choice and application of allocation principles, inequitable distribution of resources and damages is linked to systemic, procedural, and epistemic injustices that have allowed certain actors to overuse the Earth at the expense of others. There is a need both for a better understanding of how multiple types of injustice underpin current ways of distributing mobility-related goods and harms, and for guidance on how to implement mobility budgets and other means of arriving at safe and just limits in ways that are inclusive, fair, and transparent (IV.13).

Further discussion is expected to understand how intergenerational equity concerns can be reconciled with principles of egalitarianism and sufficiency in mobility (Willberg et al., 2024). Relatedly, the intergenerational perspective has remained largely absent in accessibility and transport poverty research. There is a conceptual and empirical void in understanding how efforts to maximize accessibility for the current generation may compromise the ability of future generations to maximize their accessibility and how these dilemmas should be reconciled (Accessibility, III.1, III.6–7).

We also lack standardized measures of justice and perceived justice, including those which could be systematically applied in transport surveys (Haxhija et al., 2025). Such measures could be applied to evaluate the different costs and benefits of travel, as well as their distribution, and the procedural and epistemic injustices. They would also include tools that would enable the study and comparison of what constitutes sufficient or excessive travel for different social groups (IV.4, 5, 8, 13–14).

Finally, a comprehensive approach to justice in mobility requires seriously treating global and spatially shifted injustices, such as externalized ecological and social costs related to the operation, modernization, and expansion of mobility systems. These include, i.a., green transformation (e.g., resulting from mining for minerals required for vehicle fleet electrification), maximizing mobility of some (e.g., unconstrained global tourism) while restricting the mobility of others (e.g., with border controls and deportations), environmental injustices related to air pollution and other "externalities" of transport systems, and spatial injustices between urban, suburban, and rural areas (IV.14).

5.6. Provisioning systems for sufficient access and mobility

There is an urgent need for conceptual and empirical work on provisioning systems that would provide sufficient mobility and access within social and ecological limits, as well as those that work against this goal (IV.15). The latter requires studying the role of various

dependencies, power structures, and vested interests in maintaining the status quo (e.g., obstructing climate change mitigation and the phase-out of damaging industries (Huwe et al., 2025; Rinscheid et al., 2021)) and stimulating developments that undermine sustainability and sufficiency (such as space travel or SUVs, see Markard et al. (2023)) – and strategies to counter them (IV.16). Crucial topics here include the provision of physical and organizational infrastructures that structure living environments and social practices in ways that escalate need satisfiers (e.g., airports, highways, parking spaces, urban sprawl) and the role of powerful actors (e.g., the automotive industry) in entrenching dependencies (Mattioli et al., 2020). Key research directions towards sufficiency-oriented provisioning systems include just transitions and phase-out policies in most burdensome sectors (e.g., car manufacturing, aviation, mass tourism) (IV.17), developing the intra-sectoral decision-making processes for "production corridors" in the transport sector (Bärnthaler, 2024) (IV.18), sufficiency-oriented transport and land use planning principles and just processes, and studying the potential role of key actors (such as trade unions, social movements, local, regional and national governments, international organizations) in bringing about change (IV.19).

5.7. Studying pathways leading in and out of the safe and just space

Multiple topics and research directions proposed in this paper refer either directly or indirectly to the transitions required to reach a safe and just space in mobility, or to transitions that have led us in the opposite direction, decreasing the satisfaction of human needs, satisfying needs at excessive consumption levels, and/or increasing ecological overshoot (Fig. 3) (IV.20). The overarching objective of corridor-oriented studies should be to provide knowledge on the conditions and pathways necessary to achieve sufficient mobility, access, and well-being within ecological limits, as well as those that have led us away from it. To this end, the corridor approaches could be combined with theories of socio-technical transitions and complex systems (Geels, 2004; Köhler et al., 2019; McPhearson et al., 2016). Although transition studies have offered valuable insights into historical developments and strategies for future change, they have frequently overlooked the social and ecological ramifications of these changes (Fanning et al., 2020). Future studies could replicate and expand the few existing studies that address this gap in the mobility domain (Dillman et al., 2023c, 2024).

Furthermore, several researchers have highlighted the absence of studies on negative trends that increase the environmental intensity of well-being, their drivers, and strategies to address them, in the transition

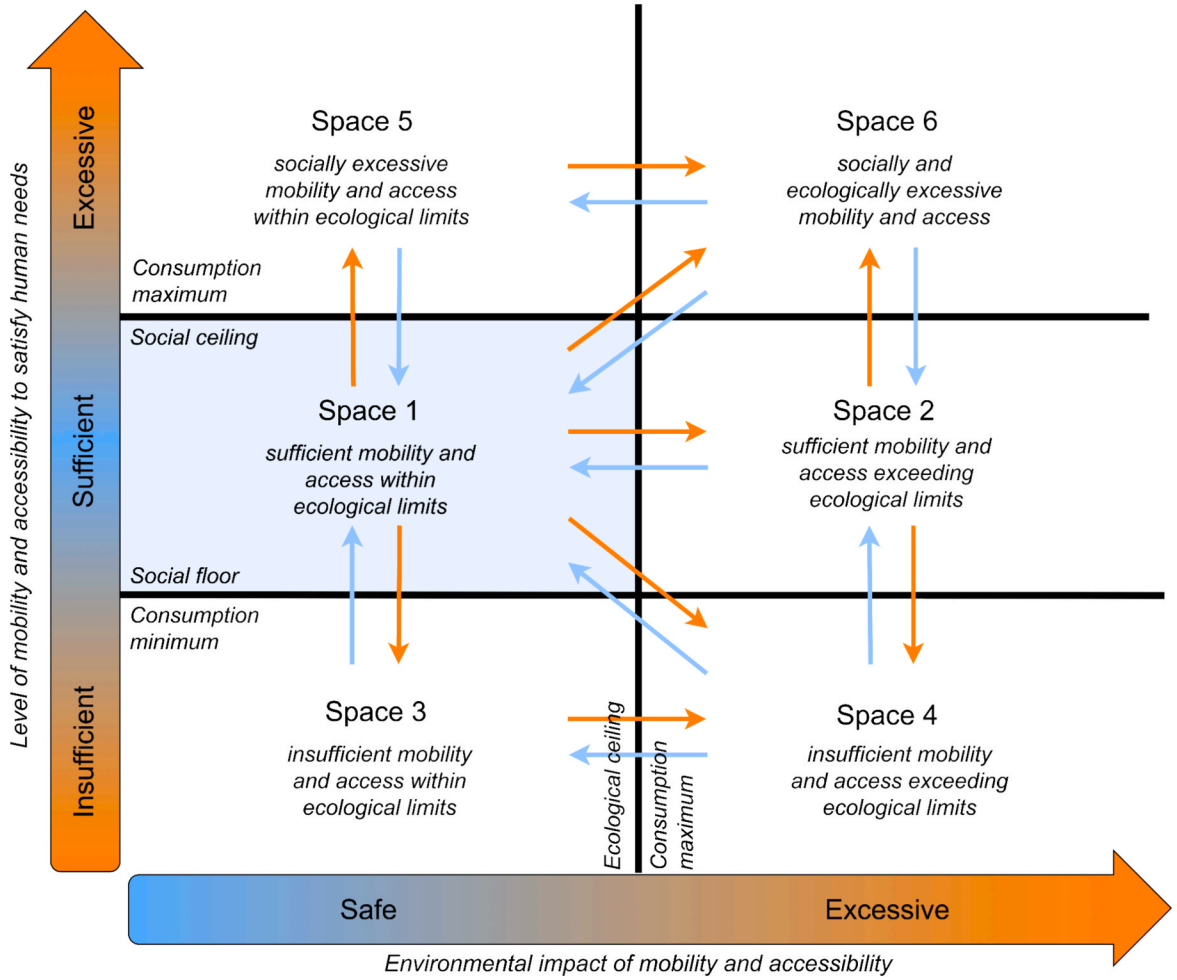

Fig. 3. The space of possible positions of transport systems in the spectrum of potential social and ecological outcomes, and the conceptual pathways of transitions between them.

Blue arrows represent transition pathways in line with the normative goals of the corridor frameworks, and orange arrows represent transition pathways in the opposite direction. Space 1 is the "safe and just space for mobility", in which mobility-related needs are satisfied at a safe environmental cost. Space 2 is when mobility-related needs are satisfied at an excessive ecological cost. Space 3 represents systems where environmental impacts are at safe levels, but mobility-related needs are not universally met. Space 4 represents systems where mobility-related needs remain unsatisfied despite excessive ecological cost. In Space 5, mobility does not exceed safe environmental thresholds, but is excessive for other reasons (e.g., burdens on social life or health), and in Space 6, excessive levels of mobility and access come at an excessive social and environmental cost.

literature (Antal et al., 2020; Markard et al., 2021). Studying pathways towards and away from a safe and just space in mobility would contribute to the broader research agenda on pathways towards achieving human well-being within ecological ceilings (Roberts et al., 2020). Fig. 3 depicts the conceptual space created by combining environmental and social outcomes of mobility systems and their social and ecological thresholds. It illustrates pathways in and out of the safe and just mobility space. Appendix B provides examples of associated research questions related to the research directions outlined in this paper.

6. Conclusion

This article has reviewed four strands of literature in mobility and transport research, each of which focuses on aspects that are key from a corridor framework perspective. As shown, each of them is limited in its focus and has blind spots. While this might make sense in terms of a 'division of labor' between different research strands, it also prevents a more holistic consideration of the socio-ecological challenges facing this sector in the 21st century.

We believe that the emergence of corridor frameworks provides an opportunity for these strands to coalesce around a common vision and research agenda. For each of these research traditions, this will require both transcending self-imposed limits (e.g., the lack of consideration for ecological ceilings in most transport poverty and accessibility research) and an openness to cross-pollination with other traditions.

The article also provides a review of recent research efforts to apply corridor frameworks in a mobility and transport context. Here, the challenge for researchers is to adequately take into account and integrate the many insights that already exist in the four strands reviewed in the first part of the paper. In this spirit, we put forward a research agenda with seven directions that we believe ought to be prioritized, highlighting how these could build on and advance existing research in this field. We thereby add an agenda for integrating various disciplines to address current socio-ecological issues more holistically. This includes a greater focus on social floors, ecological ceilings, greater downscaling, inclusion of long-distance travel and tourism, a broader perspective on justice, a focus on provisioning systems for sufficient access and mobility, and studying pathways leading in and out of the safe and just space. We hope that this can provide guidance and impetus to efforts to chart a path between ecological limits and social justice for the transport sector.

Current mobility and transport policies remain only partially aligned with a corridor- or limits-based perspective. While many national and local strategies acknowledge climate targets, the policy instruments guiding mobility systems still overwhelmingly prioritize efficiency, speed, and infrastructure expansion, with limited attention to absolute ecological thresholds or minimum accessibility standards. At the same time, social objectives are frequently framed in terms of increasing mobility options rather than ensuring meaningful access, leaving structural dependencies and forced travel largely unaddressed. From a corridor perspective, this indicates that current policy frameworks remain far from integrating explicit floors and ceilings: ecological limits are weakly operationalized, and social floors are undefined or implicit.

The absolute minimum and maximum boundaries of mobility consumption can already be used to define strategic indicators and targets for Sustainable Urban Mobility Plans (SUMPs) and other strategic and operational documents. However, implementing corridor frameworks in transport policy would require public bodies to treat these thresholds as core constraints in policy design rather than optional or advisory benchmarks. This also entails translating national climate targets and Earth system boundaries into absolute, mobility-related ceilings that guide infrastructure planning, investment decisions, and transport subsidies.

From a practical standpoint, at the local level, policymakers should adopt sufficiency-oriented transport planning that prioritizes reducing excessive mobility through compact urban development and investments in public and active transport, while limiting infrastructure expansion that creates lock-ins. This, in turn, requires identifying where people are structurally dependent on high-cost mobility modes and developing pathways that reduce travel demand (e.g., relocating services or improving local provision), while safeguarding essential mobility for remote communities where accessibility improvements are not feasible.

To address structural drivers of excess long-distance mobility, policies should directly target demand for aviation and long-distance car travel through phase-out strategies, regulatory reforms, abandoning airport expansion plans, and removing subsidies that incentivize high-impact mobility, complemented by support for viable alternatives such as night-train networks and just transition strategies for tourism-dependent regions. In both cases, new transport investments should be approved only when there is clear evidence that they bring mobility to the corridor space.

When defining mobility and access standards, policymakers should adopt sufficiency-oriented and 'just accessibility' metrics that assess whether people achieve meaningful participation and need satisfaction within ecological limits, rather than relying on trip counts, modal shares, or time-based efficiency indicators. All restrictive or demand-side measures should, in turn, undergo mandatory equity impact assessments to anticipate, measure, and mitigate social risks, while also recognizing the unequal distribution of benefits such as reduced pollution, noise, and congestion. To ensure that both social floors and ecological ceilings are context-sensitive and avoid generating new access-related inequalities, policymakers should establish participatory processes that develop mobility thresholds that are substantively just and procedurally robust.

CRediT authorship contribution statement

Michał Czepkiewicz: Writing – review & editing, Writing – original draft, Visualization, Supervision, Investigation, Conceptualization. **Giulio Mattioli:** Writing – review & editing, Writing – original draft, Supervision, Investigation, Conceptualization. **Filip Schmidt:** Writing – review & editing, Writing – original draft, Visualization, Supervision, Investigation, Conceptualization. **Elias Willberg:** Writing – review & editing, Writing – original draft, Visualization, Investigation, Conceptualization. **Lena Kilian:** Writing – review & editing, Writing – original draft, Investigation, Conceptualization. **Henrikki Tenkanen:** Writing – review & editing, Writing – original draft, Investigation, Conceptualization. **Dick Timmer:** Writing – review & editing, Writing – original draft, Investigation, Conceptualization. **Ákos Gosztonyi:** Writing – review & editing, Writing – original draft, Visualization, Investigation, Conceptualization. **Johanna Raudsepp:** Writing – review & editing, Writing – original draft, Visualization, Investigation. **Sanna Ala-Mantila:** Writing – review & editing, Writing – original draft, Investigation, Conceptualization. **Lisa Jacobson:** Writing – review & editing, Writing – original draft, Investigation, Conceptualization. **Mònica Guillen-Royo:** Writing – review & editing, Writing – original draft, Investigation, Conceptualization. **Dawid Krysiński:** Writing – review & editing, Writing – original draft, Investigation, Conceptualization. **Kevin Dillman:** Writing – original draft, Investigation, Conceptualization. **Jukka Heinonen:** Writing – review & editing, Writing – original draft, Investigation, Conceptualization. **Petter Næss:** Writing – review & editing, Writing – original draft, Investigation, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgments

Initial ideas for the article originated from a seminar on "Socio-Ecological Perspectives on Mobility" held at TU Dortmund University on the 3rd and 4th of July, 2023. The seminar was funded by the DFG research project "Change in long-distance travel: uncovering travel activity trends, inequalities, and dynamics over the life course" (2022-2025, Project Number: SCHE 1692/10-2), led by Joachim Scheiner and Giulio Mattioli. Participation of Michał Czepkiewicz, Filip Schmidt, and Dawid Krysiński in the workshop was made possible by the "Travel behavior in Polish cities: causality, behavioral changes, and climate impacts" project funded by the National Science Centre in Poland (2020/37/B/HS4/03931). Henrikki Tenkanen thanks the Research Council of Finland for the financial support for this work via the MAPICO project (2023-2027, grant number: 354342). Elias Willberg thanks the European Research Council for the financial support for this work via the GREENTRAVEL project (101044906). We acknowledge the contributions of Jörgen Larsson, Sarah Christine Olson, and Janine Welsch, who participated in the seminar. Petter Næss (1951–2025) contributed significantly to this article but passed away in April 2025, before the final version was submitted. This work is dedicated to his memory.

Appendix A

Table A1
An operational roadmap for the research agenda, with questions and research directions by tradition, and those postulated by the corridor frameworks.

Research directions / Research traditions	I Traditional research directions	II More recent research directions	III Corridor frameworks Challenges and questions specific to different traditions	IV Common challenges and questions
Accessibility	1. What is the level of accessibility for given places, groups, and trips? 2. How to maximize accessibility (rather than mobility)?	1. How (un)just is the current distribution of accessibility – disparities in accessibility? 2. What are the minimum accessibility thresholds that should be met? 3. How to include other travel costs than time or distance? 4. What is the relationship between accessibility and exposure to air pollution, noise, greenery, and extreme weather conditions? 5. What are the impacts of certain policy measures on accessibility and environmental costs?	1. How to make access to mobility as just as possible without exceeding ecological ceilings? 2. How to include carbon budgets and other ecological thresholds in calculating and shaping accessibility? 3. When is accessibility excessive? 4. What is the impact of certain increases in accessibility on needs satisfaction and environmental costs, in different places, for various social categories? 5. What is the role of supply of infrastructure and connections (e.g., airports, railroads, highways) in stimulating travel demand and escalation of need satisfiers? 6. How much (of what type of) new infrastructure is possible in the safe space? 7. How do accessibility-related expectations grow, and how can they be contained if they harm current or future generations?	1. How to construct and apply measures that consider sufficient mobility and access rather than only analyze disparities? 2. How to construct and apply measures which directly refer to the ends of mobility and its social outcomes rather than means? 3. How to downscale and disaggregate the measures and translate ceilings and floors into different aggregation levels (global, regional, local, individual, sectoral)? 4. How to adjust the measures to local conditions and include variability of people's life situations, abilities, perceptions, experiences, values, resources, and other characteristics that influence their mobility needs and skills? 5. How to mobilize and design public participation in defining corridors in a procedurally and epistemically just way?
Sustainable transport	1. How to make sustainable transport work as a means to connectivity, trade, and economic growth? 2. How to decouple transport from carbon emissions through improved efficiency, new infrastructure, and technological innovations? 3. How to generally reduce the relative environmental impact of mobility, particularly the use of private cars? 4. How to increase public acceptability for policies related to sustainable transport?	1. How do current social, economic, and political structures contribute to high transport emissions? 2. What is the impact of high emitters? 3. How to include social justice, focusing on accessibility, affordability, and public participation? 4. What are the benefits of sustainable transport for human health?	1. How to satisfy mobility-related needs without increasing energy and resource demands (i.e., escalating satisfiers)? 2. How to satisfy mobility-related needs within ecological limits? 3. How do the outcomes of different sustainable transport policies and transitions relate to the ecological ceilings and social floors? 4. What are the social risks (e.g., transport poverty, gentrification) of sustainable transport policies?	6. What are the conditions for satisfying the needs at low mobility levels and for enabling purposeful immobility? 7. How to translate other types of planetary boundaries than GHG emissions into distributive principles and thresholds in the field of transport and mobility? 8. What better notions of excess and limits can be developed? 9. How do the societal and environmental burdens of intensive mobility unevenly affect different people, accumulate, and spill over to other domains?
Transport poverty	1. What inequalities exist concerning travel behaviour, access to transport, access to services and opportunities, and exposure to the negative impacts of transport? 2. How can limitations on travel activity hinder social inclusion and need satisfaction?	1. How to substitute 'efficiency' and aggregate utility maximization with distributional equity and justice criteria? 2. How to make equity the goal of transport planning? 3. What other types of justice are at play besides distributional? 4. What processes and policies create transport-related inequalities and	1. How to define minimum or decent standards of mobility and access in different geographical, cultural, and social circumstances? 2. How to increase the satisfaction of mobility-related needs of the transport-poor without exceeding ecological ceilings? 3. How to eradicate transport poverty	10. What risks and negative social consequences might result from imposing consumption maxima and restrictive policies, and how can they be mitigated? What is the impact of decreasing the environmental and consumption overshoot and sustainable transport policies on unprivileged communities and their ability to satisfy mobility-related

(*continued on next page*)

Table A1 (*continued*)

Research directions Research traditions	I Traditional research directions	II More recent research directions	III Corridor frameworks Challenges and questions specific to different traditions	IV Common challenges and questions
		inequities? Who and why is particularly vulnerable to the effects of sustainable transport and climate policies?	while staying within ecological limits? What types of redistribution and restoration are needed in this regard?	needs? 11. How to include not only SDT but also LDT and tourism in the studies and policies informed by corridor frameworks?
Long-distance travel (LDT) and tourism	1. How to balance the economic, social, and environmental impacts of tourism? 2. What are the determinants of LDT-related distances, modes, and environmental impacts? 3. What is the environmental impact of tourism? 4. How unequal is the distribution of LDT and participation in tourism?	1. How can long-distance transport poverty be defined? 2. How does tourism contribute to well-being? 3. How is the need for leisure and rest to be met equitably?	1. What is the sufficient level of long-distance travel and tourism for the satisfaction of needs related to leisure and social relatedness? 2. What levels of LDT and tourism are excessive? How can sector-specific thresholds be set for LDT in terms of environmental impact and consumption maxima? How much LDT and how much tourism is possible in a safe and just space? 3. What is the impact of the geographical spread of social networks on the need satisfaction and GHG emissions? 4. How can needs related to leisure and maintaining social ties be met at low mobility levels and without trespassing the planetary boundaries or compromising the well-being of other people? 5. How do highly excessive forms of LDT (e.g., private jets, space tourism) grow, and what strategies can curb them before they get further entrenched in societies?	12. What is the impact of particularly unsustainable developments in mobility (e.g., growing size of cars, growth in long-haul flights, and space tourism) on the environment and well-being of different people? How do we understand, stop, and reverse unsustainable transitions? 13. How do multiple types of injustice underpin current ways of breaching the boundaries? How to simultaneously consider both the environmental and social aspects in justice-oriented mobility studies and mobility budgets? 14. How to include global and spatially displaced injustices, such as externalized ecological and social costs related to the operation and expansion of mobility systems, including green transformation, maximizing mobility of some while restricting the mobility of others, environmental injustices, and spatial injustices between urban, suburban, and rural areas? 15. How is the economic system and its production regimes and provisioning system to be reshaped to be compatible with corridors? 16. How to overcome the opposition of vested interests that are based on trespassing the boundaries? 17. How to develop just transition and phase-out policies in the most burdensome mobility-related sectors? 18. How to complement the idea of consumption corridors with production and infrastructure supply? 19. How to create sufficiency-oriented transportation and land use planning principles, including multiple stakeholders, in ways that are inclusive, fair, and transparent, and include multiple bodies of knowledge? 20. What are the pathways of transitions required to reach a safe and just space in mobility, or to transitions that have led us in the opposite direction, decreasing the satisfaction of human needs, satisfying needs at excessive consumption levels, and/or increasing ecological overshoot?

Appendix B

The appendix contains example research questions related to different boundaries, spaces, and pathways depicted in Fig. 3.
Research questions related to boundaries depicted in Fig. 3

Boundary 1: Ecological ceiling and consumption maxima (ecological)

How to define ecological ceilings:

- In absolute terms (e.g., based on biophysical tipping points)?

- While considering (1) different justice criteria, including procedural ones, and (2) the costs and impact of exceeding ceilings and of actions aimed at mitigating this impact for different places and communities?
- Including other types of planetary boundaries than climate impact?

Boundary 2a: Social floor and consumption minima

How to define the social floors and consumption minima:

- In terms of sufficient access (e.g., based on theories of needs, decent living standards, or impact on life expectancy)?
- Measuring ends of mobility and its social outcomes rather than means?
- Relative to people's characteristics and capabilities?
- Relative to the location's built environment and population distribution?
- Using different criteria of distributive justice?

Boundary 2b: Consumption maxima (social)

How to define consumption maxima:

- Using different definitions of excessive consumption?
- Considering the negative social consequences of excessive mobility and accessibility (e.g., burdens on travelers and other society members)?
- In procedurally just ways?

All three boundaries

How to define and apply floor(s) and ceiling(s):

- In a disaggregated and downscaled manner (e.g., to the transport sector, to urban areas), and adjusted to local conditions?
- That include both short and long-distance travel?
- In a way that engages stakeholders in a procedurally and epistemically just process, including local communities?
- In a way that considers the effects of imposing consumption maxima and ecological ceilings on the social floor?

Research questions related to pathways between the safe and just space (Space 1) and other spaces depicted in Fig. 3

Pathways from Space 3 to Space 1

Alleviation of transport poverty and providing sufficient mobility and access without exceeding ecological ceilings (e.g., improving accessibility by other modes than private car, enabling local satisfaction of needs).

Examples of RQs:

- How to increase the satisfaction of mobility-related needs of the transport poor without exceeding ecological ceilings?
- How can we make access to mobility as equitable as possible while staying within ecological limits?
- How to improve regional accessibility of disadvantaged regions without exceeding ecological ceilings?

Pathways from Space 1 to Space 3

Producing transport poverty without increasing ecological impacts (e.g., reducing overall mobility by decreasing accessibility with all means of travel).

Examples of RQs:

- How to counteract the decline of public transport in rural areas in ways that safeguard sufficient levels of accessibility for residents while not exceeding ecological limits?
- What types of practices, arrangements, and provisioning systems that are compatible with staying in safe and just space have been in decline, discarded, or forgotten, and could be reinstated?

Pathways from Space 4 to Space 1

Reducing the dependence on environmentally harmful mobility practices while providing sufficient mobility and access (e.g., enabling local satisfaction of needs, replacing long-haul trips with shorter ones, improving accessibility by public transport to alleviate car dependence).

Examples of RQs:

- What is the impact of certain increases in accessibility on needs satisfaction at their different levels and on environmental costs, in other places, for various social categories?
- Do the environmental costs of increased accessibility exceed absolute ecological limits?
- How to provide sufficient accessibility for the current generation without compromising the ability of future generations to satisfy their mobility-related needs?

Pathways from Space 1 to Space 4

Producing car dependence and flight dependence (e.g., decreasing chances of satisfying needs locally, expanding the distances between places where close people live).

Examples of RQs:

- How does car and air travel become essential for the social floor and need satisfaction for certain groups of people, societies, and regions, and how can it be prevented?
- How do we understand, stop, and reverse transitions that increase ecological cost of satisfying human needs through mobility?

Pathways from Space 1 to Spaces 2 and 6

Unsustainable mobility transitions: exceeding ecological ceilings despite insignificant gains in need satisfaction or due to excessive mobility consumption and escalation of need satisfiers (e.g., growing size of cars, normalization of frequent and distant flying, space flights).

Examples of RQs:

- What is the impact of particularly unsustainable developments in mobility (e.g., bigger cars, SUVs, frequent intercontinental flights, space tourism) on exceeding ecological limits, increasing the ecological cost of human need satisfaction, and harming people?
- What is the role of the supply of infrastructure and connections (e.g., airports, railroads, highways) in stimulating travel demand and the escalation of need satisfiers?

Pathways from Spaces 2 and 6 to Space 1

Reducing environmental impact without compromising satisfaction of the need for access and mobility (e.g., switching from private to shared cars, reduction of leisure flights in favor of more local holidays).

Examples of RQs:

- What policies can bring social and ecological impacts of transportation systems into a safe and just space?
- How to reduce excessive and environmentally harmful mobility practices without compromising need satisfaction?
- What is the impact of decreasing the environmental and consumption overshoot on unprivileged communities and their ability to satisfy mobility-related needs?

Pathways from Space 6 to Space 5

Reducing the environmental impact of socially excessive mobility to stay within ecological ceilings (e.g., modernizing fleets using new technologies while keeping excessively high levels of mobility and access).

Examples of RQs:

- What technological breakthroughs would be needed to keep the environmental impacts of mobility within ecological ceilings without curbing overconsumption of mobility in highly-mobile societies?
- To what extent is it possible to reduce the environmental impacts of mobility below ecological ceilings without curbing overconsumption of mobility in highly-mobile societies?

Pathways from Space 1 to Space 5

Developing types or levels of mobility which do not exceed ecological ceilings but are in other ways excessive (e.g., due to negative impact on the well-being or accessibility of others).

Examples of RQs:

- What are the negative social impacts of transport modes with relatively small ecological footprints?
- To what extent and to what point does well-being increase with increasing mobility?
- What are the detrimental effects of high mobility and accessibility on well-being (e.g., increase in the pace of life or tiredness)?

Research questions common to all spaces and pathways

What are the paths to redistribute the use of mobility resources in processes that:

- Allow to bring ecological impacts below the ceilings or minimize the overshoot?
- Allow to minimize the number of people living below the social floor?
- Reshape provisioning systems towards safe and just spaces, overcoming the opposition of vested interests, in procedurally and epistemically just ways?

Data availability

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

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