Transportation Research Part A 195 (2025) 104449

Contents lists available at ScienceDirect

Transportation Research Part A

journal homepage: www.elsevier.com/locate/tra

Socio-material perspectives on perceived accessibility of cycling: A sociological inquiry into practices, regulations and informal rules☆

Tommy Ho-Yin Chan

Transport Studies Unit, School of Geography and the Environment, University of Oxford, South Parks Road, Oxford OX1 3QY, UK

A R T I C L E I N F O

Keywords:
Perceived accessibility
Social practices
Socio-material
Cycling
Bike sharing
Hong Kong

A B S T R A C T

This paper examines the intersubjectivity of perceived accessibility (PA) as a relational construct emerging from the interplay between individuals' internalised dispositions and socio-material environments. Through ethnographic observations and interviews with cyclists, non-cyclists, and bike rental operators, it explores cycling practices within Hong Kong's app-based bike-sharing landscape. Findings reveal that PA extends beyond individual experiences, shaped by the interplay between material infrastructure, cycling practices, formal regulations, and informal rules. Factors such as spatial (cycling areas), temporal (weather, nighttime), and material (bike parking, rental availability) conditions mediate PA. Symbolic and material power are evident in government policies that promote 'safe cycling' while restricting infrastructure development in urban areas, shaping cycling practices and reinforcing its marginalisation in urban mobility. Despite these constraints, residents actively reshape accessibility by informally redefining cycling spaces and reinterpreting bike reliability, both through physical and digital experiences, thereby materially and symbolically integrating cycling into transit-oriented mobility. The study also highlights the temporality of PA; for instance, night-time cycling remains viable for those leveraging cultural awareness of reduced law enforcement at particular times, preparing with proper lighting equipment, or benefiting from well-lit infrastructure. These findings demonstrate that PA is contextually produced, shaped by relational social structures rather than fixed attributes of individuals or infrastructure alone. The paper calls for policy approaches that recognise the intersubjective nature of PA, advocating for adaptive regulations and inclusive infrastructure to foster equitable and sustainable urban mobility.

1. Introduction

Bicycling, recognised for its health and environmental benefits, is a compelling alternative to motorised transport in urban areas and a driver of land use and transport policies (Kosmidis and Müller-Eie, 2024; Stevenson et al., 2016; van Wee, 2002). Bicycle accessibility has become a focal point, encompassing access to retail (Arranz-López et al., 2019; Christiaanse, 2020; Krizek et al., 2012), residential locations (Qiao et al., 2021), and transit stops (Chan et al., 2023; Chen et al., 2022; Scheepers et al., 2016; Xu et al., 2022; Zhao and Li, 2017; Zuo et al., 2020). However, unlike car and public transport, local-level accessibility for walking and cycling often lacks clear definitions in policy and practice. Accessibility assessments predominantly focus on cars and rail traffic (Boisjoly and El-Geneidy, 2017; Van Der Meulen and Mukhtar-Landgren, 2021), relying on spatial metrics that only partially capture how

☆ This article is part of a special issue entitled: 'Perceived accessibility' published in Transportation Research Part A.

E-mail address: ho.chan@ouce.ox.ac.uk.

https://doi.org/10.1016/j.tra.2025.104449

Available online 14 March 2025

individuals perceive the built environment and assess the ease of reaching destinations (Cheng and Chen, 2015; De Vos et al., 2023).

Emerging interest in perceived accessibility (PA) positions it as a valuable heuristic for understanding the actual or potential use of opportunities to access services and activities. PA captures individuals' perceptions of the built environment, shaped by socio-demographic factors, travel abilities, and preferences (Márquez and Soto, 2021; Mazzulla et al., 2024; Xu et al., 2024). While empirical studies—predominantly quantitative—investigate PA's determinants, including links to objectively measured accessibility (Fu et al., 2024; Lättman et al., 2018; Negm and El-Geneidy, 2025; Pot et al., 2021; Vafeiadis and Elldér, 2024) and facility usage (Völker et al., 2018), significant gaps remain in understanding its qualitative dimensions. Existing qualitative studies often adopt an individualistic focus (e.g., Pot et al., 2023, 2021; van der Vlugt et al., 2019), overlooking the collective and relational aspects of mobility practices. This limitation has prompted a shift toward a practice-oriented perspective, emphasising the interplay of individual actions and collective mobility practices within social and material contexts (Kent, 2022; Schwanen et al., 2012; Shove and Walker, 2010).

This paper examines PA through the lens of cycling as a social practice, framing it as a relational construct that is both socially and materially shaped (Davidson, 2022; Larsen, 2017). While previous research highlights the influence of external environments and individual abilities on PA (De Vos et al., 2023; Vecchio and Martens, 2021), this study extends the discussion to include the role of broader social structures and power relations (Cresswell, 2006) inherent in the socio-material urban environment. The findings show that PA transcends individual experiences, shaped by the interaction of social practices, formal regulations, and informal rules. These factors are mediated by spatial (e.g., permitted cycling areas), temporal (e.g., weather and nighttime), and material (e.g., parking and bike availability) conditions, collectively influencing PA across diverse social groups and neighbourhoods with varying socio-material environments. The paper concludes with policy recommendations, emphasising the importance of understanding the interplay between formal and informal rules, bike rental operations, parking management, and physical infrastructure in shaping cycling practices and accessibility.

2. Literature review

2.1. Accessibility of cycling

Accessibility in transport is a critical component of urban planning and public policy, focusing on how easily people can reach essential services and opportunities. Despite varying definitions, accessibility in transport is fundamentally understood as the ease with which people can reach desired destinations. This encompasses a range of factors, including physical accessibility to transport services and infrastructure (Bivina et al., 2019; Bree et al., 2020), connectivity of transport services (Yang et al., 2020), and the availability of multi-modal services (Chan et al., 2023), all of which must be considered from both spatial and temporal perspectives (Handley et al., 2019; McArthur et al., 2019). For cycling, accessibility involves both the availability of bicycles and the infrastructure that supports cycling as a mode of transport. This includes how individuals can access a bicycle, whether through ownership, rental from traditional bike shops, or automated, dockless systems. Moreover, it considers the reach of cycling as a mode of transport, supported by dedicated bike lanes, parking, and integration with other transport modes.

The literature highlights the significant role of cycling as a standalone mode of transport for leisure and commuting, as well as in combination with public transport—known as bike-transit integration—which is seen as a promising approach to enhance sustainable urban mobility (Kosmidis and Müller-Eie, 2024). This integration facilitates the first and last mile connectivity, thereby extending the reach of public transport and making it more accessible. The effectiveness of cycling, whether as a transfer or a primary mode of transport, is influenced by various built environment factors such as urban density and land-use mix. Higher urban density and mixed land use tend to enhance the accessibility of cycling to destinations, making it a more viable transport option. In densely populated urban areas with diverse land uses, cyclists can more easily reach a variety of destinations, such as workplaces, schools, shops, and recreational facilities, within a reasonable distance. In rural Dutch cities, where cycling is deeply embedded in the culture, car mobility still appears to be a major contributor to perceived levels of accessibility in rural areas (Pot et al., 2023). This observation aligns with findings by Bruno and Nikolaeva (2020), which highlight that cycling mobility in Dutch cities is enhanced through comprehensive considerations of environment, culture, practices, and infrastructure. Additionally, the integration of cycling with other modes of public transport is crucial for creating a seamless and efficient urban mobility system (Passmore et al., 2024). Successful bike-transit integration requires awareness of spatial disparities (Zhou et al., 2023) and necessitates consideration of social practices and their formation (Nello-Deakin and te Brömmelstroet, 2021). These social practices can vary significantly across different social groups, including gender differences (Waitt and Lewis, 2024). This underscores the social complexity of cycling, emphasising that it can act as both a substitute and an integral part of different social and material contexts within the transport system. The next section will explore emerging attempts to incorporate the concept of PA, aiming to address the complexities and limitations of current approaches in understanding and improving transport accessibility.

2.2. Subjectivity and perceived accessibility

The concept of PA has emerged as a critical area of study aimed at developing more holistic models that incorporate both objective and subjective measures of accessibility (Márquez and Soto, 2021; Mazzulla et al., 2024; Moleman and Kroesen, 2025; Xu et al., 2024). Traditional models of accessibility often focus on quantifiable aspects such as distance, time, and cost. In contrast, PA takes into account how individuals perceive and experience accessibility, which can be influenced by personal experiences, social norms, and cultural contexts. Despite the increased interest in PA in recent years, many aspects remain underexplored. Research indicates that

there is not always a direct correspondence between PA and objectively measured accessibility (Fu et al., 2024; Lättman et al., 2018; Pot et al., 2021; Vafeiadis and Elldér, 2024). For instance, Völker et al. (2018) conducted research centred on blue spaces (i.e., outdoor environments—either natural or manmade) in two German cities, testing associations between PA, use, and wellbeing. Their findings showed inconclusive links between PA and wellbeing, although there were indications that frequent use of blue spaces enhances mental health. They concluded that PA alone does not explain variations in the frequent use of blue spaces or their effects on health, underscoring the need for deeper investigation into how people perceive accessibility and use spaces. Christiaanse and Haartsen (2017) studied how PA to grocery stores was affected by the closure of a supermarket in a Dutch rural context. They found that while objective accessibility was only an issue for a relatively small group of people—since there were often alternative supermarkets that were cheaper and larger for many villagers—most people perceived a significant decrease in accessibility. This was explained by individual and collective emotional attachment to the supermarket and the general symbolic value of a supermarket for a village. Fu et al. (2024) explored the relationship between multimodality and PA, demonstrating that multimodality could be a choice based on diverse options or a necessity due to the inability to use a car or other specific modes. Their study illustrated that increasing objective accessibility through multi-modal transport options does not necessarily lead to higher PA. Instead, it often results in difficulties promoting a shift from car use to public transport, highlighting the complexity of transport choices and the need to consider the subjective experiences and perceptions of users. The examples above show that the determinants and usability of PA are still underexplored.

To create accessibility policies that are more responsive to people's cycling and mobility practices, it is essential to recognise these determinants. The limitations of available empirical evidence on the practicality of PA suggest a need for qualitative studies offering deeper insight into behaviours (Hitchings, 2012). From the aforementioned examples, this paper argues that PA is socially and materially constructed. This necessitates treating cycling not just as a physical mobility method but as a social practice encompassing materials, meanings, and competencies (Shove, 2010; Shove et al., 2012), embedded in cultural, economic, and social contexts. For instance, in the study by Christiaanse and Haartsen (2017), villagers' grocery accessibility extended beyond the physical availability of goods. It included the emotional and symbolic meanings associated with visiting a specific supermarket. Such grocery practices could be linked to other social practices, demonstrating that accessibility encompasses more than mere material needs. Similarly, participants in Fu et al. (2024) who drove cars could have multiple destinations scheduled close together, while those using multi-modal transport had destinations near their transit stations. These individuals developed positive attitudes toward their chosen forms of transport and relevant skills (i.e., 'meanings' and 'competencies' in practice theory terms). However, using these transport options required making difficult adjustments to other activities such as shopping, childcare, and social activities (Berg and Ihlström, 2019). The above discussions demonstrate that PA is associated with both the external built environment and internalised abilities. Apart from personal socio-cultural factors such as gender, age, and ethnicity, PA is influenced by the wider social structure, which often involves power relations (Cresswell, 2006; Law, 1999). This is exemplified by empirical works examining gender differences (Fullagar and Pavlidis, 2012; Waitt and Lewis, 2024) and the symbolic representation of different groups of riders (Chan et al., 2025; Ravensbergen et al., 2023; Sarrica et al., 2019) in their different travel responses to temporality of day such as nighttime (Hadfield, 2015; Plyushteva and Boussauw, 2020; Waitt et al., 2011), weather (Goldmann and Wessel, 2021; Hong et al., 2020), traffic regulations (Boateng et al., 2022; Divall and Revill, 2005; Latham and Nattrass, 2019; Parnell et al., 2024), which this paper argues as an important factors of PA.

This necessitates qualitative studies to consider not only how people perceive and interact with physical spaces and what prevents access but also the connection between societal structures (such as cultural norms, policy, and legislation) and cycling behaviour (Aldred and Jungnickel, 2014; Spotswood et al., 2015). The formation of such structures is also important (Bruno and Nikolaeva, 2020; Chan et al., 2024; Nello-Deakin and te Brömmelstroet, 2021). Such approaches allow sensitivity to the limited consideration of power relations and social structures in the PA literature. The next section will introduce the sociological perspective and explain how it helps to understand the complexities of PA.

2.3. Sociologising perceived accessibility

Sociologists emphasise the intersubjective nature of PA, which emerges from the interplay between individual actions and structural forces (Reay, 2004). PA aligns closely with Bourdieu's (1977) concept of habitus, described as the 'subjective but not individual system of internalised structures, schemes of perception, conception, and action common to all members of the same group or class' (p. 86). Habitus comprises learned preferences and dispositions, shaping how individuals navigate their social world (Edgerton and Roberts, 2014). These dispositions lead individuals with different habitus to interpret and respond to opportunities, such as digitalised bike-sharing schemes, in distinct ways. Cultural capital—including knowledge, skills, and symbolic capital—further influences individuals' ability to secure bikes and leverage cycling-related resources. PA should not be reduced to individual-level experiences but must be understood as conditioned by fields of practice such as politics, education, and family, which define value through social positions and cultural contexts. In contrast, utilitarian approaches in transport choice modelling often decontextualise individuals (Shaw and Hesse, 2010; Tapio and Hietanen, 2002; Timms, 2008), reducing actions to behaviours aimed at satisfying personal needs while ignoring structural constraints (Bourdieu and Wacquant, 1992). A sociological perspective emphasises the cultural and symbolic creation of power, reproduced through social practices. Habitus shapes perceptions of accessibility, influencing individuals' capacity to navigate and leverage power within social contexts. Investigating PA requires exploring not only structural forces but also the roles of individuals and groups in shaping symbolic orders within social fields.

The material world is deeply intertwined with PA, as the built environment strongly influences perceptions of accessibility (De Vos et al., 2023; Gan et al., 2021; Gutiérrez et al., 2025; Ma et al., 2014). Studies show that the objective quality of an environment may indirectly affect behaviour by shaping perceptions. For instance, while a well-designed cycling environment is necessary for cycling

uptake, it alone is insufficient (Ma et al., 2014). Wacquant (2018) cautions against overlooking the materiality of physical spaces, highlighting the distinction between material and symbolic power. Material power relates to economic capital, while symbolic power arises when material power is perceived as legitimate through social categories (Christensen, 2023; Cronin, 1996). Differentiating between these forms of capital allows us to map social positions and strategies, reflecting accumulated advantages or disadvantages within physical and social spaces. Physical space, as Bourdieu (2018) notes, serves as a site where social hierarchies and reified social spaces manifest. For cycling, access to well-designed infrastructure creates opportunities for individuals to accumulate cultural, social, and economic capital. Group rides, cycling events, and clubs foster social capital, offering support networks and information exchange (Stroope, 2021). However, transport investments often prioritise economically advantageous areas, compounding existing inequalities. The built environment thus mirrors societal hierarchies, influencing how accessible and inclusive cycling spaces are perceived. This study investigates the socio-materially constructed PA within these social and physical spaces, seeking to untangle the complexities shaping accessibility and inclusivity in cycling practices.

3. Case study and methods

This paper examines a case-study focusing on the New Territories (NT), Hong Kong. The most updated official data (Transport Department, 2014) estimates the cycling accounts for about 0.5 % of the daily weekday mechanised trips in Hong Kong overall. Spatially, 97 % of the daily cycle trips take place in the rural and suburban areas in NT while only 3 % take place on in the urban areas. Less than 0.01 % of cycling tracks and parking spaces are located outside of the NT areas (HKSARG, 2021). The study focuses on new towns, characterised by their proximity to metro stations and formal cycling tracks in Fig. 1.

A short-term ethnographic approach was employed, allowing the researcher to connect personal lived experiences with those of participants (Pink and Morgan, 2013). Fieldwork was conducted over six months in 2023 and included 25 semi-structured interviews, 4 travel diaries, 12 short walk-alongs (approximately 15 min each), and 2 ride-alongs (approximately 2–3 h each) with users and non-users of bike-sharing schemes and traditional bike rentals. Given the dominance of road transport and reliance on public transit in the NT, these methods enabled an in-depth exploration of the socio-material dynamics shaping cycling practices.

Participants were recruited through diverse strategies to capture perspectives from cyclists, non-cyclists, and users of different bike types. Key informants, including operators of sharing bike schemes ($N = 2$) and traditional bike rentals ($N = 3$), were interviewed to establish foundational insights. Sharing bike users and parking volunteers were recruited via advertisements on social media and instant messaging platforms. Semi-structured online interviews ($N = 12$) followed. To include diverse users and non-users, individuals were randomly approached in villages and streets for standing interviews ($N = 8$), while walk-alongs ($N = 12$) allowed participants to share personal commuting stories. Ride-along interviews ($N = 2$) provided further depth, with participants selecting routes that reflected their daily routines. All interviews were transcribed and translated from Cantonese to English, with pseudonyms assigned for confidentiality. This combination of methods offered insights into the PA of cycling, revealing diverse experiences, practices, and

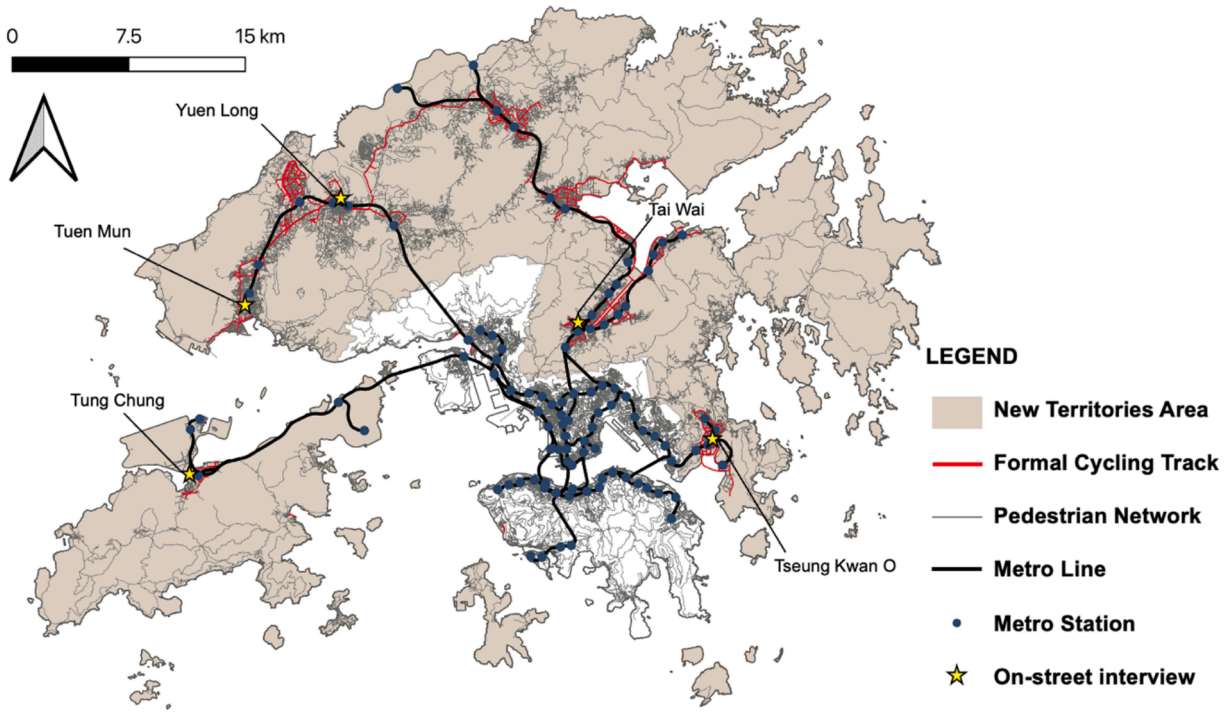

Fig. 1. Study area of Hong Kong New Territories.

perceptions shaped by the socio-material environment.

4. Findings

4.1. Spatiality of perceived accessibility

4.1.1. Perceived accessibility by cycling

Perceived accessibility by cycling in Hong Kong relates to the question of where one can cycle, encompassing areas formally defined by regulations and those informally recognised as suitable. Regulations and practices are appropriated and adapted differently across diverse social-spatial contexts, reflecting the interplay between material conditions and societal norms.

Cycling in Hong Kong is predominantly confined to the NT, where the government has invested in formal infrastructure such as elevated tracks, designated parking, and cycling hubs. These facilities separate cyclists from pedestrians and vehicles, marked by distinctive colours and prohibitive signage (Fig. 2a). Residents often express sentiments like, '*cycling is only for New Territories*', often accompanied by the belief that '*urban people do not know how to cycle*', reflecting both material differences and social assumptions about cycling practices. The NT accounts for most daily cycling activity, primarily as a first-and-last-mile transport mode complementing public transit (Transport Department, 2014). Yet, not all NT residents are proficient cyclists, with skill levels varying significantly, echoing findings by Coll and Stokes (2017).

Urban areas such as Kowloon and Hong Kong Island lack equivalent infrastructure. Government policies actively discourage urban cycling, citing congestion and safety risks. A Transport Department statement underscores this stance:

> *Traffic in the urban area […] is relatively heavy, with narrower and more crowded roads […] increasing risks on roads, the cyclists themselves and other road users […] the Government does not encourage the public to use bicycles as a mode of transport in the urban area* (Director of Transport Department, Dec 2022).

Cyclists are restricted to designated tracks or traffic roads, with riding on pedestrian pavements explicitly prohibited. These policies frame cycling as incompatible with urban commuting, positioning it instead as a recreational activity within the NT. This spatial segregation creates a symbolic hierarchy: urban areas are deemed unsuitable for cycling, while the NT is positioned as the city's exclusive '*cycling zone*'. The unequal distribution of infrastructure reinforces this narrative (Tan and Martínez López, 2019). Cyclists themselves acknowledge this disparity, with remarks like, '*you won't cycle in Kowloon, right? There are no cycling tracks at all*'. Urban anti-cycling policies marginalise cyclists, symbolically portraying them as disruptors rather than legitimate road users. The absence of urban cycling infrastructure amplifies accessibility barriers, reinforcing the perception that cycling is incompatible with Hong Kong's urban mobility and limiting its integration into the broader transport ecosystem.

In the NT, however, the infrastructure is far from seamless. Cycling tracks are often fragmented (Fig. 2b), requiring cyclists to navigate gaps by using pedestrian pavements or traffic roads. Parking facilities are frequently disconnected from cycling tracks, further complicating accessibility. As one cyclist explained, '*What can I do if the parking space is five minutes from the cycling track? I know it's not allowed, but everyone does the same*'. These inadequacies foster widespread informal practices, with cyclists adapting by perceiving adjacent streets and pavements as part of their cycling territories (Fig. 2c). Such practices, while technically illegal, reflect practical responses to infrastructural gaps. Informal norms also gain collective acceptance, as reflected in comments like, '*When you drive along these streets, you need to be aware of the cyclists and drive slower. Experienced drivers all know that*'. This sentiment underscores how the actions of cyclists and other road users collaboratively contribute to the recognition of an expanded '*cycling zone*'. Cyclists' adaptive behaviours blur the boundaries of designated cycling areas, integrating previously excluded spaces into their routes.

Government enforcement of cycling regulations is inconsistent, further shaping these practices. As a cyclist remarked, '*The government gets it—you can't just ban everything all the time. But when stuff goes down, like accidents or complaints, they start doing it in a stricter manner*'. Regulations fluctuate in response to incidents and public pressure, enabling cyclists to develop alternative informal systems of regulation driven by collective safety concerns. These practices not only address immediate accessibility challenges but also reshape perceptions of cycling areas. By integrating disconnected spaces into their routes, cyclists challenge formal spatial hierarchies and redefine accessibility beyond the government's rigid frameworks. This dynamic interplay of social, political, and material factors illustrates how adaptive strategies expand the boundaries of perceived accessibility in ways that transcend formal designations, contributing to a more inclusive and nuanced understanding of mobility in Hong Kong.

4.1.2. Perceived accessibility to bicycle

The advent of dockless bike-sharing services has reshaped the intersubjective PA of cycling, reflecting a collective preference for efficiency, accessibility, and reliability among public transport users. These services offer the flexibility to pick up and drop off bikes within designated areas,[1] enabling the creation of unique cycling regions within cities and extending the reach of cycling to diverse geographical locations. Interviews revealed that users commonly associate bike-sharing with convenience, often expressed as a preference for transport options close to home. One resident remarked, '*You always want transport close to your home, just like the metro*', capturing the shared values of efficiency and reliability across users. This sentiment resonates with findings from Zhang (2022) in a similar Chinese context, highlighting the collective nature of PA within urban mobility. Compared to other groups, such as those

[1] Bike sharing services, also officially known as 'automated dockless bicycle rental service', are permitted to operate in the New Territories Areas. Specific parking restrictions are determined on a case-by-case basis.

Fig. 2. Cycling environment in Hong Kong: (a) Elevated cycling tracks that are separated from pedestrian walkways; (b) Disconnected section of formal cycling tracks; (c) Parking spaces that is not served with cycling tracks; (d) Sharing bike parked on the streets next to railings: accessibility or obstacles?

relying on walking or driving, frequent public transport users perceive the large number of shared bikes parked on streets next to railings as a sign of convenience rather than obstacles (Fig. 2d). This shared view underscores the intersubjective nature of PA, where the presence of visible bike-sharing infrastructure aligns with the collective expectations of transport accessibility, rooted in their transit-oriented mindset. The increased objective accessibility introduced by bike-sharing depends on users' shared interpretations and habits, underscoring the relational nature of PA. The emphasis on convenience reinforces symbolic representations tied to shared mobility and technological solutions. Statements such as '*a transport mode close to home*' illustrate how cycling transcends its functional role, becoming integral to users' identities. Those who adopt these technological solutions align themselves with a social group that prioritises modernity and efficiency, using dockless bike-sharing as a marker of social distinction.

However, this convenience also introduces challenges. The '*bike-sharing boom*' in 2017 left a lasting impression, as issues related to bike disposal, vandalism, and public nuisance shaped negative perceptions. Images of abandoned bikes littering streets or thrown into rivers became symbolic representations of these problems. Non-users and traditional bike owners often voiced concerns about shared bikes being 'broken' or poorly maintained. Traditional bike owners further criticised high depreciation rates and vulnerability to weather, reinforcing negative perceptions of bike-sharing. These sentiments were echoed in operational practices. For instance, some areas, including parts of the NT, have been designated as "red zones" where parking shared bikes is prohibited due to theft and vandalism. As one bike-sharing founder noted, "We reduce the number of bikes available there and designate these spots as red zones" (April 2023). This territorialisation reflects how shared bikes are perceived differently depending on their socio-material context. For non-users, negative perceptions are rooted in the visible state of shared bikes, while for users, the digital mediation of accessibility—through apps—shapes a more positive perception.

Avid users of bike-sharing services rely heavily on mobile apps to navigate the system, trusting operators to maintain bike functionality. One regular user stated, '*I typically pick up a bike near the metro station to ride back home […] everything works fine for me […] I primarily use the app to check availability and functionality*'. This trust in technology fosters a shared internalised schema of actions where digital interfaces mediate spatial awareness and perceived accessibility. However, this reliance on technology is not without contradictions. A go-along interview highlighted these challenges:

> *We commence a go-along interview at 2:00 PM on a weekend with the task of locating two shared bikes near the metro station where we meet. Surprisingly, Eric, the participant, doesn't begin by checking the vehicle availability in the mobile application, contrary to my expectation. Instead, he instinctively heads to a spot he usually frequents when renting a bike for leisure on weekends. With confidence, he mentions, 'No need to check the app. I know where we can get them'. However, our search proves futile, and he suggests that we might have started too late, as he typically initiates an hour earlier after lunch. Realising the need to use the app, we locate two bikes just a 5-minute walk away, around the bike parking area of a shopping mall. The challenge arises when we don't know which floor they are on, given the two-dimensional nature of the map. We grapple with the navigation, and it's not until 2:20 PM that we finally secure a bike. The process took longer than expected, highlighting the intricacies and challenges associated with using the app for bike retrieval.* (Field notes, Sep 2023).

Eric initially avoided using the app, relying instead on his familiarity with a particular location to find bikes. When this strategy failed, he turned to the app, only to face difficulties navigating the two-dimensional map to locate bikes within a shopping mall. This experience underscores the complexities of technology-mediated accessibility, where individual agency and habitus intersect with digital tools. The temporal dimension also emerged, as Eric attributed the lack of available bikes to starting his search later than usual. These contradictions illustrate how digitalisation shapes PA, creating both opportunities and limitations. While shared bikes physically occupy urban spaces, their PA differ among users, influenced by their reliance on technology. The app acts as an intermediary, shaping how users interpret their surroundings and accessibility. This interplay between digital and physical realms contributes to the evolving territorialised identities of users and non-users. The narrative highlights that perceptions of accessibility are shaped by localised contexts and individual practices. While digital tools mediate access for some, others remain focused on physical conditions and visible cues (Fig. 2d). These dynamics reveal how users '*think locally and act locally*', as Johnson (2002) observes, while collectively influencing broader patterns of cycling behaviour. This understanding of bike-sharing underscores the intricate interplay of socio-material factors, individual habitus, and technological mediation in shaping PA.

4.2. Temporality of perceived accessibility

4.2.1. Night-time

The intersubjective interpretation of 'night-time' is shaped by formal traffic regulations, cultural norms, and societal expectations, illustrating how concepts like night are socially constructed. The need for vision-aid lamps is influenced not only by physical darkness but also by social perceptions of safety and the utility of equipment. For cyclists relying on bike-sharing services, night-time cycling offers a practical option when public transport services are limited or disrupted. A rental experience from traditional bike rental shops reveals how cultural norms and material conditions jointly influence perceptions of night-time cycling:

> *This marks the last stage of our cycling interview. The time is now 5:30 PM, and we're in the process of renting bikes from a local, traditional bike shop. They've inquired about the return time, emphasising the need for front and rear lamps for night-time riding. We've settled on a one-hour ride, but the question arises: is 6:30 PM truly considered 'night-time'? We've engaged in a discussion, but there is no clear consensus. According to the weather report, the sunset is expected at 6:22 PM. However, the bike shop informs us that the sky does not immediately darken after sunset, not to mention the nearby streetlamps. They mention instances of people getting into trouble due to the absence of lights. After deliberation, we have decided to forego the lamps and have successfully made it to the town centre before sunset. Following the ride, we walk our bikes back after sunset, and by 6:44 PM, the sky has completely darkened.* (Field notes, Sep 2023).

A key concern for night-time cycling is the temporal design of cycling spaces (cf., Egan and Philbin, 2021), such as availability of vision-enhancing equipment, particularly since shared bikes lack such features. Interviews revealed mixed responses regarding their necessity. While some cyclists ensure they have lamps for unexpected night journeys, others dismiss their need, citing well-lit streets and the low likelihood of encountering law enforcement officers after dark. During interviews conducted on a significant Chinese festival, participants noted that '*no one cares during the festival*' further illustrating the temporal flexibility in rule enforcement. These narratives highlight the time-sensitive nature of PA for bike-sharing. While bike-sharing serves as an accessible transport mode during unplanned daytime scenarios, it primarily caters to individuals prepared for night-time outings. Night-time cycling relies heavily on socio-material factors, including street lighting, safety perceptions, and equipment availability. Additionally, societal norms and the enforcement of cycling rules play a crucial role in shaping accessibility.

Night-time cycling underscores the intricate interplay of temporal, spatial, and social dimensions that dictate PA. Variations in what constitutes 'night-time', disparities in access to lighting equipment, and differing perceptions of safety all influence cycling's role in promoting PA. Furthermore, the social-political dimension, encompassing authority and the enforcement of rules, shapes how individuals perceive and behave in night-time cycling contexts. These narratives highlight how temporal and socio-material considerations interact, offering a nuanced understanding of PA after dark.

4.2.2. Raining

Weather is a socio-material construct that significantly influences PA for cycling. This construct combines natural conditions, such as rain and heat, with societal perceptions and adaptations, reflecting both physical realities and socio-cultural interpretations. Interviewees expressed concerns about the vulnerability of shared bikes to '*hot and wet outdoor*' conditions. Operators attempt to mitigate these challenges by providing sheltered storage during extreme weather. However, residents frequently voice dissatisfaction with the messy aftermath of storms, describing it as a symbolic devaluation of shared bikes. This perception contributes to a broader societal

narrative about shared mobility. Traditional bike shops emphasise the rapid depreciation of shared bikes left outdoors in hot and humid conditions, highlighting the need for designated parking areas. This argument underscores the symbolic capital tied to shared bikes and their perceived reliability.

In contrast, shared bike operators argue that their materials are weather-resistant, presenting their interventions as a challenge to the symbolic order imposed by detractors. Yet, the perception of bike functionality during inclement weather remains a critical concern. Users often express uncertainty, stating, '*You don't know if it's working until you pay and use it*', or citing extreme cases like typhoons when shared bikes become a last-resort option. These comments reveal how material conditions and societal perceptions intertwine, shaping users' willingness to cycle under adverse weather.

Interviews revealed significant class-based differences in responses to rainy conditions, shaped by cultural, societal, and individual perspectives. While some participants viewed rain as a minor inconvenience, others saw it as a substantial barrier to cycling. These differing attitudes influence the adoption of cycling as a mode of transport. For instance, a blue-collar working-class cyclist remarked, '*Cycling in small rain is just like walking in hot weather […] I need to work under the sun anyway*'. This statement reflects a practical and resilient approach often associated with those accustomed to outdoor labour or active transport. For these individuals, getting wet during rain is normalised and integrated into their daily routines. In contrast, participants from higher-income or more sedentary occupational backgrounds were more likely to perceive rainy conditions as a significant deterrent. For these groups, rain represented a disruption to comfort and convenience, illustrating how different socio-economic contexts shape the perceived accessibility of cycling. These contrasting perspectives reveal how habitus, deeply influenced by social class, frames interpretations of weather and its impact on cycling.

The divergent attitudes toward rain highlight how cultural and symbolic distinctions influence PA. For individuals prioritising practicality and resilience, rainy weather aligns with a habitus that adapts to challenging conditions. Meanwhile, for those with greater reliance on motorised transport or walking in sheltered environments, rain creates a symbolic and practical barrier. These variations underscore the interplay of natural and social factors in shaping PA. Cycling during rain is not merely a response to environmental conditions but reflects the socio-material realities and cultural norms of individuals. This complexity shows how weather intersects with class-based distinctions to influence decisions, attitudes, and practices related to cycling, further emphasising the nuanced nature of PA.

5. Conclusion and discussions

5.1. Implications for study of perceived accessibility

This analysis, grounded in a sociological perspective, highlights the critical role of social structures in shaping PA within cycling. The study underscores the social construction of cycling materials, encompassing both physical environments and cycling-related entities. For example, bike parking—central to accessing rental systems—may enhance PA for some social groups while imposing burdens on others. Spatial factors, such as designated cycling areas, and temporal conditions, like weather and nighttime settings, further influence PA, varying across social groups. These differences reflect the interplay of socio-materiality, regulations and informal rules that mediate cycling practices.

The examination of where, how, when, and by whom cycling occurs extends beyond the presence of infrastructure or vehicle accessibility. While socio-material urban environments mirror societal hierarchies (Bourdieu, 2018), focusing solely on physical structures neglects the importance of social spaces. Cycling accessibility, or the reach of a bicycle, is shaped by physical environments, individual perceptions, and social and political forces—both explicit (e.g., traffic regulations) and implicit (e.g., informal practices). Within the cycling field, symbolic power is evident in policies like anti-cycling measures and the practices of cyclists and non-cyclists. These efforts to establish norms interact with the habitus of social actors, shaping both cycling practices and perceptions of accessibility.

The socio-spatially differentiated experiences of agents across various cycling contexts—for instance, renting a bike at a shop versus through an app—further illustrate how PA is linked to historically constituted dispositions, schemata, and competencies. Qualitative research, incorporating in-depth interviews, focus groups, and participant observation, becomes vital in transport planning, revealing how internalised perceptions and social factors influence PA. Viewing transport as a social field with its own rules and power dynamics (Chan, 2025) allows planners to understand how individuals navigate this system. By examining the interactions of informal rules, internalised perceptions, and symbolic capital, the study uncovers how social inequalities are reproduced and reconfigured, linking these dynamics to the concept of internalised PA.

5.2. Implications for policy and practice

From the viewpoint of transport policymakers and researchers, sociological contributions may appear less accessible compared to more conventional economic, psychological, or geographical studies (Cairns et al., 2014). Sociological discourse is often characterised by its conceptual nature, rooted in theory-building qualitative research and less frequently subjected to experimental or quantitative testing. The abstract nature of sociological writing and the absence of a clearly defined body of 'action-based interventions', with implemented and evaluated outcomes, present challenges for bridging the gap between sociology and the broader transport community. Nonetheless, our sociological investigation highlights notable challenges in shifting towards more sustainable travel patterns, especially regarding the night-time narrative and how regulations impact cycling behaviours in a socio-material context. This is particularly relevant in the evolving landscape of emerging mobility, where new regulations and policies frequently emerge (Laa and

Emberger, 2020). These emerging mobility solutions and new regulations not only affect practical aspects but also shape the emotional, symbolic, and meaningful associations tied to specific modes of transport (Lois and López-Sáez, 2009), impacting both social interactions and physical spaces. Consequently, proponents of alternative mobility solutions may need to adopt a more creative approach in presenting options and highlighting their distinctive features.

5.2.1. Formal regulations and informal rules

This paper first highlights both formal regulations and informal rules play a central role in regulating, promoting, and shaping the practice of cycling. However, it is crucial to acknowledge the diverse interpretations of these rules among different individuals, as well as their existence within both formal and informal frameworks. This recognition, augmented by findings from our study and aligned with the revitalised sociological perspective on traffic regulations (Boateng et al., 2022; Divall and Revill, 2005; Latham and Nattrass, 2019; Parnell et al., 2024) alongside earlier works (Maguire et al., 1990; Richman, 1972), broadens our comprehension beyond a limited focus on individualistic (and less reductionist) approaches such as education and psychology (Alonso et al., 2017; Holman and Popusoi, 2018; Varet et al., 2021). For instance, Boateng et al. (2022) illuminate how certain transgressive driving behaviours, such as speeding and risky overtaking, can be perceived as necessary strategies for minibus drivers to navigate the intricate power dynamics inherent in their work environment. Meanwhile, Latham and Nattrass (2019) uncover the diverse interpretations of traffic regulations among cyclists, particularly regarding right turns. Some cyclists may choose to dismount and walk their bikes across intersections, while others may opt to signal and manoeuvre towards the centre of the road before turning. Significantly, they underscore how formal rules and legal frameworks are shaped by the contextual expectations of street usage across different neighbourhoods. These studies, in conjunction with our own, collectively underscore the socio-material construction of both formal and informal rules, highlighting the interplay of social, material, regulatory, and normative elements in shaping cycling practices and structures.

5.2.2. Bike rental operation and parking management

This paper also illustrates the significant impact of the physical environment, particularly bike parking, on PA. While an ample supply of bike parking can be seen as beneficial, indicating sufficient availability of rental bikes and designated cycling spaces, it can also have adverse effects on certain social groups, such as non-users of automated bike rental systems (both cyclists and non-cyclists). This finding aligns with previous research on the multiple effects of bicycle parking on PA and safety from crime (Aldred and Jungnickel, 2013; Heinen and Buehler, 2019; Schneider et al., 2022). These studies show that parking practices are linked to other social practices (also reflecting aggregate behaviours from a modelling perspective (Fukuda and Morichi, 2007)). The implications of these findings for policy and practice are substantial. For instance, the design and placement of bike parking facilities must consider the diverse perceptions and needs of different social groups. Ensuring that bike parking is conveniently located, safe, and accessible can enhance PA for users. However, it is equally important to address the concerns of non-users who might perceive bike parking areas as obstacles or unsafe spaces. This dual approach can help in creating a more inclusive and user-friendly urban environment. Moreover, policies should aim to integrate bike parking solutions into the broader urban planning framework, considering their potential to influence social behaviours and practices on the streets. By acknowledging the cultural and social dimensions of bike parking, policymakers can better address the varied needs of the community, promoting cycling as a viable and attractive mode of transport for a broader segment of the population. Future studies could explore specific policy measures, such as providing sheltered and secure bike parking in high-demand areas, incorporating bike parking into urban design projects, and engaging with community members to understand their perceptions and preferences regarding bike parking facilities. By doing so, urban planners and policymakers can develop more effective strategies to enhance PA and support sustainable urban mobility.

5.2.3. Physical infrastructure for cycling

Finally, the socio-materially constructed spatial–temporal aspects of PA in cycling have significant implications for transit operation and planning. Understanding where, how, when, and by whom cycling occurs is critical for effective transit planning and operation, especially when cycling is considered a substitute mode of transport for short-distance feeder services (Cheng et al., 2023; Zhao and Li, 2017) and during transport disruptions (Cheng et al., 2022). Integrating cycling into the broader transit network requires thoughtful consideration of these spatial and temporal dynamics (Chan, 2024), ensuring that infrastructure and services are designed to accommodate the diverse needs and behaviours of cyclists. For instance, while strategically placing bike parking and rental stations near transit hubs can facilitate seamless multimodal journeys while accommodating peak usage times and varying user demographics, it is equally important to consider how these facilities are perceived and used by different social groups, taking into account factors such as safety, convenience, and cultural acceptance. Particularly, the social practices of cycling at night and during rainy weather highlight the social-material constructed PA. Ensuring well-lit and secure bike routes for nighttime cycling, with clear signage providing advice about nighttime and rainy cycling, can symbolically imply the authorisation of cycling under various spatial–temporal conditions (Bigon and Dahamshe, 2014), potentially impacting cyclists' willingness to use bikes during evening hours. Similarly, providing covered bike parking and ensuring good drainage on bike paths can physically and symbolically make cycling more appealing during rainy conditions. These considerations underscore the need to address both the physical and perceived barriers to cycling to encourage broader adoption.

5.3. Concluding remarks

Cycling practices are inherently complex, with agents participating in multiple fields, such as multimodal transport and non-transport activities, and engaging in a variety of practices, including parking, riding, and other related behaviours. Policymakers

and regulators must acknowledge the socio-material origins of these practices, understanding that rules and regulations are dynamic and shaped by socio-material contexts. Engaging a diverse range of stakeholders—cyclists, motorists, urban planners, and community members—is essential to capturing the multifaceted perspectives on cycling regulations and practices. Rulemaking processes should allow for regulatory flexibility and adaptation to local contexts (Biais and Wagne, 2007; Chan, 2025), as uniform policies may fail to address the specific needs of diverse communities or overlook underlying social issues. Regularly reviewing and updating cycling policies is equally important to ensure they remain relevant and effective in the face of evolving social, environmental, and technological dynamics. A holistic approach that integrates social, material, and regulatory dimensions can foster environments conducive to safe, sustainable, and inclusive cycling practices.

Nevertheless, due to the comparatively low share of cycling trips in Hong Kong compared to other Chinese cities (CAUPD, 2023), sampling does not target cyclists of specific trip purpose, but all residents who have (or not) cycling experience and explore diverse individuals/groups as possible. This paper acknowledges that it is crucial to consider the purpose of travel has a significant impact on cycling behaviours (Lee et al., 2022; Xing et al., 2020). It is recommended to read the findings with the generic perspective and caution when applying them to practices to promote specific purposes of cycling.

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.

Acknowledgements

I express my gratitude to the Guest Editorial team and referees for their thoughtful and constructive comments and suggestions. These valuable inputs have significantly enhanced the quality and clarity of the contributions made in this article. Any errors of fact are solely the responsibility of the author. This research is supported by the Graduate Student Research Grants at the St Anne's College, University of Oxford.

References

Aldred, R., Jungnickel, K., 2014. Why culture matters for transport policy: the case of cycling in the UK. J. Transp. Geogr. 34, 78–87. https://doi.org/10.1016/j.jtrangeo.2013.11.004.

Aldred, R., Jungnickel, K., 2013. Matter in or out of place? Bicycle parking strategies and their effects on people, practices and places. Soc. Cult. Geogr. 14, 604–624. https://doi.org/10.1080/14649365.2013.790993.

Alonso, F., Esteban, C., Montoro, L., Useche, S.A., 2017. Knowledge, perceived effectiveness and qualification of traffic rules, police supervision, sanctions and justice. Cogent Soc. Sci. 3, 1393855. https://doi.org/10.1080/23311886.2017.1393855.

Arranz-López, A., Soria-Lara, J.A., Witlox, F., Páez, A., 2019. Measuring relative non-motorized accessibility to retail activities. Int. J. Sustain. Transp. 13, 639–651. https://doi.org/10.1080/15568318.2018.1498563.

Berg, J., Ihlström, J., 2019. The importance of public transport for mobility and everyday activities among rural residents. Soc. Sci. 8, 58. https://doi.org/10.3390/socsci8020058.

Biais, L.E., Wagne, W.E., 2007. Emerging science, adaptive regulation, and the problem of rulemaking ruts. Tex. Law Rev. 86, 1701–1739.

Bigon, L., Dahamshe, A., 2014. An anatomy of symbolic power: israeli road-sign policy and the palestinian minority. Environ. Plan. D Soc. Sp. 32, 606–621. https://doi.org/10.1068/d2613.

Bivina, G.R., Gupta, A., Parida, M., 2019. Influence of microscale environmental factors on perceived walk accessibility to metro stations. Transp. Res. Part D Transp. Environ. 67, 142–155. https://doi.org/10.1016/j.trd.2018.11.007.

Boateng, F.G., Ofori-Dua, K., Dwumah, P., Forkuor, J.B., 2022. Crimes of accommodation: a criminological grounding for road traffic violations among minibus drivers in Africa. Int. Rev. Sociol. 32, 290–310. https://doi.org/10.1080/03906701.2022.2089612.

Boisjoly, G., El-Geneidy, A.M., 2017. How to get there? A critical assessment of accessibility objectives and indicators in metropolitan transportation plans. Transp. Policy 55, 38–50. https://doi.org/10.1016/j.tranpol.2016.12.011.

Bourdieu, P., 2018. Social space and the genesis of appropriated physical space. Int. J. Urban Reg. Res. 42, 106–114. https://doi.org/10.1111/1468-2427.12534.

Bourdieu, P., 1977. Outline of a Theory of Practice. Cambridge University Press, Cambridge, UK.

Bourdieu, P., Wacquant, L.J.D., 1992. An Invitation to Reflexive Sociology. Cambridge: Polity.

Bree, S., Fuller, D., Diab, E., 2020. Access to transit? Validating local transit accessibility measures using transit ridership. Transp. Res. Part A Policy Pract. 141, 430–442. https://doi.org/10.1016/j.tra.2020.09.019.

Bruno, M., Nikolaeva, A., 2020. Towards a maintenance-based approach to mode shift: comparing two cases of Dutch cycling policy using social practice theory. J. Transp. Geogr. 86, 102772. https://doi.org/10.1016/j.jtrangeo.2020.102772.

Cairns, S., Harmer, C., Hopkin, J., Skippon, S., 2014. Sociological perspectives on travel and mobilities: a review. Transp. Res. Part A Policy Pract. 63, 107–117. https://doi.org/10.1016/j.tra.2014.01.010.

CAUPD, 2023. 2023 Annual Report on Shared Bicycle/Electric Bicycle Riding in Major Chinese Cities. China Academy of Urban Planning and Design.

Chan, H.-Y., Ma, H., Zhou, J., 2024. Resilience of socio-technical transportation systems: a demand-driven community detection in human mobility structures. Transp. Res. Part A Policy Pract. 190, 104244. https://doi.org/10.1016/j.tra.2024.104244.

Chan, H.-Y., Xu, Y., Chen, A., Zhou, J., 2023. Choice and equity: a critical analysis of multi-modal public transport services. Transp. Policy 140, 114–127. https://doi.org/10.1016/j.tranpol.2023.06.013.

Chan, H.Y., Tse, W.-Y., Chen, A., 2025. Unlocking the gates: Pedestrian route choice in transforming metro station paid areas into mobile public spaces. J. Transp. Geogr. 123, 104083. https://doi.org/10.1016/j.jtrangeo.2024.104083.

Chan, T.H.Y., 2025. How does bike-sharing enable (or not) resilient cities, communities, and individuals? Conceptualising transport resilience from the socio-ecological and multi-level perspective. Transp. Policy. https://doi.org/10.1016/j.tranpol.2025.01.020.

Chan, T.H.Y., 2024. Rethinking urban street experiments through Lefebvre's rhythmanalysis: from vehicles and vibrancy to virtuosos. Cities 152, 105175. https://doi.org/10.1016/j.cities.2024.105175.

Chen, Z., van Lierop, D., Ettema, D., 2022. Perceived accessibility: How access to dockless bike-sharing impacts activity participation. Travel Behav. Soc. 27, 128–138. https://doi.org/10.1016/j.tbs.2022.01.002.

Cheng, L., Huang, J., Jin, T., Chen, W., Li, A., Witlox, F., 2023. Comparison of station-based and free-floating bikeshare systems as feeder modes to the metro. J. Transp. Geogr. 107, 103545. https://doi.org/10.1016/j.jtrangeo.2023.103545.

Cheng, L., Mi, Z., Coffman, D., Meng, J., Liu, D., Chang, D., 2022. The role of bike sharing in promoting transport resilience. Networks Spat. Econ. 22, 567–585. https://doi.org/10.1007/s11067-021-09518-9.
Cheng, Y.H., Chen, S.Y., 2015. Perceived accessibility, mobility, and connectivity of public transportation systems. Transp. Res. Part A Policy Pract. 77, 386–403. https://doi.org/10.1016/j.tra.2015.05.003.
Christensen, G., 2023. Three concepts of power: foucault, bourdieu, and habermas. PowerEduc. https://doi.org/10.1177/17577438231187129.
Christiaanse, S., 2020. Rural facility decline: a longitudinal accessibility analysis questioning the focus of Dutch depopulation-policy. Appl. Geogr. 121, 102251. https://doi.org/10.1016/j.apgeog.2020.102251.
Christiaanse, S., Haartsen, T., 2017. The influence of symbolic and emotional meanings of rural facilities on reactions to closure: the case of the village supermarket. J. Rural Stud. 54, 326–336. https://doi.org/10.1016/j.jrurstud.2017.07.005.
Coll, B.V., Stokes, R., 2017. Cycling for commuting in Hong Kong: an observational study. Institute, Digit. WPI, Worcester Polytech.
Cresswell, T., 2006. On the Move: Mobility in the Modern Western World. Routledge.
Cronin, C., 1996. Bourdieu and Foucault on power and modernity. Philos. Soc. Crit. 22, 55–85. https://doi.org/10.1177/019145379602200603.
Davidson, A.C., 2022. Cycling lungs: understanding mobile subjectivity as enfleshed. Antipode 54, 218–239. https://doi.org/10.1111/anti.12767.
De Vos, J., Lättman, K., van der Vlugt, A.-L., Welsch, J., Otsuka, N., 2023. Determinants and effects of perceived walkability: a literature review, conceptual model and research agenda. Transp. Rev. 43, 303–324. https://doi.org/10.1080/01441647.2022.2101072.
Divall, C., Revill, G., 2005. Cultures of transport: representation, practice and technology. J. Transp. Hist. 26, 99–111. https://doi.org/10.7227/TJTH.26.1.6.
Edgerton, J.D., Roberts, L.W., 2014. Cultural capital or habitus? Bourdieu and beyond in the explanation of enduring educational inequality. Theory Res. Educ. 12, 193–220. https://doi.org/10.1177/1477878514530231.
Egan, R., Philbin, M., 2021. Precarious entitlement to public space & utility cycling in Dublin. Mobilities 16, 509–523. https://doi.org/10.1080/17450101.2021.1913067.
Fu, X., van Lierop, D., Ettema, D., 2024. Is multimodality advantageous? Assessing the relationship between multimodality and perceived transport adequacy and accessibility in different travel contexts. Transp. Res. Part A Policy Pract. 179, 103893. https://doi.org/10.1016/j.tra.2023.103893.
Fukuda, D., Morichi, S., 2007. Incorporating aggregate behavior in an individual's discrete choice: an application to analyzing illegal bicycle parking behavior. Transp. Res. Part A Policy Pract. 41, 313–325. https://doi.org/10.1016/j.tra.2006.09.001.
Fullagar, S., Pavlidis, A., 2012. "It's all about the journey": women and cycling events. Int. J. Event Festiv. Manag. 3, 149–170. https://doi.org/10.1108/17582951211229708.
Gan, Z., Yang, M., Zeng, Q., Timmermans, H.J.P., 2021. Associations between built environment, perceived walkability/bikeability and metro transfer patterns. Transp. Res. Part A Policy Pract. 153, 171–187. https://doi.org/10.1016/j.tra.2021.09.007.
Goldmann, K., Wessel, J., 2021. Some people feel the rain, others just get wet: an analysis of regional differences in the effects of weather on cycling. Res. Transp. Bus. Manag. 40, 100541. https://doi.org/10.1016/j.rtbm.2020.100541.
Gutiérrez, M., Hurtubia, R., Ortúzar, J.de.D., 2025. Willingness to change compulsory trips to bicycle: role of habit, perceptions and the built environment. Transp. Res. Part A Policy Pract. 193, 104395. https://doi.org/10.1016/j.tra.2025.104395.
Hadfield, P., 2015. The night-time city. Four modes of exclusion: Reflections on the Urban Studies special collection. Urban Stud. 52, 606–616. https://doi.org/10.1177/0042098014552934.
Handley, J.C., Fu, L., Tupper, L.L., 2019. A case study in spatial-temporal accessibility for a transit system. J. Transp. Geogr. 75, 25–36. https://doi.org/10.1016/j.jtrangeo.2019.01.005.
Heinen, E., Buehler, R., 2019. Bicycle parking: a systematic review of scientific literature on parking behaviour, parking preferences, and their influence on cycling and travel behaviour. Transp. Rev. 39, 630–656. https://doi.org/10.1080/01441647.2019.1590477.
Hitchings, R., 2012. People can talk about their practices. Area 44, 61–67. https://doi.org/10.1111/j.1475-4762.2011.01060.x.
HKSARG, 2021. Bicycle-friendly policy in Hong Kong.
Holman, A.C., Popusoi, S.A., 2018. Avoiding blame when violating traffic rules: the development and validation of the justifications of traffic violations scale. Psychol. Crime Law 24, 873–894. https://doi.org/10.1080/1068316X.2018.1442450.
Hong, J., Philip McArthur, D., Stewart, J.L., 2020. Can providing safe cycling infrastructure encourage people to cycle more when it rains? The use of crowdsourced cycling data (Strava). Transp. Res. Part A Policy Pract. 133, 109–121. https://doi.org/10.1016/j.tra.2020.01.008.
Johnson, S., 2002. Emergence: The Connected Lives of Ants, Brains, Cities, and Software.
Kent, J.L., 2022. The use of practice theory in transport research. Transp. Rev. 42, 222–244. https://doi.org/10.1080/01441647.2021.1961918.
Kosmidis, I., Müller-Eie, D., 2024. The synergy of bicycles and public transport: a systematic literature review. Transp. Rev. 44, 34–68. https://doi.org/10.1080/01441647.2023.2222911.
Krizek, K.J., Horning, J., El- Geneidy, A., 2012. Perceptions of accessibility to neighbourhood retail and other public services. In: Accessibility Analysis and Transport Planning. Edward Elgar Publishing. https://doi.org/10.4337/9781781000113.00013.
Laa, B., Emberger, G., 2020. Bike sharing: regulatory options for conflicting interests – case study Vienna. Transp. Policy 98, 148–157. https://doi.org/10.1016/j.tranpol.2020.03.009.
Larsen, J., 2017. The making of a pro-cycling city: social practices and bicycle mobilities. Environ. Plan. A Econ. Sp. 49, 876–892. https://doi.org/10.1177/0308518X16682732.
Latham, A., Nattrass, M., 2019. Autonomous vehicles, car-dominated environments, and cycling: using an ethnography of infrastructure to reflect on the prospects of a new transportation technology. J. Transp. Geogr. 81, 102539. https://doi.org/10.1016/j.jtrangeo.2019.102539.
Lättman, K., Olsson, L.E., Friman, M., 2018. A new approach to accessibility – examining perceived accessibility in contrast to objectively measured accessibility in daily travel. Res. Transp. Econ. 69, 501–511. https://doi.org/10.1016/j.retrec.2018.06.002.
Law, R., 1999. Beyond 'women and transport': towards new geographies of gender and daily mobility. Prog. Hum. Geogr. 23, 567–588. https://doi.org/10.1191/030913299666161864.
Lee, M., Hwang, S., Park, Y., Choi, B., 2022. Factors affecting bike-sharing system demand by inferred trip purpose: integration of clustering of travel patterns and geospatial data analysis. Int. J. Sustain. Transp. 16, 847–860. https://doi.org/10.1080/15568318.2021.1943076.
Lois, D., López-Sáez, M., 2009. The relationship between instrumental, symbolic and affective factors as predictors of car use: a structural equation modeling approach. Transp. Res. Part A Policy Pract. 43, 790–799. https://doi.org/10.1016/j.tra.2009.07.008.
Ma, L., Dill, J., Mohr, C., 2014. The objective versus the perceived environment: what matters for bicycling? Transportation (Amst). 41, 1135–1152. https://doi.org/10.1007/s11116-014-9520-y.
Maguire, B., Hinderliter, R., Faulkner, W., 1990. The illinois seat belt law: a sociology of law analysis. Humanity Soc. 14, 395–418. https://doi.org/10.1177/016059769001400405.
Márquez, L., Soto, J.J., 2021. Integrating perceptions of safety and bicycle theft risk in the analysis of cycling infrastructure preferences. Transp. Res. Part A Policy Pract. 150, 285–301. https://doi.org/10.1016/j.tra.2021.06.017.
Mazzulla, G., Eboli, L., Forciniti, C., 2024. Do women perceive pedestrian path attractiveness differently from men? Transp. Res. Part A Policy Pract. 179, 103890. https://doi.org/10.1016/j.tra.2023.103890.
McArthur, J., Robin, E., Smeds, E., 2019. Socio-spatial and temporal dimensions of transport equity for London's night time economy. Transp. Res. Part A Policy Pract. 121, 433–443. https://doi.org/10.1016/j.tra.2019.01.024.
Moleman, M.L., Kroesen, M., 2025. Revealing accessibility disparities: a latent class analysis linking objective and subjective accessibility measures. Transp. Res. Part A Policy Pract. 192, 104341. https://doi.org/10.1016/j.tra.2024.104341.
Negm, H., El-Geneidy, A., 2025. Subjectivity matters: Investigating the relationship between perceived accessibility and travel behaviour. Transp. Res. Part A Policy Pract. 193, 104399. https://doi.org/10.1016/j.tra.2025.104399.

Nello-Deakin, S., te Brömmelstroet, M., 2021. Scaling up cycling or replacing driving? Triggers and trajectories of bike–train uptake in the Randstad area. Transportation (Amst). 48, 3239–3267. https://doi.org/10.1007/s11116-021-10165-9.
Parnell, K.J., Merriman, S.E., Plant, K.L., 2024. Resilient interactions between cyclists and drivers, and what does this mean for automated vehicles? Appl. Ergon. 117, 104237. https://doi.org/10.1016/j.apergo.2024.104237.
Passmore, R., Watkins, K., Guensler, R., 2024. Assessing Bike-Transit Accessibility. Transp. Res. Rec. J. Transp. Res. Board. https://doi.org/10.1177/03611981241234902.
Pink, S., Morgan, J., 2013. Short-Term ethnography: intense routes to knowing. Symb. Interact. 36, 351–361. https://doi.org/10.1002/symb.66.
Plyushteva, A., Boussauw, K., 2020. Does night-time public transport contribute to inclusive night mobility? exploring Sofia's night bus network from a gender perspective. Transp. Policy 87, 41–50. https://doi.org/10.1016/j.tranpol.2020.01.002.
Pot, F.J., Koster, S., Tillema, T., 2023. Perceived accessibility in Dutch rural areas: bridging the gap with accessibility based on spatial data. Transp. Policy 138, 170–184. https://doi.org/10.1016/j.tranpol.2023.04.014.
Pot, F.J., van Wee, B., Tillema, T., 2021. Perceived accessibility: What it is and why it differs from calculated accessibility measures based on spatial data. J. Transp. Geogr. 94, 103090. https://doi.org/10.1016/j.jtrangeo.2021.103090.
Qiao, S., Gar-On Yeh, A., Zhang, M., 2021. Capitalisation of accessibility to dockless bike sharing in housing rentals: evidence from Beijing. Transp. Res. Part D Transp. Environ. 90, 102640. https://doi.org/10.1016/j.trd.2020.102640.
Ravensbergen, L., Ilunga-Kapinga, J., Ismail, S., Patel, A., Khachatryan, A., Wong, K., 2023. Cycling as social practice: a collective autoethnography on power and vélomobility in the city. Mobilities 1–15. https://doi.org/10.1080/17450101.2023.2211238.
Reay, D., 2004. 'It's all becoming a habitus': beyond the habitual use of habitus in educational research. Br. J. Sociol. Educ. 25, 431–444. https://doi.org/10.1080/0142569042000236934.
Richman, J., 1972. The motor car and the territorial aggression thesis: some aspects of the sociology of the street. Sociol. Rev. 20, 5–27. https://doi.org/10.1111/j.1467-954X.1972.tb00197.x.
Sarrica, M., Alecci, E., Passafaro, P., Rimano, A., Mazzara, B.M., 2019. The social representations of cycling practices: An analysis of symbolic, emotional, material and bodily components, and their implication for policies. Transp. Res. Part F Traffic Psychol. Behav. 64, 119–132. https://doi.org/10.1016/j.trf.2019.04.019.
Scheepers, C.E., Wendel-Vos, G.C.W., van Kempen, E.E.M.M., de Hollander, E.L., van Wijnen, H.J., Maas, J., den Hertog, F.R.J., Staatsen, B.A.M., Stipdonk, H.L., Int Panis, L.L.R., van Wesemael, P.J.V., Schuit, A.J., 2016. Perceived accessibility is an important factor in transport choice — results from the AVENUE project. J. Transp. Heal. 3, 96–106. https://doi.org/10.1016/j.jth.2016.01.003.
Schneider, R.J., Wiers, H., Schmitz, A., 2022. Perceived Safety and Security Barriers to Walking and Bicycling: Insights from Milwaukee. Transp. Res. Rec. J. Transp. Res. Board 2676, 325–338. https://doi.org/10.1177/03611981221086646.
Schwanen, T., Banister, D., Anable, J., 2012. Rethinking habits and their role in behaviour change: the case of low-carbon mobility. J. Transp. Geogr. 24, 522–532. https://doi.org/10.1016/j.jtrangeo.2012.06.003.
Shaw, J., Hesse, M., 2010. Transport, geography and the 'new' mobilities. Trans. Inst. Br. Geogr. 35, 305–312. https://doi.org/10.1111/j.1475-5661.2010.00382.x.
Shove, E., 2010. Beyond the ABC: climate change policy and theories of social change. Environ. Plan. A Econ. Sp. 42, 1273–1285. https://doi.org/10.1068/a42282.
Shove, E., Pantzar, M., Watson, M., 2012. The dynamics of social practice. Sage, London.
Shove, E., Walker, G., 2010. Governing transitions in the sustainability of everyday life. Res. Policy 39, 471–476. https://doi.org/10.1016/j.respol.2010.01.019.
Spotswood, F., Chatterton, T., Tapp, A., Williams, D., 2015. Analysing cycling as a social practice: an empirical grounding for behaviour change. Transp. Res. Part F Traffic Psychol. Behav. 29, 22–33. https://doi.org/10.1016/j.trf.2014.12.001.
Stevenson, M., Thompson, J., de Sá, T.H., Ewing, R., Mohan, D., McClure, R., Roberts, I., Tiwari, G., Giles-Corti, B., Sun, X., Wallace, M., Woodcock, J., 2016. Land use, transport, and population health: estimating the health benefits of compact cities. Lancet 388, 2925–2935. https://doi.org/10.1016/S0140-6736(16)30067-8.
Stroope, J., 2021. Active transportation and social capital: the association between walking or biking for transportation and community participation. Prev. Med. (Baltim). 150, 106666. https://doi.org/10.1016/j.ypmed.2021.106666.
Tan, H., Martínez López, M.A., 2019. Has urban cycling improved in Hong Kong? A sociopolitical analysis of cycling advocacy activists' contributions and dilemmas, in: Yip, N.M., Martinez Lopez, A.Mi., Sun, X. (Eds.), The Contemporary City. Palgrave MacMillan, pp. 123–146. Doi: 10.1007/978-981-13-1730-9_6.
Tapio, P., Hietanen, O., 2002. Epistemology and public policy: using a new typology to analyse the paradigm shift in Finnish transport futures studies. Futures 34, 597–620. https://doi.org/10.1016/S0016-3287(02)00003-4.
Timms, P., 2008. Transport models, philosophy and language. Transportation (Amst). 35, 395–410. https://doi.org/10.1007/s11116-007-9154-4.
Transport Department, 2014. Travel Characteristics Survey 2011 Final Report. Transp. Dep. Hong Kong.
Vafeiadis, E., Elldér, E., 2024. When is perceived accessibility over- or underestimated by accessibility indicators? Findings. https://doi.org/10.32866/001c.94648.
Van Der Meulen, J., Mukhtar-Landgren, D., 2021. Deconstructing accessibility – discursive barriers for increased cycling in Sweden. Mobilities 16, 493–508. https://doi.org/10.1080/17450101.2021.1902240.
van der Vlugt, A.-L., Curl, A., Wittowsky, D., 2019. What about the people? Developing measures of perceived accessibility from case studies in Germany and the UK. Appl. Mobilities 4, 142–162. https://doi.org/10.1080/23800127.2019.1573450.
van Wee, B., 2002. Land use and transport: research and policy challenges. J. Transp. Geogr. 10, 259–271. https://doi.org/10.1016/S0966-6923(02)00041-8.
Varet, F., Granié, M.-A., Carnis, L., Martinez, F., Pelé, M., Piermattéo, A., 2021. The role of perceived legitimacy in understanding traffic rule compliance: a scoping review. Accid. Anal. Prev. 159, 106299. https://doi.org/10.1016/j.aap.2021.106299.
Vecchio, G., Martens, K., 2021. Accessibility and the Capabilities Approach: a review of the literature and proposal for conceptual advancements. Transp. Rev. 41, 833–854. https://doi.org/10.1080/01441647.2021.1931551.
Völker, S., Heiler, A., Pollmann, T., Claßen, T., Hornberg, C., Kistemann, T., 2018. Do perceived walking distance to and use of urban blue spaces affect self-reported physical and mental health? Urban for. Urban Green. 29, 1–9. https://doi.org/10.1016/j.ufug.2017.10.014.
Wacquant, L., 2018. Bourdieu comes to town: pertinence, principles. Applications. Int. J. Urban Reg. Res. 42, 90–105. https://doi.org/10.1111/1468-2427.12535.
Waitt, G., Jessop, L., Gorman-Murray, A., 2011. 'The guys in there just expect to be laid': embodied and gendered socio-spatial practices of a 'night out' in Wollongong, Australia. Gender, Place Cult. 18, 255–275. https://doi.org/10.1080/0966369X.2010.551651.
Waitt, G., Lewis, A., 2024. The politics of emotion as affective judgement: bike-and-ride transit in Greater Sydney, Australia. Gender, Place Cult. 31, 572–594. https://doi.org/10.1080/0966369X.2023.2170987.
Xing, Y., Wang, K., Lu, J.J., 2020. Exploring travel patterns and trip purposes of dockless bike-sharing by analyzing massive bike-sharing data in Shanghai. China. J. Transp. Geogr. 87, 102787. https://doi.org/10.1016/j.jtrangeo.2020.102787.
Xu, Y., Chan, H.-Y., Chen, A., Chim, T.-Y., Liu, X., 2024. Aged and wheeled mobility in transit-oriented development: the capabilities approach. Transp. Res. Part D Transp. Environ. 127, 104058. https://doi.org/10.1016/j.trd.2024.104058.
Xu, Y., Chan, H.-Y., Chen, A., Liu, X., 2022. Walk this way: Visualizing accessibility and mobility in metro station areas on a 3D pedestrian network. Environ. Plan. B Urban Anal. City Sci. 49, 1331–1335. https://doi.org/10.1177/23998083221089321.
Yang, L., Chau, K.W., Szeto, W.Y., Cui, X., Wang, X., 2020. Accessibility to transit, by transit, and property prices: spatially varying relationships. Transp. Res. Part D Transp. Environ. 85, 102387. https://doi.org/10.1016/j.trd.2020.102387.
Zhang, J., 2022. What is shared in shared bicycles? Mobility, space, and capital. Mobilities 17, 711–728. https://doi.org/10.1080/17450101.2022.2099755.
Zhao, P., Li, S., 2017. Bicycle-metro integration in a growing city: the determinants of cycling as a transfer mode in metro station areas in Beijing. Transp. Res. Part A Policy Pract. 99, 46–60. https://doi.org/10.1016/j.tra.2017.03.003.
Zhou, X., Dong, Q., Huang, Z., Yin, G., Zhou, G., Liu, Y., 2023. The spatially varying effects of built environment characteristics on the integrated usage of dockless bike-sharing and public transport. Sustain. Cities Soc. 89, 104348. https://doi.org/10.1016/j.scs.2022.104348.
Zuo, T., Wei, H., Chen, N., Zhang, C., 2020. First-and-last mile solution via bicycling to improving transit accessibility and advancing transportation equity. Cities 99, 102614. https://doi.org/10.1016/j.cities.2020.102614.