



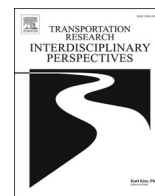
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Beyond fear and abandonment: Public transport resilience during the COVID-19 pandemic

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ABSTRACT

The outbreak of the COVID-19 pandemic challenged urban public transport systems to maintain accessibility and service for daily users while adapting to local health and safety regulations. Developing sustainable and resilient urban policies under such crisis conditions requires understanding the different feelings, experiences and expectations of passengers and how these relate to socio-economic inequalities. Drawing on a mixed-method study in Berlin (Germany), Brussels (Belgium), Stockholm (Sweden) and Tallinn (Estonia), we show how the pandemic outbreak has changed both who uses public transport and how users experience their journeys. Challenging the narratives that portray public transport as a place of fear, we find that remaining passengers assess the risk of contagion lower than those who avoided it completely. We argue that promoting resilient public transport requires policies that address the needs of passengers relying on public transport services. Therefore, we question the current policies under the sustainable mobility paradigm for not taking sufficient account of the feelings, experiences and emotions and particularly of transport-dependent users.

Introduction

Since the outbreak of the COVID-19 pandemic, cities across Europe have faced unforeseen challenges related to the management of public spaces and provision of services such as public transport (PT), a key urban infrastructure that ensures the mobility of many citizens. Local authorities and transport operators have been encouraged to restrict people's freedom of movement to contain the spread of the virus by introducing travel bans, social distancing measures, curfews and lockdowns. At the same time, a reduction in leisure activities and travel for work meant that urban residents simply had fewer reasons to engage in mobility (DeWeese et al., 2022). Hence, the outbreak of COVID-19 had "a dramatic impact on travel patterns in terms of number of trips and distances travelled, purpose of travel, and choice of travel mode" (Cats & Hoogendoorn, 2020). In many cities, the narrative of "governmental regulations and public health fears" (Gkiotsalitis & Cats, 2020, p. 4) framed PT as a place of dangerous proximity to others (Borkowski et al., 2021). Consequently, during the outbreak of the pandemic, many urban

residents exercised their freedom or privilege to adjust daily routines and drastically reduce their use of PT by avoiding it altogether, choosing other means of transport or staying at home (Jenelius & Cebeacauer, 2020). Witnessing a sharp decline in ridership and ticket revenue, transport operators had to find new financial resources to implement safety measures, notably oriented towards ensuring physical distance and contact tracing, or sanitising vehicles (Vitrano, 2021). Thus, the COVID-19 pandemic posed challenges to PT's resilience, i.e. its capacity to withstand major disruptions.

Urban resilience, characterised by durability, transformability and adaptability to changes in external factors as well as internal processes, is key to recovery from the pandemic. In this regard, issues of urban mobility generally and PT specifically play a fundamental role (Fernandes et al., 2017) but are, depending on its characteristics and configurations, vulnerable to technical, human and natural risks. However, resilience relates not only to recovery from a crisis, but also to the potential towards the transition into a more sustainable model of urban development. The aim of this research is to explicate the link between

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urban resilience, sustainability and the role that PT plays in times of harsh conditions brought about by the outbreak of the COVID-19 pandemic. Based on a mixed-method study involving both quantitative and qualitative analysis conducted in four European cities (Berlin, Brussels, Stockholm and Tallinn), we argue that understanding the impact of the current pandemic on cities does not only depend on analysing traffic flows and passenger volumes, but also involves exploring PT passengers' experiences, expectations, behaviours and feelings.

Our study joins the growing literature on the impact of the COVID-19 pandemic on PT (see Jenelius & Cebecauer, 2020; Molloy et al., 2020; Tirachini & Cats, 2020; Kellermann et al., 2022). We expand the existing urban policy-oriented perspective on mobility with increased attention to issues of urban culture and citizenship by offering novel insights into users' decisions to continue, reduce or avoid PT in a given state of emergency. Thus, we show why the continued use of PT during a global pandemic offers perceptions beyond that go beyond the key narratives of fear and abandonment during the COVID-19 pandemic.

Below we present conceptual reference points and embedding for the empirical results by discussing sustainable mobilities and their relevance for resilient cities, guidelines to improve focus, previous studies on mobility in times of COVID-19, and emerging research on behavioural and attitudinal approaches to PT use and policy-making. We highlight the robustness of PT systems that dependent on regular users and adaptation practices that allow system to be resilience. Subsequently, we outline the empirical findings of the study to identify the changed patterns in PT uses and experiences during the COVID-19 pandemic. Finally, we link these results to changes in PT provision and regulation in light of the sustainable mobility paradigm and reflect on lessons for planning policy.

Sustainable mobility, COVID-19 and experiences of public transport

The push towards sustainable mobility, advanced by economics and engineering, draws attention to a series of vital environmental aspects of urban transport (Schwanen et al., 2011) and is closely related to the concept of a "resilient city" that seeks to create conditions capable of withstanding or adapting to hazards such as the exigencies of climate change (Jabareen, 2013). While both concepts have often been conflated in analysis (Zhang & Li, 2018), they differ in their focus: sustainability centres on transformation or transition to a sustainable path, but resilience emphasises contextual adaptation and gradual change towards sustainability (Redman, 2014). Adaptability emerges as a key aspect of resilience to recover from crises, as it allows systems such as PT to prepare for rapid change (Santos et al., 2020). The "sustainable mobility paradigm", as outlined by Banister (2008) directs attention to social dimensions, place qualities and multicriteria analysis for promoting sustainability in transport planning.

Notwithstanding the potential for adaptation in PT, the concept of sustainability has been criticised as relatively blind to socio-economic inequalities (Kębłowski et al., 2019), particularly in relation to whether transport policies that focus on middle-class customers and commuting to work are fair for a broader urban population across class, race, gender and age (Hanson, 2010; Preston & McLafferty, 2016). After all, PT networks have been criticised for disregarding the daily needs of those reliant on current systems by prioritising and financing new large-scale projects over improvements to existing infrastructure (Grengs, 2004; Martens, 2017). This dynamic has been particularly conspicuous since the outbreak of the COVID-19 pandemic. While ridership is declining, PT gaining importance as an essential means of ensuring daily mobility for work and care. Thus, the robustness of the PT system, can be traced back its essential benefits (Yap and Cats, 2021). Furthermore, the pandemic has underlined the role of transport workers as key workforce and highlighted the shortcomings of sustainable urban mobility plans that undermine socio-economic inequalities exacerbated by the pandemic. PT infrastructure is therefore a key element for resilient cities

to cope with the disruption caused by the pandemic (AbouKorin et al., 2021).

Affecting urban lives and travel worldwide, the COVID-19 outbreak brought about a surge of research on how the pandemic relates to issues of mobility, whether in everyday life, for leisure or tourism travels. Besides a general observation that ridership dropped by up to 60 % in some European cities, studies focusing on the first months of the pandemic found that the decline in PT ridership reflected a lower number of active users and was accompanied by a shift to other modes of transport such as car, bicycle or walking (Bucksky, 2020; Jaekel & Muley, 2022; Jenelius & Cebecauer, 2020; Molloy et al., 2020). Further literature concentrates on PT as a space of increased risk of contagion. Epidemiological studies in Chinese cities have found that PT's structural characteristics, such as high passenger density and poorly ventilated air, favour the spread of the virus (Shen et al., 2020), that infection is higher on high-speed trains and long-distance buses increasing proportionally to the duration of the journey (Liu & Zhang, 2020), and that the spread of the virus is higher in areas with dense and frequently used PT infrastructure (Hu et al., 2021). A case study in Catalonia shows that risk perception by regular users is low, but negatively influenced by the presence of tourists during the holiday season (Vich et al., 2022). To reduce the risk of infection in PT, transport authorities and operators have tested various measures. Studies synthesised by Tirachini and Cats (2020) show the risk of transmitting the virus to be significantly curtailed by enforcing social distancing measures and consistent, correct use of masks or other personal protective equipment. Indeed, a mask mandate on PT could reduce infection rates almost to 10 % (Zargari et al., 2022). Furthermore, public health measures (e.g. staying at home, closing non-essential businesses or declaring a state of emergency) restricting the mobility of residents also reduced infection rates overall (Rafiq et al., 2022).

Nevertheless, there is little empirical evidence that travelling on intra-urban PT is particularly risky. Contract tracing efforts in Austria, France and Japan have not isolated any COVID-19 super-spreading cluster in PT (Joselow, 2020). While this might be related to the difficulty of tracing passengers, it may also relate to the comparably short duration of most trips allowing little time for transmission. In the light of such findings, *The Journal of Transport & Health* has argued that suspending local PT only has a limited impact in terms of slowing down the spread of COVID-19 (Musselwhite, 2020). Nevertheless, Tirachini and Cats (2020) observe a strong and widespread perception that public transport "adapts poorly to post-pandemic conditions" (p. 1) and is a disease vector for the general public, leading to a potential decline in ridership. Due to the risk perception and public health awareness leading to a "PT-shame" effect, as well as lower interest in shared mobility (e.g. car sharing or carpooling) (Faiyetole, 2022), studies forecast an uptick in usage of individual modes of transport (Cats and Hogendoorn, 2020). However, the introduction of security measures has somewhat offset this demotion of PT. Studies in Great Britain and Germany have shown that a majority of passengers not only finds measures such as vehicle disinfection or contactless ticket payment pleasant, but would even forego PT without measures such as social distancing (DLR Verkehr, 2020; transportfocus, 2020). Finally, studies have identified the uneven distribution of risk resulting from the COVID-19 outbreak across different population groups, largely due to differences in who can work from home and who must travel to work using PT (Rafiq et al., 2022; Burström & Tao, 2020; Cordes & Castro, 2020).

We show that to improve PT performance and service, users' attitudes and behaviours must be taken into account in addition to technical, organisational or administrative procedures, and that it is necessary to embed these emotional factors in the institutional framework (Canitez et al., 2019). A plethora of studies within the sustainable mobility paradigm have looked at travel behaviour changes across generations, such as owning fewer cars, driving less or choosing other travel modes (e.g. Delbosc et al., 2019). These travel choices entail not only the technical aspects of mobility, but also experiential aspects

associated with identity, attachment, atmosphere and general comfort (Anwar, 2016; Deutsch et al., 2013). However, while economically based arguments usually take into account elements of safety and comfort, they rarely include aspects of emotion and atmosphere related to experience and associated (dis)satisfaction nor related social interactions and encounters.

Sociality has already been recognised by urban and mobility scholars as an intrinsic influence on the PT experience (Wilson, 2011; Koefoed et al., 2017) and introduced into planning and design strategies for public spaces. For instance, the “familiar stranger”, a person someone encounters and observes “at various locales and times but never interact [s] with” (Zhou et al., 2020) is acknowledged to be a fundamental player within a neighbourhood or a commuting journey. However, “from a public health’s perspective, the familiar stranger may help spread of infectious disease” (Zhou et al., 2020, p. 1). Thus, social encounters can turn into negative micro-encounters (Wilson, 2011). At the same time, sociality is shaped by established social norms that govern interactions with strangers, attitudes towards proximity and perceptions of crowds, and which are reflected in the way participants interact with their immediate social environment (Nikitas et al., 2018). PT environments are emotional spaces where atmospheres are affected by experiences, behaviour of other passengers and regulations communicated in signs or announcements (Bissell, 2010). Transport policy-making, however, has remained rather slow to integrate these findings. According to Sur (2020), the rational way of policy formulation is hampered by a disregard for emotions as an integral part of moral judgement and a potential driver of the decision-making processes, resulting in regulations based mainly on restriction and prohibition.

Thus, we argue that it is necessary to recognise experiences and the associated atmospheres as a central element of PT and to consider fear and its manifestation for different social groups according to gender, frequency of PT use or socio-economic status when planning mobility. This becomes especially apparent during the outbreak of COVID-19, when the attitudinal, behavioural and atmospheric elements of PT are disrupted. Although declining PT ridership is associated to it, fear has the potential to turn social distancing into “a positive quality” (Freudental-Pedersen & Kesselring, 2021, p. 84) offering a means to see human emotions as diverse and neutralising risky behaviour more effectively than rationally based regulations. Therefore, recognising how norms and practices change in relation to attitudes and feelings is crucial to understanding and adapting to rapid change as a potential pathway to PT resilience.

Methods and data

For this research, we draw on empirical material collected in a two-part study in the four European cities of Berlin (Germany), Brussels (Belgium), Stockholm (Sweden) and Tallinn (Estonia). From March to August 2020, we conducted an online survey asking respondents about their mobility behaviour, as well as their perceptions and experiences in PT before and after the outbreak of the COVID-19 pandemic. The survey was administered by local research teams in respective cities and was promoted through relevant community platforms, e.g. neighbourhood groups, PT forums, local newsletters and social media platforms. In total, we collected 2164 responses, of which 1095 were complete. The questionnaire consisted of 23 multiple-answer and open-ended questions divided into three parts focusing on socio-economic background, transport use before and adjustments after the pandemic outbreak, and perceived experiences and atmospheres. The main objective of the survey was to estimate variables in parts two and three, and to prove their possible interdependencies to wider social categories. Most items were formulated on a five-point Likert scale to determine respondents’ attitude towards PT before and after the outbreak of COVID-19. Similar scales were applied for socio-economic background information (see Table 1).

Subsequently, we conducted 49 semi-structured online and

Table 1
Background characteristics of study respondents (N = 2164).

Characteristics	Categories	Percentage	
Age	Between 18 and 21 years old	2,70 %	
	Between 22 and 29 years old	12,90 %	
	Between 30 and 39 years old	28,96 %	
	Between 40 and 49 years old	24,48 %	
	Between 50 and 59 years old	18,69 %	
	Between 60 and 69 years old	7,95 %	
	70 years old or older	3,17 %	
Gender	I prefer not to say	1,15 %	
	Female	70,53 %	
	Male	26,76 %	
	Other	0,23 %	
Education	I prefer not to say	2,47 %	
	Higher education degree	63,81 %	
	Secondary education	15,25 %	
	Vocational training degree	13,00 %	
	Primary education	1,87 %	
Economic status of household	Other	2,80 %	
	I prefer not to say	3,27 %	
	<i>High</i>	I can always afford the basics and always have extra for large purchases and savings	25,35 %
	<i>Middle</i>	I can always afford the basics and can occasionally make larger purchases	41,18 %
	<i>Middle</i>	I can usually afford the basics but larger purchases (appliances, furniture) and saving are difficult	19,46 %
	<i>Low</i>	I have some money but regularly struggle to afford the basics (food, rent)	3,20 %
Working situation since COVID-19	<i>Low</i>	I have no spare money, even for food	3,46 %
	<i>No</i>	I find it difficult to answer this question	7,35 %
	I can now work from home (“tele-working”)	24,14 %	
	I could also work from home (“telework”) at least partly in my job prior to COVID-19 outbreak	23,93 %	
	I still have to travel to my workplace, but my schedule is now flexible	10,24 %	
Other	I still have to travel to my workplace, following a specific schedule	33,75 %	
	Other	7,94 %	

telephone interviews with participants who voluntarily agreed to be interviewed in person after completing the survey. A sample was selected from the available respondents according to an even distribution of socio-demographic factors: participants’ age ranged from 18 to 70 years and roughly 70 % identified as female. Despite a most likely over-representation of middle-class office workers and an under-representation of less affluent service workers, there was a range of income levels, including students, freelancers, white-collar workers and pensioners. The aim of the interviews was to gain insights into the behavioural and attitudinal factors of PT use during the pandemic.

While parts of the online survey were analysed quantitatively to find trends in mobility behaviour, the focus of the study was on the qualitative insights gained through the mixed-methods approach about users’ experiences and perceptions (see Fig. 1). Moreover, the study benefited from researchers’ presence at the different cities involved in the study, allowing knowledge on different policy responses as well as local observations on daily circumstances of COVID-19. Quantitative data was analysed through linear and ordinal regression models with SPSS to prove significance of relationship between explanatory variables (PT usage before and since COVID-19; perceived safety of/dependency on

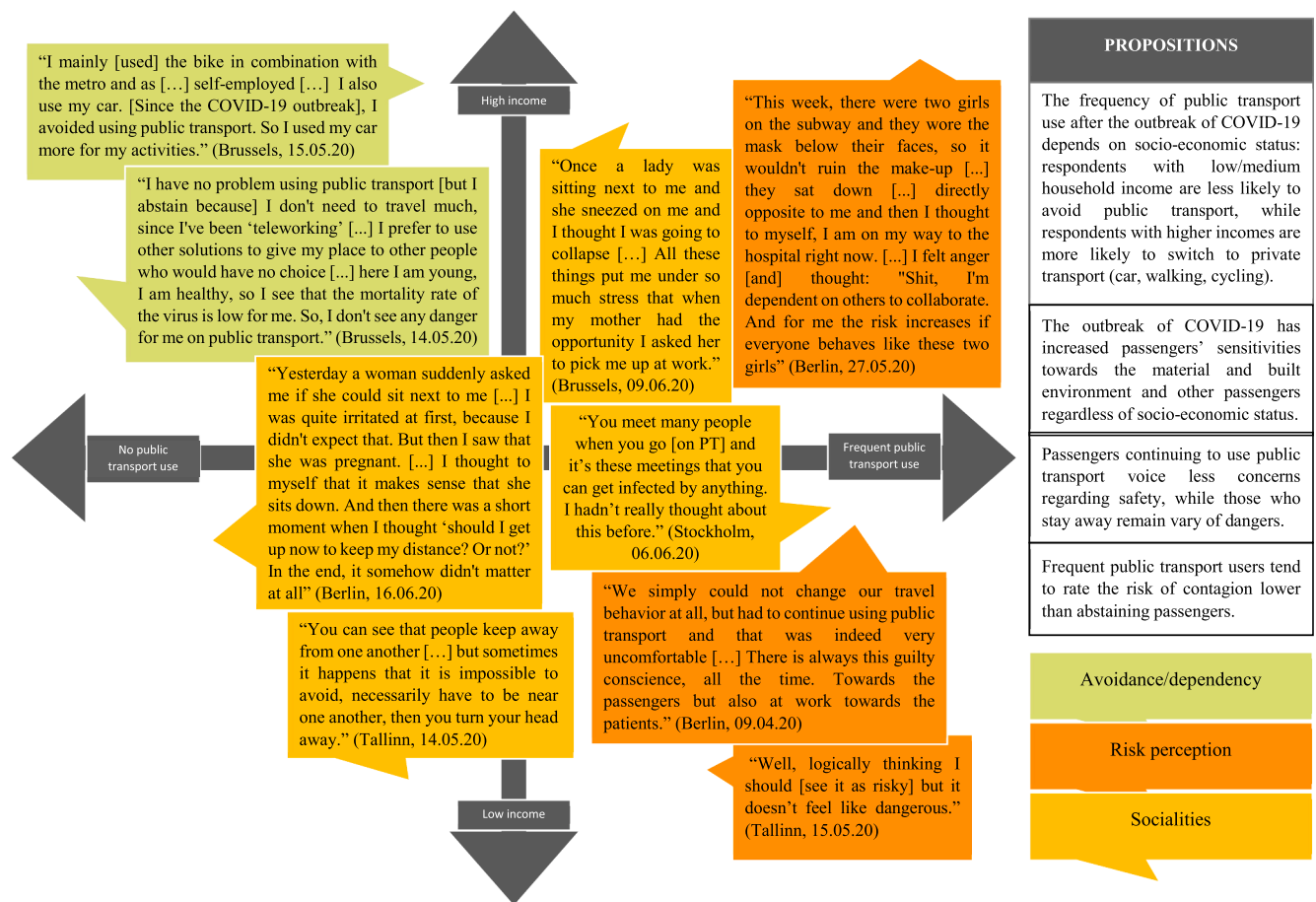


Fig. 1. Selection of qualitative interview examples arranged by income and frequency of public transport use after the outbreak of COVID-19.

PT) and socio-demographic variables (see Table 1). As most data analysed is based on ordinal Likert-scales, associations were proved by Spearman’s rho correlations. Significance of results is indicated by $p < .001$.

Such a methodological design based on basic descriptive statistics and multi-variable analysis of interview material allows us to draw a detailed picture of the different perceptions of passengers at the beginning of the COVID-19 pandemic in European cities, which complements the findings from existing quantitative studies. In response to local movement restrictions and social distancing rules, we decided to rely on online methods, which allowed us to reach a relatively large number of participants in different regions in a short time frame but also entailed a number of limitations. The participants were necessarily individuals capable of using internet, able to read one of the seven languages used (Dutch, English, Estonian, French, German, Russian, Swedish) and disposed to devote their time to an online survey. As a result, respondents do not fully reflect the demographics of transport users: 60 % of respondents are between 18 and 39 years old, while this age group only accounts for about one third of PT users in the cities studied. In addition, a higher than average percentage of participants have a university degree, identify themselves as female and are more likely to use PT. In Berlin, for example, 71 % of participants already used PT more than once a week before the outbreak of the pandemic, which is higher than the 34 % average (Nobis & Kuhnimhof, 2019, p. 43). Nonetheless, we obtained a significant amount of responses that provide valuable insights—when analysed with a certain degree of caution—about different passenger profiles and various perceptions and behaviour of PT usage. Approved by the Ethics Committee at Tallinn University, the study guaranteed anonymity, secure data storage and ethical conduct of the research in every respect.

Changed patterns of public transport use, dependency and norms during COVID-19

Respondents in all regions reported avoiding PT entirely or reducing usage either by travelling less in general, or by choosing to switch to the car, bicycle or walking instead (see Fig. 2). Notably, respondents who use PT less tend to rate the importance of maintaining services during the pandemic lower (Spearman-Rho: $r = 0,31$; $< .001$). The reduction in usage correspond to what was reported by Apple’s *Mobility Trends Report* (2022): the number of requests to use PT via routing software dropped significantly in Berlin (–80 %), Brussels (–82 %), Stockholm (–58 %) and Tallinn (–75 %).

The survey results indicate that along with walking and cycling, the use of cars also increased in comparison to PT. Similarly, most of our interviewees reported that switching to alternative modes was quite easy, as they had already been using these modes previously and simply increased their use of available alternatives.

This switch was partly justified by the fact that, for example, cycling is perceived as safer, as it allows one to be outdoors and at a distance from others. When asked to rank the relative safety of various modes of transportation, respondents consistently ranked cycling, car use and walking as safer than PT (see Fig. 3). The fact that the private car was seen as one of the safest mobility options in all regions points to a (re) emergence of the automobile as a “safe bubble” (Sheller & Urry, 2000)—a crucial counter-trend to the stream of sustainable mobilities noted also in previous studies (Campisi et al., 2020; Eisenmann et al., 2021; DeWeese et al., 2022). Thus, pandemic mobility patterns highlight a challenge for urban resilience towards a more sustainable path (Abou-Korin et al., 2021; León, 2020). One respondent in Berlin recounts:

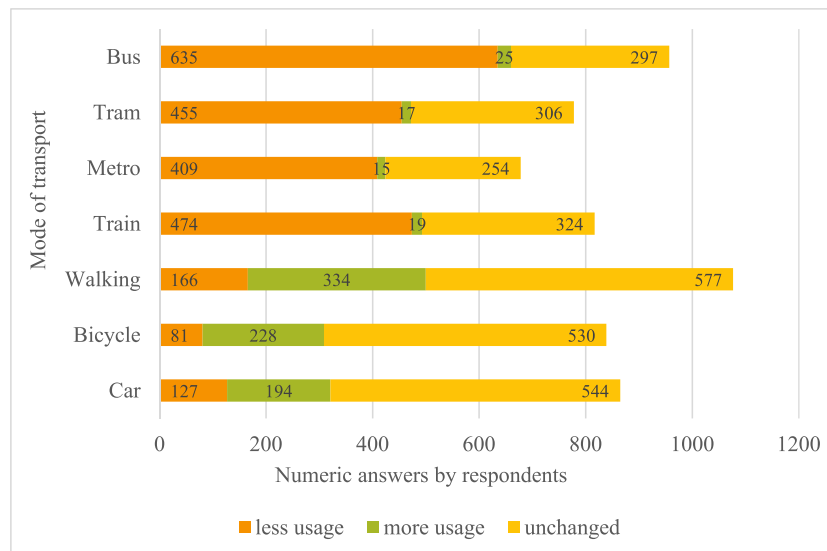


Fig. 2. Use of different modes of transport after the outbreak of COVID-19.

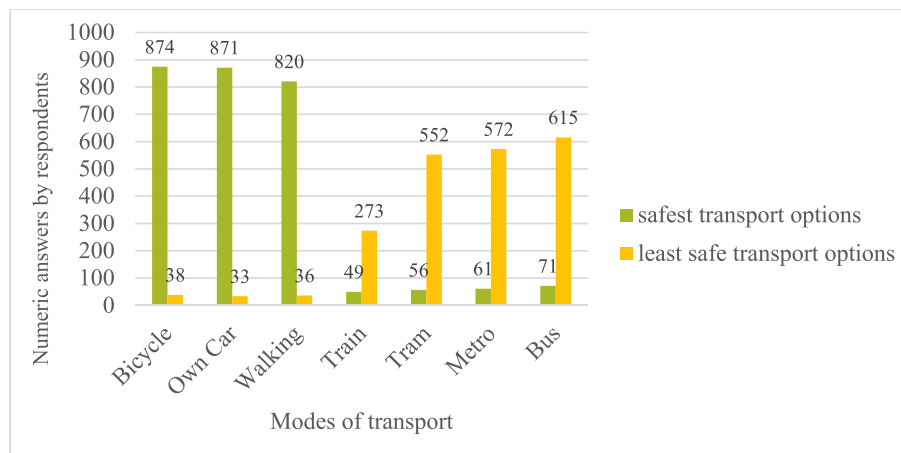


Fig. 3. Ranking of transport modes according to the perceived risk of contracting COVID-19.

“Actually, we use our car much more than usual at the moment. So, my boyfriend drives us around with the car. I guess he was waiting for such an opportunity to put his car in operation again without a bad conscience and now we drive around in the car all the time.” (User interview, Berlin, 18.05.2020)

Although the results of our study do not indicate significant regional differences in the use and perception of PT, we can identify different effects of the pandemic on passengers along socio-economic features. While a majority of urban inhabitants have less need to commute since the outbreak of COVID-19 due to increasing mobile work and childcare at home, research has found that women in particular struggle with the negative effects of the closure resulting in higher income losses and more unpaid care responsibilities compared to men (Kohlrausch and Zucco, 2020). Previous studies found that women were generally more reliant on PT before the pandemic and more likely to choose PT over walking after the easing of the lockdown (Eisenmann et al., 2021; Campisi et al., 2020). Yet, our study shows no significant results on the decisions to use or avoid PT depending on gender.

Who is able to avoid PT?

In all cities studied, passengers with higher incomes and higher

education were much more likely to forgo PT use, while passengers with lower incomes and education were more likely to continue travelling after the COVID-19 outbreak (Fig. 4). While 38 % of respondents with higher education degrees reported avoiding PT, only 17 % of those with a primary education reported not using PT at all. Similarly, our study shows a correlation between frequency of transport usage and income (Spearman-Rho = 0.24; <.001). Before COVID-19, 42 % of the most financially secure respondents reported being dependent on PT. After the outbreak, this number dropped to about 16 %. The pattern is different for people with “little spare money”: 75 % reported depending on PT before the pandemic. After the outbreak, that number remained high at 50 %. Thus, it appears that the decision to walk, use a bicycle or private motorised vehicle, or stay at home is socio-economically determined (Laverty et al., 2020). Those with financial means were in fact much less dependent than they realised, or were more able than assumed to resort to and access alternative means of transport once the pressure of COVID-19 provided enough motivation or pretext to limit the use of PT. The challenge this poses for resilient cities is that while PT is essential for regular and dependent users, it relies on the occasional users who had withdrawn during the pandemic to restore ridership and regain a higher share in urban mobility.

Changes regarding PT use are further related to changes in work and employment patterns. Overall, there is a valid correlation between

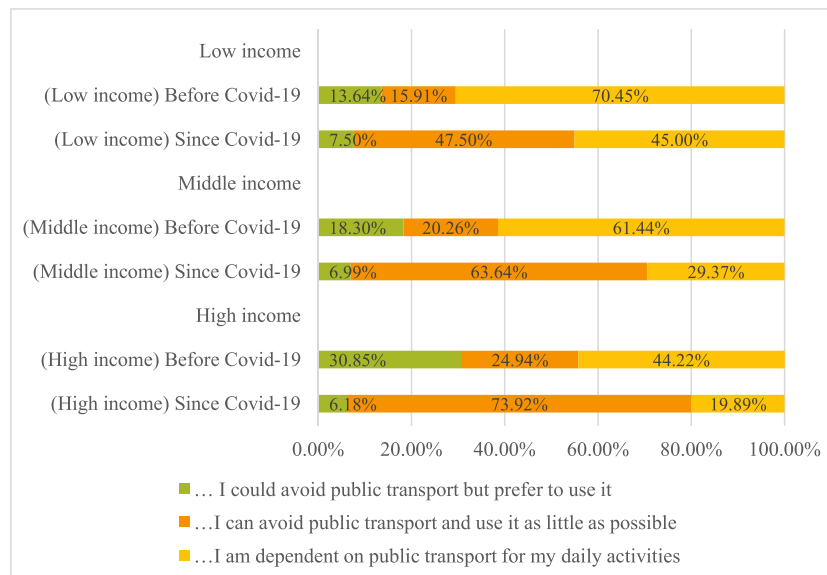


Fig. 4. Ability to avoid public transport before and since COVID-19 as related to income (n = 684).

income and the opportunity to work from home (Spearman-Rho: $r = 0,3$; $<,001$) as well as between working from home and dependency on PT during the pandemic (Spearman-Rho: $r = 0,42$; $<,001$). While only 15 % of respondents with a university degree said they had to travel to work on a specific schedule after the pandemic outbreak, this was common practice for half of the respondents with vocational, primary or secondary education. Conversely, we find that the shift from commuting to working from home was most pronounced in groups with higher education. Hence, while 42 % of respondents with a higher education degree reported working only from home after the outbreak, this was the case for only 13 % of respondents with vocational training. Thus, avoidance of PT has been a privilege that was not available to all PT users. As we highlight below, this privilege has affected the perception of PT under the conditions of COVID-19.

Adaptations to new social norms and practices on public transport

Many interviewees observed an ebb and flow of tension and tranquillity on board of PT, which could evoke feelings of stress followed by calm during the same journey. The sudden silence and absence of passengers in PT spaces previously noisy and crowded evoked a feeling of eeriness, yet at the same time made it much easier to find a seat and enjoy the journey. Many respondents stressed enjoying the free space and tranquillity that has resulted from far fewer traveller. Thus, in contrast to the common assumption that passengers are afraid to use PT during the pandemic (Campisi et al., 2020), our survey indicates a more complex array of contrasting yet not mutually exclusive experiences and perceptions. Across our data, the atmosphere of PT after the outbreak of COVID-19 was most commonly described in rather neutral keywords as “distance”, followed by “calm” (see Fig. 5).

For many respondents, “social distancing”, a key phrase of the COVID-19 pandemic, manifested itself even before they entered a vehicle. Some interviewees proactively rearranged their travel schedules to avoid peak time. Others reported more on-the-fly adjustments such as carefully assessing the capacity of carriages and declining to board if there was insufficient space to maintain distance. In Brussels, the transport operator implemented first a strategy of reducing the capacity of passengers allowed on buses and later sharing real-time occupancy figures to encourage users to avoid travelling during peak hours. Moreover, once inside a PT carriage, maintaining distance required a new type of alertness to the presence and proximity of others. Respondents from Tallinn corroborated this dynamic, noting that many

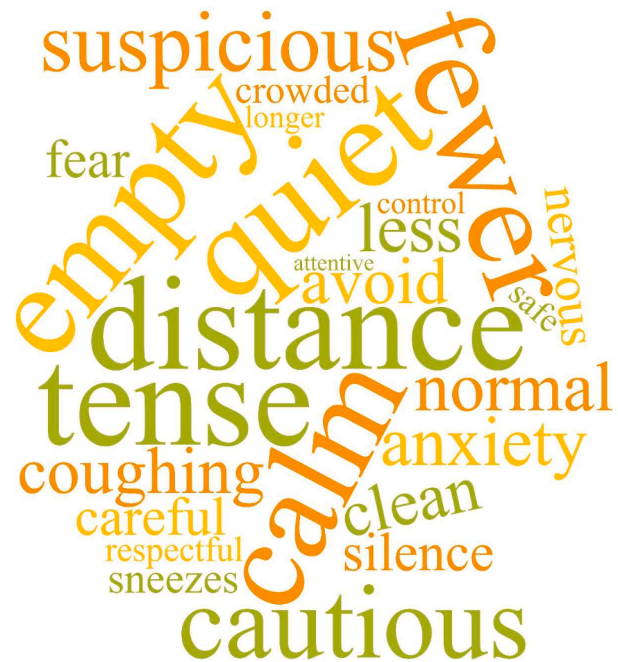


Fig. 5. Word cloud from the top 25 answers translated to English from the question: “Following the COVID-19 outbreak, how would you describe the atmosphere in public transport?”.

passengers adopted the strategy of constantly moving about and changing place within a carriage to maintain distance:

“You can see that people keep away from one another. If I sit at the front, (someone) comes on at the stop [...] I watch where she sits, she looks at me and goes to the back.” (User interview, Tallinn, 14.05.2020)

These experiences and precautions adopted in response to the COVID-19 pandemic resulted in remaining users acting out new social norms and behaviours while riding PT. In this way, new practices like distancing are seen as politeness and passengers feel compelled to adhere to a more conscious etiquette focused on personal space. For instance, one respondent from Brussels framed abiding by distance

guidelines as a matter of “respect” (User interview, Brussels, 04.04.2020). This has effects on future experiences of PT, as users will face challenges in balancing existing practices with new norms about appropriate behaviour in public space. Newly introduced social norms and expectations come with numerous uncertainties and struggles, such as in relation to whether one should help others (e.g. to board a bus) or not. One respondent from Tallinn answers the question whether there is even less of such helping than before [the COVID-19 outbreak in March 2020]: “Yes, I’m afraid so, nobody knows [what could happen] when it’s a stranger” (User interview, Tallinn, 27.05.2020).

Moreover, more than fear of personal infection, many users claim to be avoiding PT out of concern for the wellbeing of others. Beyond the practical, day-to-day measures, many governments have appealed to the population with a narrative of solidarity and consideration, also influencing PT passengers. A Brussels respondent states: “If I can [...] I prefer to use other solutions to give my place to other people who would have no choice.” (User interview, Brussels, 14.05.2020). In response to the outbreak of the pandemic, not only have transport companies introduced practical adaptations in PT spaces, but, as our study shows, these adaptations have also come from passengers themselves. The resilience of PT is therefore also significantly based on the changing practices and behaviours that travellers adopt to deal with the transforming circumstances, and that have also normalised the use of PT under COVID-19 conditions by enabling PT to function in various ways as a public space to be used rather than avoided.

A narrative of fear and its unequal distribution

In an effort to maintain PT services for those who depend on it, while counteracting the spread of the virus, operators tried to introduce different measures, such as increased cleaning of vehicles, automated opening of doors at stations and barriers to enforce compliance with distance measures. In Brussels, for example, a sticker was put on every second seat in trams, metros and buses, instructing passengers not to use it. Even a few months after the outbreak of COVID-19, compliance with the new PT regulations and passenger wellbeing remained controversial, with a study conducted in London in January 2021 finding that transport dependent users demand stronger disciplinary measures to ensure physical distance and the wearing of masks ([transportfocus, 2021](#)). The results of our study indicate an increased awareness among the remaining users towards the material environment, such as surfaces or barriers, as well as other passengers resulting in mixed feelings. A respondent from Berlin observes:

“Well, there are just so many infectious things you have to touch on the train. Or you don’t have to, but you do so subconsciously because you don’t think about it.” (User interview, Berlin, 19.06.2020)

Across the cities explored in our study, respondents reported being extremely cognisant of everything they touch, in particular the stop buttons, door handles and support bars. Accordingly, some passengers developed new practices: trying to sit down so as not to touch bars and handles, using elbows and backs of hands when touching surfaces. These small adjustments became very noticeable:

“It was still business as usual in public transport, but like the next morning, people were wearing masks and gloves. [...] nobody wanted to touch the metro handles like to open the door to push the button. As if some people were even willing to almost miss their stop because they didn’t want to open the door. It was that bad.” (User interview, Brussels, 24.03.2020)

Besides an increased vigilance of the material environment, the pandemic seems to have changed the way users perceived the presence of others. They often reacted violently to rule-breaking or inappropriate behaviour by others refusing to wear a facemask or keeping distance, which often led to strong feelings of discomfort, annoyance or even fear. Our study complements previous research showing not only that “fear

has a significant impact on travel behaviour” ([Kim et al., 2017](#), 2894) and that risk perception varies by socio-demographic characteristics ([Jaekel & Muley, 2022](#)), but that fear is above all unequally distributed (see [Fig. 1](#)). Comparing the changes experienced in PT compared to other urban public spaces, such as markets and parks respondents perceive PT as relatively safe. In particular, remaining passengers consider PT to be as safe or even safer than other shared spaces such as grocery shops or shopping centres ([Fig. 6](#)). In contrast, nearly 70 % of passengers who completely avoid PT find it to be “much less safe” with only approximately 12 % judging PT safer than grocery stores. Our survey suggests a moderate to strong interdependence of usage and the perceived safety of PT in comparison to other public spaces (Spearman-Rho = -0,655).

Thus, the group of frequent users who perceive PT as less dangerous is a potential source of robustness and resilience of the system. Transport policy should therefore focus on these users and pay attention to the uneven usage of public transport by passengers and how this affects the different perceptions of public transport as a public space.

Public transport beyond the sustainable mobility paradigm

The outbreak of the COVID-19 pandemic has significantly changed urban residents’ travel behaviour and experiences with PT, as our study shows. Although the lasting impact of the COVID-19 pandemic on urban mobility and resilient cities remains yet at hand, there are lessons to be learned for planning policy beyond the sustainable mobility paradigm.

Firstly, building on the agendas arising from the sustainable mobility paradigm approach, which identifies marketing PT as fundamental to its attractiveness to car users, we assume a more critical stance on PT policy, arguing that policy decisions should not be based on the expectations and behaviour of those who have better mobility options than others. Namely, under the umbrella of the sustainable mobility paradigm, in recent decades transport planning in European cities has focused on generating a modal shift from private motorised vehicles towards active mobility modes as well as PT, measuring the quality of the latter through efficiency, speed and network coverage. Debates on resilience were integrated into this discussion, with a focus on the transition to a sustainable path. Both concepts of resilient urbanity and sustainable mobility advocate for a stronger link between land use and transport policies, reducing travel needs, and tackling the ever-increasing dependence on automobility ([Schwanen et al., 2011](#); [Fernandes et al., 2017](#)). Yet, as observed by [Tirachini and Cats \(2020\)](#), and corroborated by our study, the pandemic has heightened social and class divides among PT users. The data we gather demonstrates that residents in several urban contexts across Europe generally refrained from using PT at the onset of the pandemic crisis, but that this adjustment was uneven. Namely, more often than not, passengers who limited their mobility were financially well off, and could afford not to use PT. This observation challenges the prevalent influence of the sustainable mobility paradigm among many local authorities across Europe, who have made considerable efforts and expanded resources to make PT attractive to the well-educated middle-class. Our study shows that this group was among the first to withdraw from PT in times of strain, opting for individual mobility options. Our study indicates that those who continue to use PT voice less concerns regarding safety, whereas the abstaining users remain wary of its perceived and actual dangers. Our results thus point towards a discrepancy in perceptions and needs between these two groups, and highlight the importance of maintaining a baseline level of resilience to sustain the provision of PT services. As PT is critical for users whose capacity to withdraw from the service is lower, we argue that promoting resilience requires policies targeting this user group.

Secondly, however, not using PT may have helped passengers who rely on it to maintain distances. In this way, the refusal to use PT among some passengers can be viewed positively as an expression of politeness, care and solidarity with others. Relatedly, this approach reveals the

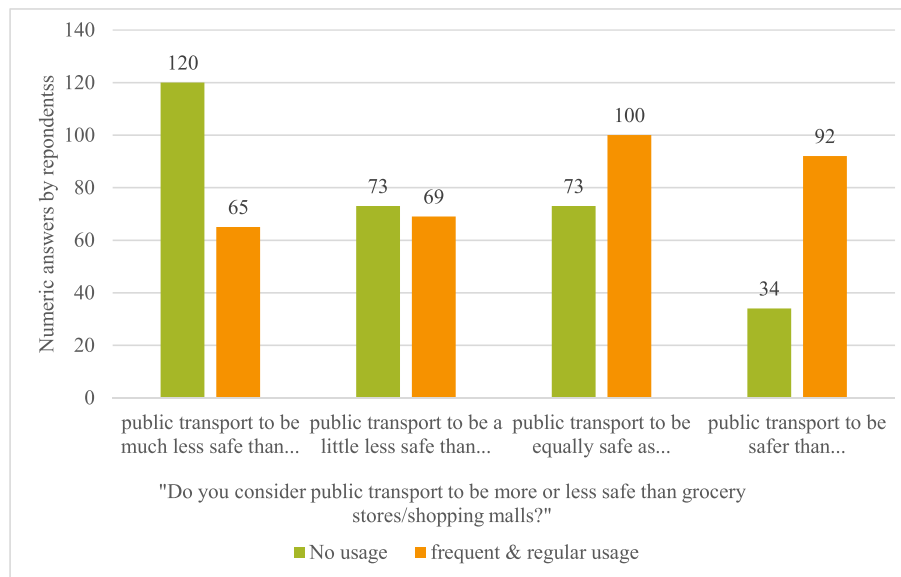


Fig. 6. Responses to the survey question “Do you consider public transport to be more or less safe than grocery stores/shopping malls?” sorted by use of PT during the pandemic (n = 626).

contradicting role of developing alternatives to PT during the pandemic as adaptations for increasing resilience. On the one hand, while throughout the pandemic many working-class residents continued to depend on reliable, frequent and comfortable PT for their daily work and care duties, the focus of public policies has too often been on developing cycling infrastructure and practices. On the other hand, providing for alternatives ensures better physical distancing among PT passengers, increasing its functionality and safety for those in need. Our respondents’ comments mirror emerging findings that one is more likely to follow public health recommendations when they are framed as means to protect others rather than means to protect oneself (Jordan et al., 2020). Alas, the approach of local government’s and PT operators’ communication programmes was precisely the opposite: instead of building on notions of care and solidarity, they typically focused on struggle and strain, as seen at across PT spaces in Brussels (“Tous ensemble contre le COVID-19” [All together against COVID-19]) and Berlin (“Gemeinsam gegen Corona - gemeinsam sicher unterwegs“ [Together against corona - safe together on the road]).

Thirdly, our study extends the discussion on resilience by adding embodied and affective as well as cultural perspectives on travel behaviour and experiences. In doing so, we combine a policy-oriented analysis with a study of diverse practices of PT during the COVID-19 pandemic. We emphasise the importance of the behavioural, attitudinal and atmospheric elements of experience in shaping policy for a socially just, inclusive and resilient urban future after the pandemic. During the COVID-19 pandemic outbreak, mainstream media and research supported a narrative that foregrounded PT as a space of contagion and fear. However, our study shows that PT users’ perceptions and experiences are more diverse and suggests that continued use of PT also reduces anxiety.

Finally, the ways in which systems are maintained and financed have important policy implications for PT resilience. In response to emerging challenges, transport operators had to adjust to reduced vehicle utilisation owing to fewer passengers and measures to improve social distance, and trialled innovative forms of service delivery or financing, such as demand responsive transport in Milton Keynes (United Kingdom) or service contracting for Metro Manila (Philippines), in the hope of finding alternatives for resilient PT after the pandemic (Potter et al., 2021; Sunio et al., 2022). The COVID 19 pandemic has also led to several hundred municipalities worldwide—including at least 60 in Europe and 270 in the United States alone—temporarily suspending fare

collection (Goldberg, 2021). Further, in many places, fare-free public transport (FFPT) was offered to certain groups of essential workers, e.g. in the medical sector. The pandemic therefore provided reasonable arguments for FFPT, as transport operators relying on user fares (such as London) struggled under the crisis conditions and relied on public money transfers, while the case city Tallinn, which had a ticket-free system since 2013, faced a limited number of service delivery and revenue concerns.

Thus, pandemic resilience should not equate with cutting PT (AbouKorin et al., 2021). While there is little evidence for PT being a major factor in the spread of virus, there is overwhelming evidence that PT remains an essential infrastructure in the cities for a number of users. Importantly, the robustness of the PT system as one element of its resilience (Yap and Cats, 2021) rests on dependent users providing a base level of usage. If the aim for pandemic resilient cities is to positively bounce forward to a sustainable path (León, 2020), planning should learn from the PT users highlighted in this paper who demonstrated and experienced heightened solidarity. Instead of reactively curtailing PT, the lesson here stresses the importance of models designed to keep the system running for both those in need as well as for the future of resilient cities. Thus, the sustainable mobility paradigm needs to incorporate the perspective of not just those shifting from cars to PT, but also of those who rely on PT the most.

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.

Data availability

The data that has been used is confidential.

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Appendix A. Supplementary data

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