

# STREET EXPERIMENTS AND COVID-19: CHALLENGES, RESPONSES AND SYSTEMIC CHANGE

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## ABSTRACT

Cities have introduced street experiments, among others, in order to cope with the urgent health challenges caused by the COVID-19 pandemic. They are primarily intended to allow people to move safely in urban spaces according to physical distancing requirements. It has been suggested that street experiments have the potential to not only respond to pressing needs, but to also trigger systemic change in mobility. This paper explores urban case studies and demonstrates how pandemic-induced street experiments provide a solution to specific challenges to mobility and public space. There are, however, issues concerning equity and citizen participation. Finally, we find that pandemic-induced street experiments have a higher acceptance among the public and authorities, a more permanent character and a greater embeddedness in long-term planning agendas. The paper concludes that the pandemic stimulated the introduction of street experiments and fostered their potential to enable systemic change in urban mobility.

**Key words:** street experiments; urban mobility; public space; systemic change; COVID-19; tactical urbanism

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## INTRODUCTION

The COVID-19 pandemic required cities to respond quickly to sanitation and health challenges that were often new and previously unconsidered. Physical distancing, and thus limitations on travel, are considered a very effective way to prevent virus spread (Chu *et al.* 2020). Lockdowns were introduced in order to guarantee physical distancing, with the accompanying necessary closure of services and restrictions on gatherings in both indoor and outdoor spaces. Anticipating this last challenge, cities worldwide implemented emergency measures which were often mobility- and traffic-restrictive, and took place in the public space, and more specifically in streets and on squares (Honey-Rosés *et al.* 2020).

Measures involved installing pop-up cycling lanes and extending pavements, freeing up parking spaces for eating facilities, and blocking entire streets for recreational activities. Also referred to as ‘pandemic pop-ups’ (Flynn & Thorpe 2021), many of these interventions can be regarded as ‘street experiments’. Bertolini (2020) defines a street experiment as ‘an intentional, temporary change of the street use, regulation and/or form, aimed at exploring systemic change in urban mobility, away from “streets for traffic”, and towards “streets for people”’ (Bertolini 2020, p. 735). Street experiments are not a completely new concept in urban planning. Tactical urbanism, do-it-yourself urbanism, urban acupuncture, and planning-by-doing are some of the terms used to refer to new forms of urban planning tools,

where cheap and quick short-term actions are intended to achieve long-term goals, mainly focused on the location of the intervention itself. They are responses to conventional city making that evolve around manifesting needs for change, developing tools for engagement and prototyping. Criticisms include that participation is often uneven, however, and may prevent public engagement and interventions in a way that might be related to gentrification, forms of displacement and state disinvestment (Thorpe *et al.* 2017).

The measures taken by cities and local authorities during the pandemic varied greatly, and some meet this definition more than others. It is still open for discussion, however, whether these measures – given that street experiments can be seen as quite disruptive in relation to more conventional or traditional planning standards (Combs & Pardo 2021; Glaser & Krizek 2021; Lowe *et al.* 2022) – offer an opportunity to transition to paradigms that prioritise forms of sustainable mobility (Glaser & Krizek 2021), and that could eventually lead to systemic change in the mobility system (Bertolini 2020).

It has already been suggested that experimental approaches in street design and in mobility regulation during the pandemic played a specific role in tackling the effects of the pandemic as a whole, through responding to urgent needs. Reardon *et al.* (2020) state that ‘reallocating and reprogramming main street space—from parking or traffic to people and local businesses—is an essential part of a holistic pandemic recovery’ (p. 2). Honey-Rosés *et al.* (2020) point out that several public health objectives are met by freeing space for pedestrians and active mobility, mainly through physical activity and the reduction of pollution exposure.

It is not only the recent need for physical distancing that urges us to change course, however (Glaser & Krizek 2021; Macharis *et al.* 2021). Social and ecological questions have arisen in cities worldwide in recent decades. The ongoing crisis has highlighted – and in some cases even reinforced – rather than generated, some of the key problems challenging our society, environment, and current way of living. Taylor and Laville (2020) suggest that initial schemes of mobility measures during

the pandemic might ‘point the way to more radical long-term measures that will help tackle inequality and the climate crisis’. Many of the challenges that became more apparent are related to mobility and public space, and more specifically to car traffic and city streets. These temporary changes might actually respond to more than pandemic-caused urgencies.

This paper has two goals. First we seek to examine how street experiments work in practice, and to what extent measures taken at the level of streets and in public spaces respond to problems and challenges posed by the pandemic. We focus on two domains: (i) the use of public space, and (ii) effects on mobility, and the social interdependent component they have. Secondly, we identify the role of the pandemic in the relationship between street experiments and their potential to enable systemic change. Here we build further on the question asked by de Bruijn and Bertolini (2020), regarding whether temporary COVID-19 measures in public spaces can be regarded as transition experiments. The hypothesis is that street experiments might offer a resolution to the problems and challenges that emerged or were reinforced throughout the pandemic in these two domains (see also Sengers *et al.* 2019).

We adopt the following structure to answer our questions. First, based on an explorative literature review of several urban case studies, we provide an overview of the challenges and problems that arose during the pandemic at street level in the two aforementioned domains, and consider in what sense a form of street experiment can help to solve these problems. This overview will then be used to analyse whether these experiments will or could have a lasting effect. To this end we focus on creating greater acceptance, embeddedness in long-term planning agenda, and a permanent character.

## TAKE IT TO THE STREETS

The pandemic had huge effects on many aspects of modern city life. At the peak of the near-global lockdown, the daily lives of many people were disrupted, forcing them to dramatically change their everyday routines as workplaces, stores and shops closed or went

online, opportunities for entertainment and socialising were banned, and travel was restricted to walking and cycling in the local neighbourhood (Hook *et al.* 2021). As a consequence, people also started to rediscover their local public space, new forms of active micro-mobility, and the importance of their neighbouring economy. It is no coincidence that these three domains are connected to a very strong social component. The streets are key here. Streets make up a major part of public space, and are traditionally the physical space where mobility takes place. Public spaces host possibilities for commercial activities, such as esplanades and vending stalls, which are linked to the economy. Whenever one of these domains is affected, the others are as well. Figure 1 shows this interrelatedness. As the focus of this paper lies in the relationship between street experiments and systemic change in urban mobility, it will examine the domains of public space and mobility. This does not mean that the effects on the local economy domain – nor on any other aspect of urban life – could be seen, as the emphasis of pandemic interventions was (after assuring health) increasingly on enabling economic activity (Flynn & Thorpe 2021).

It needs to be noted that the effect of the pandemic differed across countries (and cities), and over time, for two reasons. First, the

COVID-19 pandemic was not a homogenous period in terms of gravity and restrictions (see for example Google COVID-19 Community Mobility Trends [GCCMT] 2021). Periods of strict lockdown had far greater consequences on mobility patterns and on public space use. Street experiments that involved a social interaction aspect, for example, often took place when there were fewer restrictions in place, and thus the need for physical distancing was less prominent. Still, that does not mean physical distancing could be neglected. The same is true for mobility related measures, which were necessary to smooth traffic flows and guarantee physical distancing when people could move freely outside again (Combs & Pardo 2021). Secondly, public space is socially produced, and, thus, lived and experienced very differently from place to place (Gottdiener 2010). This means that the implications for public space, both due to the pandemic and due to the implementation of street experiments, varies considerably. The same is true for mobility. The next two paragraphs will critically discuss some important challenges brought by the pandemic, in each of the two domains, and how street experiments responded to these challenges (for an overview, see Table 1).

The following methodology was employed. First, the problems and challenges that emerged during the pandemic were

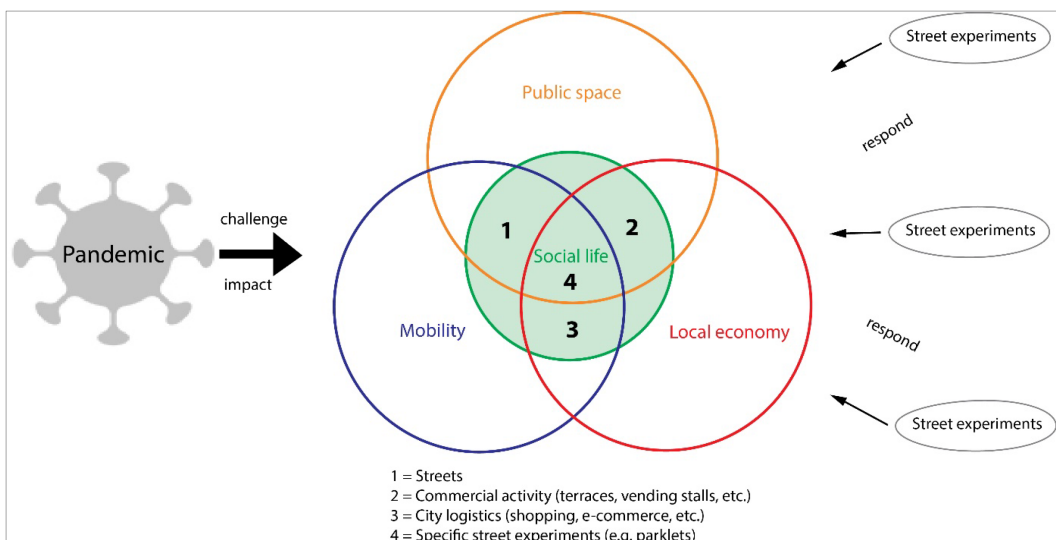


Figure 1. *Street experiments as a means to social life.*

Table 1. An overview of challenges, problems and solutions following pandemic-induced street experiments. The numbers between brackets in the 'challenges and problems' column refer to the confluence of the three domains, as indicated in Figure 1

Domain	Challenges and problems	Solutions & <i>examples</i>
Public space	Physical distancing on pavements and in squares (1)	<ul style="list-style-type: none"> <li>• Installation of designated queuing areas</li> <li>• Pavement extensions to adjacent roads, cycling roads or parking spaces</li> <li>• The provision of furniture to separate opposite walking directions</li> <li>• 'Gathering circles' in squares (<i>Sint-Pietersplein, Gent, Belgium; Domino Park, New York City, USA</i>)</li> <li>• <i>The Safer Busy Streets programme (Portland, USA)</i></li> <li>• <i>Calle Reloncaví, Chillán, Chile</i></li> <li>• <i>Shared streets initiative (Amsterdam, The Netherlands)</i></li> </ul>
	The need for and access to quality open and green outdoor spaces (1) <ul style="list-style-type: none"> <li>• Unequal access to, and distribution of, parks and green spaces</li> </ul> Social interaction in a COVID-19-safe way (1, 4)	<ul style="list-style-type: none"> <li>• Streets as a more pleasant and accessible space for residents for different types of activities and users</li> <li>• Streets as an alternative to holidays abroad</li> <li>• Street transformed into a park (<i>Maruncouchi Street, Tokyo, Japan</i>)</li> <li>• Holiday streets/play streets (<i>Vakantiestraten, Amsterdam, The Netherlands</i>)</li> <li>• Organising indoor activities in outdoor spaces through a clear delineation of activities (<i>Calle Reloncaví, Chillán, Chile</i>)</li> <li>• 'Gathering circles' in squares (<i>Sint-Pietersplein, Gent, Belgium; Domino Park, New York City, USA</i>)</li> <li>• Installing planters to separate street furniture such as benches in a way that encourages gatherings (<i>Summer Streets, Munich, Germany</i>)</li> <li>• Organising events (manifestations, cultural/religious events): providing open access and egress points, parking restrictions, static manifestations, demarcation lines, etc.</li> <li>• Organising normally indoor events outdoors (<i>Celebration of the end of Ramadan (Eid al Fitr) Abadjan, Ivory Coast</i>)</li> </ul>
Mobility	Road safety and access to safe travel for all, especially cycling safety (1, 3) <ul style="list-style-type: none"> <li>• Reduce traffic related injuries</li> </ul>	<ul style="list-style-type: none"> <li>• Providing more space for cycling: narrowing driving lanes, instating bends and furniture</li> <li>• Redistributing street space: moving pedestrians to cycle paths and cyclists to driving lanes (<i>Shared streets initiative, Amsterdam, The Netherlands</i>)</li> <li>• Creating safe crossings for pedestrians and cyclists by adding objects such as cones, delineators, and armadillos, and surface treatment (traffic paint and epoxy gravel)</li> <li>• Enabling the safe use of public transport by providing transit waiting areas, boarding platforms or temporary curb ramps with sufficient space for social distancing</li> <li>• Providing safe access to services, such as healthcare stations, schools, sanitation, ATMs, etc. Safe access to food services is especially important during a period of crisis</li> <li>• Decreasing the number of injuries of both motorists and pedestrians (<i>Pavement to Plaza initiative, New York, USA</i>)</li> <li>• Raising awareness of mobility issues and mobility related casualties</li> </ul>
	The need for physical activity and active travel modes (1)	<ul style="list-style-type: none"> <li>• Providing (workshops about) sustainable and active mobility modes, including in less wealthy and more peripheral neighbourhoods (<i>Bruxelles en Vacances, Brussels, Belgium</i>)</li> <li>• Installing temporary shared mobility hubs (<i>South Woodford Mobility Hub, London, United Kingdom</i>)</li> </ul>

Sources: NACTO (2020); Schlossberg *et al.* (2021) and various case studies.

identified according to an exploratory literature review. Relevant keywords were then identified through this literature review, such as ‘pandemic pop-up’, ‘COVID-19 measure’, ‘mobility measure/restriction’, ‘street closure’, ‘temporary intervention’, ‘tactical urbanism’, and ‘street space reallocation’. These keywords were used to select the case studies by systematically searching relevant articles in the scientific Web of Science database and popular media (newspapers and magazines), after which relevant examples – meaning those with a link to the problems and challenges identified earlier – were singled out. The case studies were then assessed on their ability to respond to the challenges and problems identified, with special attention on issues that might arise.

**Public space** – In many parts of the world there was a restriction on the use of public space in order to reduce transmission of the virus and to protect public health (Honey-Rosés *et al.* 2020). The overall trend shows measures which require the avoidance of public spaces during peak hours, especially during strict lockdowns. During periods when the virus was less rampant, more people start crowding outdoor spaces, which required specific regulations. Four main challenges were identified to which street experiments and public space-related measures responded: providing physical distancing, the need for and access to qualitative open and green outdoor spaces, social interaction in a COVID-19-safe way, and ensuring the fair use of public spaces.

Street experiments assisted with the objective of guaranteeing physical distancing in public spaces, especially in overcrowded streets, squares and on small pavements, in multiple ways. NACTO (2020) listed some examples (see Table 1). In Ghent (Belgium) and in New York, temporary ‘gathering circles’ (Stad Gent 2020) were drawn on squares and in parks, which indicated where and how many people could sit together in a safe way. There was some opposition to this type of initiative, however, as the space could be ‘too defined or determined’ and the circles limited the imagination regarding other types of uses in this space. Shirgaokar *et al.* (2021) showed that pavements where physical distancing could be

maintained were positively experienced. The widening of pavements not only expands walking space physically, but also visually, which in turn has a positive effect on passenger comfort (NACTO 2020). It also narrows street space, resulting in cars slowing down, creating a strong link between these type of interventions and the mobility-public space domains.

Open and green outdoor spaces allow for practicing different types of activities, such as playing, exercising, and socialising. The pandemic, clearly stressed the need for these types of activities and for qualitative open and green spaces (Combs & Pardo 2021; Fischer & Gopal 2021). In most parts of the world (accept for the majority of Latin American countries), there was an increase in visits to parks and green spaces during the pandemic period, in both periods of lockdown and in periods with fewer restrictions (GCCMT 2021). A study by Geng *et al.* (2021) shows that restrictions on social gathering, movement, and the closure of workplaces and indoor recreational places had a positive effect on park visits worldwide; however, in many big cities across the globe, parks and green spaces are not equally accessible for all and are often underrepresented in low-income and minority neighbourhoods (Abercrombie *et al.* 2008). Still, as noted by Jacobs (1961), parks and green spaces are not the only type of urban outdoor spaces which allow for physical activity, play and social interaction. Streets are often the closest and most accessible type of public space to our homes, and form the cornerstone of community life. In many cases, however, their potential as a space for leisure and encounter is neglected, as car traffic dominates their use. A street experiment can respond to this imbalance by providing a more pleasant and accessible space for residents for different types of activities. Fischer and Gopal (2021) show that urban streetscapes support outdoor recreation and act as a surrogate for greenspaces. The Vakantiestraten in Amsterdam provided more space for play and socialising, and in this way provided an alternative to a holiday abroad (Gemeente Amsterdam 2020a). It needs to be noted that as more vulnerable population groups run a higher risk of being infected with COVID-19 (De Smet 2020) – mainly as a result of living

in overcrowded or bad-quality housing, making compliance with social distancing more difficult (in Patel *et al.* 2020) – they might have an even greater need for accessible and qualitative open spaces. Critics note that pandemic-induced street interventions often target white, middle-class population groups, and in this way overlook the urgent needs of the most vulnerable (Beeckmans & Oosterlynck 2021).

Further, the limitation to social interaction had huge consequences for people and communities. Even when strict lockdowns were lifted, it was often still vital to keep enough distance between individuals when going outside. A complete reconfiguration of a street in Chillán, Chile, demonstrated how a school could organise classes, lunch, and play in a COVID-19-safe way by moving these activities to the adjacent street (La Discusión 2021). At the same time, this intervention allowed for safe active travel and social interaction by others through a clear delineation of the space through activities (play, teaching, moving around, etc.). The availability of space for walking, cycling and socialising during the pandemic has been associated with positive changes in the quality of life (Shirgaokar *et al.* 2021), and thus a positive effect in the social dimension. Temporary reconfigurations of the street could also contribute to the safe organisation of gatherings and manifestations (see Table 1).

Finally, under the rationale of re-opening the economy, many catering facilities used public space to expand their outdoor seating. For example, many cities in the US adopted temporary ordinances that allowed bars and restaurants to use parking spaces for their seating (PBOT 2020). Although the use of street space and other public space for commercial activities might help businesses to recover, however – and might have a reducing effect on local traffic – this new allocation might trigger conflicts with pedestrians and cyclists. Seating areas were often extended onto pavements, and were thus at the cost of walking space instead of parking or street space, resulting in frustration for pedestrians (Honey-Rosés *et al.* 2020). Another criticism is that the expansion of outdoor seating means that public space is being regulated – ironically often in an unregulated

form (Flynn & Thorpe 2021) – on the basis of consumption, making particular public spaces less accessible for some (Beeckmans & Oosterlynck 2021). This unregulated form of space appropriation also means that both access to public spaces and mobility may be restricted.

**Mobility** – Travel restrictions and lockdowns resulted in a sudden huge change in mobility (Hook *et al.* 2021). Mobility decreased everywhere during the pandemic, but particularly in public transport (GCCMT 2021; van Wee & Witlox 2021). This is mainly the result of less trust in public transport due to the risk of infection, and has resulted in a shift towards walking and cycling (Abdullah *et al.* 2020) – as far as evidence indicates for the USA, Australia, Canada and a large part of Europe (Eco-Counter 2021 in Buehler & Pucher 2021). This also indicates an increase in cycle mode share. In the city of Brussels, Belgium, for example, increased numbers of cyclists can be seen during the weekends – at least outside periods of strict lockdown (Macharis *et al.* 2021). Still, the question remains of whether this is only due to pandemic-related causes (avoidance of public transport, measures to encourage cycling – such as pop-up cycling lanes – and measures to discourage driving) or if this change was already underway before the pandemic. This is a question which research still needs to address. A study by Kraus and Koch (2021), carried out in 106 European cities, shows that the provision of cycling infrastructure instigated an increase in cycling of between 11% and 48%, on average. On the other hand, Buehler and Pucher (2021) found that COVID-19 accelerated the implementation of cycling facilities due to both a growth in cycling, and increased public and political support. Either way, there has also been increased interest in cycling on the part of cities themselves. Kilometres of cycling infrastructure have been implemented, often at the cost of driving lanes, and cities have been installing cycle parking and bicycle sharing facilities (Kraus & Koch 2021). Shirgaokar *et al.* (2021) note, via an analysis of Twitter data in the USA and Canada, that a limitations to space were perceived for every

user other than automobiles, which argues that space should be freed for uses such as walking, cycling, and socialising. Two main challenges were identified on which street experiments and mobility-related measures responded: road safety and access to safe travel for all, and the need for physical activity and active modes of travel.

Improving road safety and safe access to travel remains essential. For example, injuries and fatalities related to cycling accidents in Europe are still very high, and are not decreasing (Adminaité-Fodor & Jost 2020). Some scholars point out that the pressure on hospitals due to COVID-19 hospitalisations makes the need to reduce traffic-related injuries even more relevant, and strengthening the argument in favour of allowing more experimentation in the street (Combs & Pardo 2021). By providing more space for cycling, street experiments could assist in making streets safer for cyclists, and instigate the further deployment of urban cycling infrastructure. Narrowing driving lanes and adding bends and furniture tend to make motorists drive more slowly, with a positive effect on road safety (Schlabach 1997). Shirgaokar *et al.* (2021) observed that opening cycling space made it more joyful for cyclists to ride. See Table 1 for examples.

Finally, the pandemic stressed the need for physical activity in cities (Combs & Pardo 2021), even when periods of strict lockdown were revoked. Access to active travel modes can contribute to this (Sahlqvist *et al.* 2012; WHO 2020). In Brussels, the 'Bruxelles en vacances' project gave residents the opportunity to engage with sustainable and active mobility modes.

As already made clear in some examples, however, tactical urban interventions during the pandemic have been received with both praise and criticism. Although this might also have been the case before the pandemic, the situation during the pandemic has been quite different. Many of the interventions made, were made with a certain sense of urgency. Decisions were often taken very quickly, and in a top-down way, and implemented in just a couple of days. It also meant that no public decision process was involved for the majority of the interventions (Combs

& Pardo 2021; Flynn & Thorpe 2021) and often not all the perspectives and needs of different population groups were thus taken into account, with potential backlashes. For example, pop-up cycling lanes were withdrawn in Berlin after a legal dispute (Krause *et al.* 2020), and there were protests by motorists in Turin as a result of traffic jams due to roads being narrowed for cycling lanes (Buzatu & Pianta 2020). In all of these examples, the opponents claimed that 'their right of space has been taken' and this mainly referred to the right to drive a car for 'those who pay taxes' (Reid 2020). Some cities have tried to find a way around this. The City of Munich decided to focus less on participation because of the difficulty organising meetings, both in-person and digitally; however, district committees were given the responsibility to politically represent their respective districts, and they could only give consent to certain projects with the permission of the district residents itself (Grötsch, personal communication December 10, Grötsch 2021). People who live closer to their workplace, which is often the case when living in and around the city centre, are often more physically active commuters, and people who can afford a more expensive lifestyle often have greater access to active travel modes (Honey-Rosés *et al.* 2020). Those who live on the periphery – often less well-off population groups – tend to live further from their workplace, and might not benefit from investments in active transport infrastructure. They are thus at risk of being excluded from active travel modes. Beeckmans and Oosterlynck (2021) point out that the pushing back of cars can also be an attempt by the gentrifying class to appropriate public space. In other words, mobility related interventions are never 'just interventions in the circulation of vehicles [...], but always also an attempt to redistribute space' (Beeckmans & Oosterlynck 2021, p. 41). This therefore also raises questions about equity issues, the same issues to which street experiments try to respond in the first place. As some argue (for example Sarkin 2020), it is equality that is key to solving the pandemic.

Even though the discussion on equity, public participation and democratic procedure in relation to tactical urban experiments has

already been begun by researchers, even before the pandemic (for example Caprotti & Cowley 2017; Evans *et al.* 2021; Scholl & de Kraker 2021; Sharp & Raven 2021), an increasing number of scholars are lifting their voice for more awareness on these issues in the (post-) COVID-19 city (Beeckmans & Oosterlynck 2021; Flynn & Thorpe 2021; Schmidt & Zhang 2022).

Having looked at the problem-solving potential of street experiments, the question remains whether the effect of such interventions during the pandemic reaches further than responding to short-term needs (Bertolini 2020). Can the street experiments and the mobility measures implemented during the pandemic be seen as transition experiments?

### HERE TO STAY OR GONE TOMORROW?

The previous section demonstrated that the strength of street experiments lies in their ability to quickly respond to short-term, but also more latent, societal and environmental challenges, but that it is necessary to be aware of issues concerning equity and participation. These temporary changes in the streetscape and public space have enormous potential for enabling systemic change in the mobility system, but also in public space use and design (Bertolini 2020; de Bruijn & Bertolini 2020; Honey-Rosés *et al.* 2020; Combs & Pardo 2021; Glaser & Krizek 2021; VanHoose *et al.* 2022). This is not always taken for granted, however, and it remains an ongoing research debate. The pandemic might be just the element to drive this potential for street experiments, and to enable systemic change (de Bruijn & Bertolini 2020; Glaser & Krizek 2021).

Bertolini (2020) and VanHoose *et al.* (2022) have explored the potential of street experiments in enabling systemic change. Following the socio-technical transition literature (Rip & Kemp 1998), they suggest a link between specific characteristics (radical, challenge drive, feasible, strategic, and communicative) of street experiments and dimensions of systemic change (individual, organisation, institutional, and material). This is a theoretical approach, and consequently requires intensive

empirical research. It would be interesting to study whether the pandemic contributed to the presence of these characteristics in experiments, and to the change realised in the four domains. In this paper, however, we focus on other aspects that may be related to fostering systemic change: (i) higher acceptance, (ii) permanent character, and (iii) embeddedness in long-term planning agenda.

**Higher acceptance of streetscape changes** – Resistance to change and lack of political will are the two main barriers to a transition to a more sustainable transport system (Orcutt & AlKadri 2009). Devine-Wright (2008) argues that changes in the energy system can only come to fruition with the acceptance (and participation) of the public. As these changes in the energy system entail new infrastructure developments (Cohen *et al.* 2014) – which also applies to changes in the mobility system (the material dimension of systemic change as defined in VanHoose *et al.* 2022) – the same reasoning could be made for urban experiments: a higher acceptance of urban experiments might be a driver for systemic change in the mobility system.

Where people tend to have difficulties imagining how things could be different, the pandemic made it easier for people to be open to change (Rowe 2021), especially when it concerns the streetscape and public space. The Vakantiestraten in Amsterdam, for example, allow people to experience what it is like to watch a film in front of their house, or to picnic with neighbours they have never met before, giving them a perceived feeling of utility gain, which reflects greater social acceptance (Cohen *et al.* 2014). The pandemic offers an opportunity to open a conversation with the community and other stakeholders involved – if done carefully – about what the function of a street could be. This might then lead to a change in awareness and attitudes towards mobility and public space use, suggesting greater social acceptance (Cohen *et al.* 2014). Vecchio *et al.* (2021) argue that emergency interventions in five South American cities had a ‘symbolic role, intending to demonstrate the potential for sustainable mobility interventions in contexts usually difficult to intervene’ (p. 1832). A generally positive attitude



towards mobility measures – which were mostly traffic- and car-restrictive – taken during the pandemic can be seen in Brussels, Belgium (Macharis *et al.* 2021). When COVID-19 infections decreased, however, and the perceived need for COVID-19 measures lessened, more negative sentiments emerged. As the acceptance of such interventions is never a one-sided story, it remains to be seen how this will evolve once the pandemic is over.

In addition to this acceptance among the public, there is also an increased openness towards street experiments among policy makers and planners. ‘Political resistance, in many cities, was replaced with enthusiasm to ‘get on board’ with what was rapidly becoming a global movement, often spurred by pressure from public health and active transport advocates’ (Combs & Pardo 2021, p. 2). With the increasing need to adapt our streets to the pandemic, the transport sector also showed more tolerance for experimentation and for implementing infrastructure with temporary materials, rather than sticking to conventional (and often car-centric) planning standards.

According to Combs and Pardo (2021), this suggests a link between the tolerance for experimentation and the further testing and implementation of experiments. In this way, the pandemic acted as enabler of experiments themselves, or at least of accepting them as being both part of the modern streetscape and part of a transition towards more sustainable cities. On the other hand, the authors suggest that when emergency regulations begin to take on a more top-down character, questions about acceptance should be raised. Public engagement and citizen participation were often very limited, or even non-existent. Whether this was for obvious practical reasons, such as the urgency of the moment, the temporary nature of the interventions, or the logistical challenges of in-person public engagement during a pandemic, these types of arguments are critically scrutinised by opponents of mobility restrictive measures. For example, opponents of the low-traffic neighbourhoods in London claim that the pandemic is being used as a free card for mobility, and more specifically, for implementing car-restrictive measures (McIntyre 2021).

**Permanent character** – Some street experiments developed from an (initially intended) experimental phase to a more permanent state, and succeeded in continuing longer, and regardless of COVID-19. Those experiments are often more strategic and challenge-driven, and tend to be less radical (Bertolini 2020). Secondly, we see that some are repeated due to their success (e.g. only in summer months), but are not permanently installed (VanHoose *et al.* 2022). This raises the question of whether the street experiments during COVID-19 could overcome this and affect systemic change.

In the spring of 2021 the City of Munich announced that the summer parklets would remain (Süddeutsche Zeitung 2021). This shows that on different levels cities are ‘ready’ to shift directions. It also demonstrates that the city’s government supports this idea – through the pledging of permits, funds, and so on. Another example is the Shared Streets Initiative in Amsterdam, which was outlined in the format of a ‘menu’ (Gemeente Amsterdam 2020b). In the summer of 2020, some streets in the centre of Amsterdam were restricted for car access. Pedestrians could walk on the existing cycling lanes, and cyclists were moved onto the driving lanes. In this way, the cars were ‘hosts’ on the driving lanes, could not go faster than 30 km/h, and should give priority to cyclists. It has been claimed that car traffic in these central roads has diminished considerably (Niemantsverdriet 2021), but no study has yet demonstrated this. In autumn 2021 the district council proposed a plan to the city government for making these temporary arrangements permanent, and the verdict is still awaited. A survey carried out in April 2020 in the UK found that a clear majority would welcome changes to the public space and mobility as permanent, while only 9% wanted ‘a complete return to normal’ (RSA 2020).

Either way, and whether or not this progress demonstrates a greater potentially supportive base for mobility restrictive measures, or for experimental approaches in street design, they at least open the conversation about it, which may open the way to potential change.

**Embeddedness in long-term planning agenda** – The observation of greater acceptance among policy makers and planners is linked

to another point: the embeddedness in the long-term planning agenda of both sustainable practices and experimental approaches. Many municipal authorities are changing their point of view towards mobility and public space planning, and are seeing the pandemic as a good time to start this transformation. As Combs and Pardo (2021) put it: ‘Political resistance, in many cities, was replaced with enthusiasm to ‘get on board’ with what was rapidly becoming a global movement, often spurred by pressure from public health and active transport advocates’ (p. 2). New long-term plans are being drawn, or their implementation is suddenly seen as timely. Among these plans, street experiments and mobility restrictive measures are becoming increasingly indispensable. This indeed points to a transition towards more sustainable cities, but there is still discussion about the extent to which the pandemic acted as an enabler, as many of these plans had been in draft form before the pandemic. In general, the expansion and improvement of, for example, cycling facilities, was in many cases already included in long-term planning agendas, but COVID-19 accelerated the implementation (Buehler & Pucher 2021). Vecchio *et al.* (2021), however, demonstrate that the disruptive character of the pandemic acted as a catalyst and accelerator of sustainable mobility plans in five South American cities.

Milan’s new mobility plan (the *Strade Aperte* programme), which builds on a previous plan (the *Piazza Aperte* plan), exemplifies how existing sustainable mobility goals gained momentum during the pandemic. The municipality noticed that interventions to safeguard public health encountered less resistance due to their urgent nature (Comune di Milano 2020) – see also Vecchio *et al.* (2021). If these interventions also entailed a change in the mobility system, it was reasoned, a win-win situation could emerge. Street experiments form an essential cornerstone in the further development of the plan from 2021 onwards: specific action plans are being established, including participation and monitoring processes. This demonstrates how these kinds of interventions are used to support city-wide objectives. The city of

Barcelona also saw the pandemic as the perfect opportunity to further deploy a reconfiguration of its centre’s mobility system (known as the *Super Block* system) (O’Sullivan 2020). The city of Portland intends to link their *Safe Streets Initiative* to long-range planning projects, and sees the pandemic as an opportunity to formulate long-term strategies (PBOT 2020).

Temporary interventions becoming permanent also reflects their embeddedness in a long-term planning agenda, or in city-wide strategies. This progress also testifies to a greater acceptance of experimental approaches among citizens and governments. The request for the *Shared Streets Initiative* in Amsterdam to become permanent is an example of this: although these measures were initially presented as being disconnected from existing policy goals in sustainable mobility (de Bruijn & Bertolini 2020), the COVID-19 crisis in the centre of Amsterdam seems to have created a testbed for modifications to public space (Niemantsverdriet 2021). It also seems to work as a catalyst for the long-term city agenda to make the city car-free.

## CONCLUSIONS

This paper examined the way that cities reacted to the COVID-19 pandemic via the implementation of emergency measures such as street experiments. It asked two relevant questions: first, how were street experiments responding to the specific challenges and problems that emerged during the pandemic; and secondly, what was the role of the pandemic in the relationship between street experiments and their potential to enable systemic change in mobility.

We focused on public space and mobility in an attempt to shed more light on these two overarching questions. There were challenges regarding public space: physical distancing on pavements and in squares; the need for, and access to, qualitative open and green outdoor spaces; social interaction in a COVID-19-safe way; and ensuring the fair use of public spaces. Challenges to mobility were identified for: road safety, and access to safe travel for all; and physical activity and

active travel modes. Our explorative study demonstrates that – in the case studies examined – mobility and public space measures in general, and street experiments in particular, have the potential to respond to the urgent challenges identified. This certainly does not mean that all pandemic-induced interventions in public space have a similar ability to answer the challenges we focused on, nor does it mean that other challenges are less relevant. It also does not mean that because the examples we studied seem to respond to some challenges, and in this way make a positive contribution to tackling the pandemic as a whole, that they should not be looked at critically. The implementation of public space interventions during the pandemic has clear social implications. The criticism of Thorpe *et al.* (2017) concerning uneven participation in tactical urban interventions is even more relevant for pandemic-induced interventions. Serious questions regarding equity and democratic procedures should also be asked. Do these interventions treat all population groups equally, or are they targeting the more affluent citizens (Flynn & Thorpe 2021)? The research questions themselves should also be questioned: is it really relevant to focus on a subject –street experiments – which tends to only focus on affluent population groups, while ignoring the population groups that need most support during the pandemic, without questioning how this specific issue could be solved? When undertaking research on this issue, one should be aware that perspectives are too often from a white, middle-class point of view (Beeckmans & Oosterlynck 2021).

Three aspects which might indicate systemic change in the long term were identified, regarding the second goal of this paper: a higher acceptance of streetscape changes and experimental approaches during the pandemic, certain experimental approaches becoming permanent, and experimental approaches being embedded in the long-term planning agenda. This paper argued that the pandemic increased these aspects of public space interventions, and thus promises long-lasting effects. The great diversity of pandemic-induced interventions in the public space is also made clear. Some interventions intend to have an

impact on traffic flows and/or on more active transport. They might therefore involve a underlying rationale of exploring systemic change in urban mobility, as they are also embedded in more overarching strategies aimed at creating more liveable and sustainable cities. Many interventions are motivated by an economic rationale, however – and this might increase once the pandemic is over. These types of interventions are also more likely to survive longer after the pandemic, and bear less or almost no relation to (systemic change in) mobility. Nevertheless, cities are seeing the pandemic as ‘the right time’ to transition towards more sustainable practices.

We are aware that this study has limitations regarding case study choice, and that other methods may be preferable (e.g. the cross-sectional research design by VanHoose *et al.* 2022). However, this approach offers more informal insights, and suggests that the pandemic acted to stimulate street experiments and enable their potential to trigger systemic change. All in all, it is an understatement to say there are high hopes that the pandemic will bring something positive after all. Street experiments could engage in a set of practices or standards to better guarantee long term change and to avoid regression back to (the previous) unsustainable practices. Wider acceptance among citizens for experimenting should be garnered, for example, the most vulnerable population groups should be supported first, a conversation should be opened with the community, and interventions should be adapted over time.

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