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# From “streets for traffic” to “streets for people”: can street experiments transform urban mobility?

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## ABSTRACT

Despite their growing application and worldwide diffusion, the transformative potential of experiments aimed at achieving “streets for people” rather than “streets for traffic” remains largely under researched. There is little to no comparative assessment of already existing experiments, and no critical reflection on their specific added value for systemic change. Building from a literature review and discussion, this paper aims to fill this gap by addressing the following questions: Which types of city street experiments have been undertaken in the pursuit of the vision of “streets for people” instead of “streets for traffic”? What are their backgrounds, main characteristics, and reported impacts? And perhaps most importantly: How can these city street experiments trigger systemic change in urban mobility? These elements are detailed per experiment type, in order of ascending functional complexity: the re-marking of streets, the re-purposing of car parking, the re-purposing of sections of streets, and the re-purposing of entire streets. Illustrative examples from practice include *intersection repairs*, *parklets*, the *pavement to plazas* programme, *play streets*, *ciclovias* and *open streets*. The reviewed literature documents positive impacts on physical activity, active transportation, safety and social interaction and capital, and more mixed impacts on business activity. While street experiments aim to create fundamentally different arrangements of urban mobility, their potential as triggers of a greater systemic change is unclear. This paper uses the defining characteristics of “transition experiments” – a concept derived from the field of transition studies – to develop and illustrate a framework to assess this transformative potential. In the conclusions, the review and assessment framework are used to sketch a research and policy agenda for this increasingly topical phenomenon.

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## 1. Introduction: what are city street experiments, and why do they matter?

City streets are a vivid materialisation of the challenges and tensions characterising contemporary urban mobility (Von Schönfeld & Bertolini, 2017). Constrained urban spaces

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need to accommodate growing and competing flows of different sorts of mobility: motorised and non-motorised, individual and collective, fast and slow. The relentlessly loud call for a transition to sustainable urban mobility is matched by claims for a re-prioritization of city street space in favour of transportation modes such as walking, cycling, and public transport, and away from transport modes such as private motorised transport (Holden, Gilpin, & Banister, 2019). Adding to the complexity, city streets are increasingly used as spaces for testing a seemingly unstoppable flow of “disruptive” mobility innovations (e.g. mobility platforms for shared mobility and ride-hailing, electric and autonomous vehicles, etc.) “in the wild”. But city streets are also, crucially, the spaces where key urban functions *other* than mobility happen: commerce and play, social interaction and leisure, creativity and politics. Particularly since the advent of the automobile, these other uses have been marginalised to benefit the single use of channelling motorised traffic (Norton, 2015). However, this shift has continually been challenged – and continues to be vocally resisted – by local communities, social movements and professionals alike, who seek to reclaim the street for the public realm, the city’s “quintessential social territory” (Lofland, 1998).

One result of these challenges and tensions is that city streets are increasingly becoming spaces for experimentation. In many urban policy fields, experimentation has become a dominant paradigm (Evans, 2016; Karvonen & Van Heur, 2014). Ideally, experimentation allows “learning by doing” in the face of irreducible uncertainty and facilitates the testing of more radical solutions than what a seemingly irreversible policy change would allow. The hope of experimentation is that the experience will generate a broad consensus about the direction of progress or at least enhanced understanding of the possibilities and constraints of change.

The experimentation paradigm is also increasingly embraced by citizens and governments attempting to shift the balance of city streets away from motorised traffic and towards active transportation and public space, “stationary” uses, such as playing and socialising in the pursuit of a vision of “streets for people”, rather than “streets for traffic” (Lydon & Garcia, 2015). Despite this ubiquity, there is little to no comparative assessment of and critical reflection on the potential of these experiments to transform urban mobility. Similar to other policy fields (Savini & Bertolini, 2019), there is an urgent need to ascertain to what extent and under which conditions city street experiments can trigger the system-wide change in urban mobility they often claim to ignite, as well as the specifics of the resulting impacts. This paper will explore this potential for change through the following guiding questions:

Which types of city street experiments have been undertaken in the pursuit of the vision of “streets for people” instead of “streets for traffic”? What are their backgrounds, main characteristics, and reported impacts? How can these city street experiments trigger systemic change in urban mobility?

City street experiments are defined in this paper as follows: 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”. The focus is on interventions that were intended as temporary at the time of their implementation, regardless of the changes later becoming permanent, or the interventions being repeated. The focus is, further, on experiments where *the street itself* is the object of the

experimentation and not where the street just provides a backdrop (e.g. in new shared mobility services such as e-scooters). The focus is also on experiments that are not just an end in themselves but intend to be a prefiguration of what a radically different arrangement of the urban mobility system would look like. Finally, experiments that challenge the dominance of motorised mobility over not just non-motorised mobility, but also over the “stationary” use of public space will be highlighted.

In the next section, the literature on city street experiments is reviewed in order to identify and characterise their main types and highlight their impacts. Next, in the third section, a framework to assess the potential of city street experiments to trigger system-wide changes is developed and illustrated. Finally, building on both sections, a research and policy agenda is sketched.

## 2. City street experiment types and impacts: a review

### 2.1. Review aims and methods

The overall aim of this paper is to identify and position an area of enquiry: street experiments as potential triggers of systemic change in urban mobility away from motorised traffic dominance and towards non-motorised travel and public space uses. The literature review in this section contributes to this overall aim by providing the evidence to (1) develop a preliminary typology of street experiments, and (2) assess the current state of research on their impacts. To the best of my knowledge, such a comprehensive review of impacts does not yet exist. Among the reviewed publications, only one attempt, concerning play streets, has been made at a comprehensive review of characteristics and impacts (see Meyer, Bridges, Schmid, Hecht, & Porter, 2019). For *ciclovias* and for open streets only comprehensive reviews of the characteristics of the events have been found (for *ciclovias*: Sarmiento et al., 2017; for open streets: Eyler, Hipp, & Lokuta, 2015; Kuhlberg, Hipp, Eyler, & Chang, 2014), but not of their impacts.

The review entailed three main steps. First, based on Lydon and Garcia's (2015) comprehensive overview of temporary “tactical urbanism” interventions in urban public space, relevant keywords were identified: “intersection repairs”, “parklets”, “park(ing) day”, “pavement to plazas”, “play streets”, “open streets”, “*ciclovias*”, “reclaiming streets”, and “tactical urbanism”. Second, these keywords were used to systematically search two scientific databases (Scopus, Web of Science) for peer-reviewed scientific articles published up until 2019 and having the impacts of one or more such experiments as empirical research object. Articles have been selected based on the occurrence of any of the keywords in the title, and further filtered based on the abstract. 25 articles have been thus identified for examination in full. In addition, as no articles were found on “intersection repairs” and “pavement to plazas”, three scientific articles on the former (Semenza, 2003; Semenza & March, 2009; Semenza, March, & Bontempo, 2007) cited in Lydon and Garcia's (2015) and a book concerning the latter (Sadik-Khan & Solomonow, 2017) were added. Third, these articles and book were used to (1) characterise different experiment types, and (2) summarise the state of scientific research on the impacts of each type.

Street experiments have been categorised according to their ascending functional complexity: simple street re-markings, alternative uses of parking spaces, reconversion of sections of streets, and the opening of entire streets to uses other than motorised

traffic. These typologies were chosen because they provide a straightforward and univocal way to begin structuring the material. Depending on specific research aims, different typologies can be adopted in the future. Relevant classification criteria could for instance include the initiators (e.g. citizens or governments), the duration of the experiment (e.g. one day or several weeks), the frequency of the experiment (e.g. once a year or every weekend), the geographical scope (e.g. a single or multiple streets, in the centre or the periphery of the city). All impacts reported in the literature have been recorded and summarised. To ensure a degree of cross-case and cross-type comparability, they have been organised in ten broad headings, whenever the information was available: physical activity, walking, cycling, public transport, car traffic, safety, social interaction, social capital/sense of place/well-being, business, and barriers/tensions/challenges.

The review procedure is not free from biases, and at least two must be named. First, the adopted keywords and databases might have generated a focus on certain experiment types and not others, which might still have fit the definition. Second, while there was no pre-set geographical scope, the procedure resulted in a dominance of North American and Latin American cases, and few European ones. While the variety of contexts is still significant, relevant cases and analyses elsewhere might have been missed. Future research should try and address these imbalances.

## **2.2. Re-marking streets**

The marking of city streets – to allocate space for different types of traffic, pedestrian crossings, and parking spaces – is one central approach to regulating their uses. As many characteristics of contemporary streets, markings have been introduced recently, together with the advent of private motorised traffic (Norton, 2015). Previously, streets were unmarked, and different uses – both mobility- and non-mobility-related (e.g. playing, socialising, lingering) – would negotiate the space informally, through social conventions and interactions (Mehta, 2015; Norton, 2015). Deliberately changing street markings is a first avenue to experiment with alternative ways of designing, regulating and using streets. This section explores one defining example of this approach: “intersection repairs”. Other examples may come to mind, for example, the temporary addition of bike lanes, redesign of zebra crossings, or “unmarking” of streets along “shared space” concepts. Such examples have been excluded from this paper because they deviate from its main focus, the use of streets as both channels for traffic and public spaces, rather than experimentation with street traffic only.

The first of what have become known as intersection repairs took place in 1997, in the Sellwood neighbourhood of Portland, Oregon. Without official permission, residents painted a mural on an intersection and placed various amenities around it (a tea kiosk, a community bulletin board, benches, an information booth, and a playhouse for children) (Lydon & Garcia, 2015). The aim was to increase safety by slowing down cars and to transform a neighbourhood street intersection into a community space, by creating interaction opportunities. The city government initially called for removal but was eventually convinced by popular pressure to let it stand and in 2000 adopted an ordinance that allowed for similar projects elsewhere in the city. More ensued, totalling 31 projects in Portland during the year 2012 (Lydon & Garcia, 2015), and several US cities have since followed suit. Today, the concept is being implemented in cities around the world, recently including Addis Ababa,

Bogota, Fortaleza, Mumbai, and Sao Paolo.<sup>1</sup> In Portland, residents fund, design, implement and maintain the intervention. The process was originally facilitated by a volunteer organisation, City Repair, which has since transformed into a non-profit NGO and presently offers support to locals and inspiration to others. As of April 2019, they had facilitated the completion of more than 60 intersection repairs in the Portland Metropolitan Area.<sup>2</sup>

Semenza and colleagues (Semenza, 2003; Semenza et al., 2007; Semenza & March, 2009) have repeatedly assessed the impacts of intersection repair interventions in Portland. Their findings are summarised in Table 1, highlighting positive impacts on social interaction, sense of place, and physical and mental health. Qualitative evaluations suggest that community participation in conceiving and implementing the intervention was a key element behind these outcomes (Semenza, 2003).

### 2.3. Re-purposing parking space

Vehicle parking accounts for a major portion of physical space in city streets and is a very inefficient use of a scarce urban resource (Shoup, 2018). On average cars are driven only a fraction of time and spend the rest standing idle in a parking space. Car drivers have little incentive to use cars and street space more efficiently, as they usually pay a segment of the market cost of a parking space, not considering the actual real cost that adequately would reflect all externalities (De Groote, 2019). There was no comparable claim on street space before the advent of private motorised transport; transportation means were much fewer in number and more collectively used. Re-purposing parking places is another way to experiment with alternative ways of designing, regulating and using city streets. The paper will examine the case of “parklets”, an example of a city street experiment that was launched in San Francisco in 2005 and has since become a global phenomenon with the yearly global event “park(ing) day” (Lydon & Garcia, 2015).

The underlying idea of parklets is straightforward (Lydon & Garcia, 2015): temporarily transforming an on-street parking space into a (semi-)public space, by installing simple structures offering amenities such as seating, bike racks, public art, or exercise equipment. The structures can be assembled, disassembled and reassembled easily. The declared aims are to encourage walking and cycling, foster social interaction and social capital, and increase economic activity. Its original conception and first application are widely

**Table 1.** Impacts of “intersection repair” in Portland.

Impact	Findings and source
Social interaction	<ul style="list-style-type: none"> <li>- 32% of pedestrians had interactions with others and/or the place, vs. 7% in control site (Semenza, 2003)</li> <li>- 30% of respondents noted increase in social interactions (Semenza &amp; March, 2009)</li> </ul>
Social capital/sense of place/ well-being	<ul style="list-style-type: none"> <li>- 65% of respondents rated the neighbourhood as excellent, vs. 35% in control site (Semenza, 2003)</li> <li>- 53% of respondents rated their neighbourhood as better than before; 13% noted increase of sense of place (Semenza &amp; March, 2009)</li> <li>- 86% of respondents reported excellent or very good health, vs. 70% in control site; 57% felt “hardly ever depressed”, vs. 40% in control case (Semenza, 2003)</li> </ul>
Barriers/tensions/challenges	<ul style="list-style-type: none"> <li>- 7% of respondents raised concerns about aesthetic aspects, 4% about negotiations with other participants (Semenza &amp; March, 2009)</li> </ul>

attributed to the efforts of the San Francisco-based design firm, originally named Rebar. In 2005, after paying the fee to use a parking space at a parking metre, they used it as a public space instead. In a process like intersection repairs, the intervention has since been legalised and even proactively promoted and facilitated by the city government. The now typical division or task is one where the municipality reviews applications, and a sponsor (most commonly a cafe or restaurant adjoining the parking space) is responsible for the construction and maintenance of the parklet, as well as for spurring community support (Littke, 2016). The parklet programme in San Francisco implemented more than 40 parklets between 2009 and 2014 (Lydon & Garcia, 2015) and in 2015 alone there were more than 51 parklets in the city (Littke, 2016). Other cities followed, and Littke (2016) found parklet programmes in more than 80 cities worldwide. Park(ing) day is an annual rapidly expanding global one day parklet event, growing from the first in San Francisco in 2005, to 975 in 162 cities and 35 countries in 2014 (Douay & Prevot, 2015). However, some observers have been critical of its evolution from a provocative intervention to a harmless, routine event (Douay & Prevot, 2015). Table 2 summarises the findings on the impacts of the parklets programme in San Francisco, the only one systematically documented by the literature. It shows positive, but weak impacts on social interaction and social capital, and mixed impacts on business. Several challenges are also mentioned.

#### 2.4. Re-purposing sections of streets

Neither of the two aforementioned city street experiment types fundamentally challenge the use of city streets as a channel for motorised traffic. Other experiment types take this crucial step, directly posing the question whether the present balance between traffic channel and public space should be reversed for the benefit of the latter. In this sub-section, I will first present experiments in which a section of a street was re-purposed followed by those that transform an entire street or multiple streets. The key difference between the two experiment

**Table 2.** Impacts of “parklets” in San Francisco.

Impact	Findings and source
Social interaction	- Respondents appreciated the provision of safe space for socialising (Panganiban & Ocuillo, 2014, in Littke, 2016)
Social capital/sense of place/well-being	- 90% of respondents reported a strong sense of community, vs. 80% before the intervention (Pratt, 2010, in Littke, 2016)
Business	- 90% of respondents stated that they spent money while visiting a parklet (Panganiban & Ocuillo, 2014, in Littke, 2016) - Some business owners wanted the parklets made permanent while others wanted them removed, and yet others were unsure; only one business reported an increase in profits, but no businesses expressed concerns about the loss of parking spaces (Pratt, 2011, in Littke, 2016)
Barriers/tensions/challenges	- Challenges are loss of parking space, money and time costs for the sponsors, local resistance, competition between businesses, maintenance, management, liability, and unequal impacts (Koué, 2013, in Littke, 2016) - “Real” ecological value does not match green claims; tension between public-private partnership nature and aim of free access (Littke, 2016) - Deployment of parklets favours already popular and successful neighbourhoods (Stroman, 2014, in Littke, 2016)

types is that in the former, space for motorised traffic is reduced but not eliminated, while in the latter, motorised traffic is banned entirely. The illustrative example in this sub-section concerns the “pavement to plazas” programme in New York City.

The “pavement to plazas” programme started in 2007 in New York City (NYC), as part of the strategy pursued by former Mayor Bloomberg and his then transport commissioner Sadik-Khan to shift the balance of the city’s streets and squares from traffic toward public space (Sadik-Khan & Solomonow, 2017). Also known as “pop-up plazas”, the programme entailed temporarily furnishing and used a section of a mostly underused street or square as public space, while making it inaccessible to motorised traffic. Monitoring the effects on traffic flow and crashes – but also on business activity – was integral to the intervention and provided essential data for the ensuing debate whether to make the intervention seasonally recurring or even permanent. As a result of the programme, between 2007 and 2014, 59 new plazas were realised in NYC (Lydon & Garcia, 2015). Most were in Business Improvement Districts and included a strong economic development motivation. Much more exceptionally, plazas were initiated and managed by neighbourhood groups, most notably in Jackson Heights, Queens. Other cities, including San Francisco and Los Angeles, have since adopted similar programmes. The impacts reported in the literature are summarised in Table 3. They document positive impacts on walking, cycling, public transport, safety, and business, and neutral impacts on traffic flows. Main challenges are of a governance nature.

## **2.5. Re-purposing entire streets**

As previously discussed, this paper sees the ultimate experiment of city street re-purposing as a vehicle for posing the fundamental question on the utility purpose of the street: Should the street be primarily used for motorised traffic or should it be rather opened up to non-motorised traffic and non-mobility-related uses (e.g. playing, socialising, exercising, or just being outside)? Seen in this light, the re-purposing of entire streets is, arguably, the ultimate city street experiment. The most well-known example is “ciclovias” (the name given to the approach in Latin America, where it was introduced) or “open streets” (as they are called in North America and elsewhere). Before further describing this experiment type, I will first discuss the related example of “play streets”, where the distinctive focus is reclaiming street space from motorised traffic for the benefit of children.

### **2.5.1. Play streets**

Play streets – the temporary closure of multiple blocks of streets to motorised traffic to allow children more space to play – have a long history. City streets have always been a space for children to play; however, the advent of motorised traffic made them unsafe and all but banned, often even literally, playing on streets (Cowman, 2017; Lydon & Garcia, 2015). Children attempting to play on streets often fell victim to traffic crashes. As a reaction to these trends, temporary play streets to keep children safe were promoted at the beginning of the twentieth century in New York (Lydon & Garcia, 2015), and, following the New York example, in several UK cities (Cowman, 2017). After World War 2, with the advent of mass-motorization and suburbanisation, streets were refocused on fulfilling a traffic channel function and play streets disappeared (Cowman, 2017). Today they are experiencing a revival in many parts of the globe, usually spearheaded by citizen initiatives.



**Table 3.** Impacts of “pavement to plazas” programme in NYC.

Impact	Data and/or source
Walking	- Increased pedestrian traffic, e.g. 11% more than before the experiment in Times Square, 6% more in Harold Square (Lydon & Garcia, 2015)
Cycling	- More people cycling (Lydon & Garcia, 2015; Sadik-Khan & Solomonow, 2017)
Public transport	- Increased speed of public buses, growth in public transport ridership (Lydon & Garcia, 2015; Sadik-Khan & Solomonow, 2017)
Car traffic	- Neutral or positive effects on traffic flows (Lydon & Garcia, 2015; Sadik-Khan & Solomonow, 2017)
Safety	- Improved safety, e.g. in Times Square 63% fewer injuries to motorists and passengers than before the experiment, and 35% fewer injuries to pedestrians (Lydon & Garcia, 2015; Sadik-Khan & Solomonow, 2017)
Business	- Increases in retail sales, drops in commercial vacancies, majority of customers arriving on foot to the area (Lydon & Garcia, 2015; Sadik-Khan & Solomonow, 2017)
Barriers/tensions/ challenges	- Key challenges are building local stakeholder support and aligning local government organisation and procedures to experimental, border-pushing practices (Sadik-Khan & Solomonow, 2017)

The aim of contemporary play streets is to provide space for outdoor play and stimulate physical activity for children. In Belgium, play streets have been routinely organised during school vacations since 1998, through collaboration between residents and the local authority (D’Haese, Van Dyck, De Bourdeaudhuij, Deforche, & Cardon, 2015). For example, in the Ghent play street programme, street residents apply to participate with the municipality; most residents must approve the initiative, and at least three volunteers must take responsibility for organisation and act as contact points with the municipality. The municipality, in turn, provides permission and basic resources such as fences, traffic signs, and insurance for the volunteers (D’Haese et al., 2015). Play streets have also become common in the UK. In 2009, a group of parents held the first informal “playing out” session in Bristol. The next year, they obtained minor funding to facilitate a similar event on five city streets. In 2011, the city council gave a further boost by developing a policy allowing the closure of a street to traffic and opening to play, for up to three hours a week. The number of play streets and people involved have been growing ever since. The national advocacy group Playing Out, a direct spin-off of the original group of Bristol activist parents, facilitated this expansion, leading to over 660 streets in 67 local authority areas as of June 2018.<sup>3</sup> In the US, a pilot programme funded by the Partnership for a Healthier America was launched in 2012 with the first in New York City, with follow-ups elsewhere since (Zieff, Chaudhuri, & Musselman, 2016). Play street initiatives are being implemented in many other countries.<sup>4</sup> The impacts reported in the literature are summarised in Table 4. Substantial positive impacts on physical activity, safety, social interaction, and social capital are highlighted, as well as some tensions between residents and children.

### 2.5.2. Ciclovias/open streets

Ciclovias, as they are called in Latin America, or open streets, as they are called in North America and elsewhere, are temporary closures of entire streets to motorised traffic in

order to use them (“to open them”) as public spaces typically in conjunction with a programme of organised activities. First implemented and recurring since 1974 in Bogota, Columbia, they have inspired initiatives across the world. In 2014–2015 there were *ciclovias*/open streets events in at least 496 cities in 27 countries on all continents, with the greatest expansion (90%) taking place after 2000 (Sarmiento et al., 2017). For Sarmiento et al. (2017) the rise of *ciclovias*/open streets has taken on the semblance of a “healthy epidemic”, providing “an example of practice-based evidence driving new programmes and policy faster than research-based evidence” (p. S34–S35). *Ciclovias*/open streets aim to promote physical activity, decrease health disparities, promote social capital, improve quality of life, advocate for cycling, and increase business activity (Eyler et al., 2015; Sarmiento et al., 2017).

Sarmiento et al. (2017) surveyed 67 *ciclovias* in seven Latin American countries in 2014–2015 and interviewed coordinators and analysed documents in five of those countries. Attendance ranged from 40 to 1.5 million participants, length from one kilometre to 113.6 km, duration from two hours to 12 hours, and frequency from eight to 169 events per year. A majority connected low-, middle- and high-income neighbourhoods and included participation of ethnic minority groups. Most involved iconic, main, or commercial streets, offered physical activity classes and promoted cycling. The researchers found a scaling-up progression across the years in all analysed *ciclovias* (i.e. increases in length, numbers of routes, activities/services or frequency). Most *ciclovias* were publicly funded and led in cooperation with a variety of non-profit and private actors. All had encountered challenges because of discontinuity in political and financial support, which were countered with flexibility, champions, alliances, and community support.

Kuhlberg et al. (2014) identified 47 US cities with open streets in 2011, with route length varying between a few blocks and 82 kilometres, and frequency from annual to monthly. Most occurred on Sundays, a few on Saturdays. The average duration was 4.7 hours; the estimated attendance was between 250 and 100,000 people. A mixture of funding sources was used: about half had a public-private mix, a quarter public, a quarter non-profit and/or private. Hipp, Bird, van Bakergem, and Yarnall (2017) found that 122 US cities had hosted open streets events, as of January 2016. They reviewed websites and social media of 122 programmes and interviewed 32 organisers. Three-quarters of the events have been initiated since 2010; the median frequency was once a year, duration 4 hours, participation 5,000–10,000, and 77% were under five kilometres in length. One-third of the 32 events analysed aimed to expand to 12 events a year, but funding, permissions, and branding were key barriers. Table 5 reports the impacts of *ciclovias*/open streets documented by the literature, highlighting sizable positive impacts on physical activity, walking, cycling, traffic, safety, social interaction, and social capital, and mixed impacts on business.

### **3. How can city street experiments trigger systemic changes in urban mobility? Towards an assessment framework**

While there are important differences among different types, the literature review shows that city street experiments can strongly promote physical activity, enable a modal shift from car to walking, cycling and public transport, improve safety, enhance social interaction and social capital, and have neutral or positive impacts on local business. Above

**Table 4.** Impacts of play streets.

Impact	Data and/or source
Physical activity	<ul style="list-style-type: none"> <li>- In Ghent, moderate to vigorous physical activity increased from 27 to 36 min/day during intervention, while decreased from 27 to 24 min/day in control streets; sedentary time decreased from 146 to 138 min/day in play streets and increased from 156 to 165 min/day in control streets (D'Haese et al., 2015)</li> <li>- In San Francisco, proportion of those engaged in vigorous physical activity was 35%, vs. 11.5% in control site (Zieff et al., 2016)</li> <li>- In Santiago, afternoon outdoor play time and daily steps increased in intervention neighbourhood vs. no change in control neighbourhood (Cortinez-O'Ryan, Albagli, Sadarangani, &amp; Aguilar-Farias, 2017)</li> <li>- In four rural communities in the US, mean steps per minute were like free/open play setting, but duration longer (up to 3 h) (Meyer, Hamilton, et al., 2019)</li> <li>- In Winterborough of Hantown, UK, 43% of parents said children would be indoors without project (Murray &amp; Devecchi, 2016)</li> </ul>
Safety	<ul style="list-style-type: none"> <li>- In Santiago, main reason for parents to prevent their children from playing outdoors before intervention was traffic and fear of strangers (Cortinez-O'Ryan et al., 2017)</li> <li>- In four rural communities in the US, 95.9% of children agreed or strongly agreed they felt safe at play street (Meyer, Hamilton, et al., 2019)</li> <li>- In Winterborough of Hantown, UK, 71% of parents and 43% of residents valued project because it provided safe and supervised outdoor play (Murray &amp; Devecchi, 2016)</li> </ul>
Social interaction	<ul style="list-style-type: none"> <li>- In Ghent, majority of parents reported that their children were enthusiastic about play streets, had a lot of friends there, and that play streets were safe for playing; adult residents reported increased social contact with neighbours during intervention (D'Haese et al., 2015)</li> <li>- In San Francisco, adults reported positive perceptions of opportunities for social interaction (Zieff et al., 2016)</li> <li>- In Santiago, main reason for children to play outdoor was presence of other children (Cortinez-O'Ryan et al., 2017)</li> <li>- In Winterborough of Hantown, UK, parents, children, and residents valued social interaction opportunities provided; 43% of parents said social interaction was the main reason they liked project (Murray &amp; Devecchi, 2016)</li> <li>- In Melbourne, children found project increased their connection to the community; both children and adults viewed project as responding to the need for more community gathering space (McGlone, 2016, in Meyer, Bridges, et al., 2019)</li> <li>- In Santa Ana, US, several parents stated intervention was a needed response to the lack of open spaces and/or parks; many children and several parents wanted project to become daily (Espinoza et al., 2012, in Meyer, Bridges, et al., 2019)</li> </ul>
Social capital/sense of place/ well-being	<ul style="list-style-type: none"> <li>- In San Francisco, 93.3% of respondents agreed with statement "play streets strengthen our community" (Zieff et al., 2016)</li> <li>- In Santiago, adults reported strengthened and newly formed relationships during events and thought intervention made their children more sociable and independent (Cortinez-O'Ryan et al., 2017)</li> <li>- In Winterborough of Hantown, UK, respondents stated street play was a good way for children to make new friends (61% of respondents) and feel part of the community (56% of respondents), for neighbours to get to know each other better (28% of respondents), and that it led to a better sense of community (20% of respondents) (Murray &amp; Devecchi, 2016)</li> </ul>
Barriers/tensions/challenges	<ul style="list-style-type: none"> <li>- In Santiago, a few complaints from residents about noise and from car drivers about detours (Cortinez-O'Ryan et al., 2017)</li> <li>- In Melbourne, some children experienced negative response by and conflicts with residents (McGlone, 2016, in Meyer, Bridges, et al., 2019)</li> </ul>

all, they conjure the vision of a public space not dominated by motorised traffic and providing plentiful opportunities for active transport modes and social activities. Both the impacts and the vision are consistent with the long term aims of sustainable urban mobility ambitions increasingly espoused by cities around the world.<sup>5</sup> However, the relationship between street experiments and broader, city-wide mobility change and policies is unclear. On the contrary, several of the barriers, tensions and challenges identified by the literature seem to concern the relationship with city-wide, mainstream policy, financial, legal, and organisational frameworks. Furthermore, the impacts of street experiments seem limited to the event itself, which is often of both short duration and low frequency. Street experiments might therefore share the declared aims of the mainstream frameworks, but seem to demand more receptiveness of their unorthodox, and perhaps disruptive processes and practices, and a strategy to consolidate their impacts beyond the event. How can, then, street experiments and city-wide mobility policies reinforce rather than be in tension with each other? How, more broadly, can the sizable positive impacts of street experiments be extended beyond the single event? These seem very relevant questions, but they are questions that have not been central to scientific research so far, which has mostly, and as discussed in the second section, focused on the immediate impacts of individual street experiments. In order to enable future research to address this knowledge gap, I will present steps toward the development of a framework that could help assess and enhance the contribution of street experiments to citywide mobility change. While concepts from other fields could have been used, (and might be rightfully used by others in the future), I build on concepts from the field of socio-technical transitions. This field has developed concepts that expressly focus on the role that experiments can have in system change and can therefore directly be applied to explore the citywide impacts of street experiments.

The field of socio-technical transition studies examines the dynamics of technological innovations as they interweave with broader societal developments. While the original focus was on analysing the dynamics of past transitions, it has since also turned to the question of how to proactively enable future transitions, especially transitions toward sustainable practices (Grin, Rotmans, Schot, Geels, & Loorbach, 2010). One such an approach is “transition management” (Loorbach, 2010; Nevens, Frantzeskaki, Gorissen, & Loorbach, 2013; Rotmans, Kemp, & van Asselt, 2001), which is “a governance approach aimed at creating space for new paradigms and practices” (Roorda et al., 2014, p. 2). It sets out to mobilise “agents of change” by means of a “co-creative” process that combines long-term visioning, system analysis, and implementation through small but radical steps, aimed at social and organisational learning. A key component of transition management strategies is organising so-called “transition experiments”: “short-term actions through which alternative structures, cultures, and practices are explored” (Roorda et al., 2014, p. 32). In order to realise their functions as potential triggers of socio-technical transitions, transition experiments need to fulfil the following criteria (Roorda et al., 2014, p. 31; see also Nevens et al., 2013):

- **Radical:** Are the practices foregrounded by the experiment fundamentally different from dominant practices?
- **Challenge driven:** Is the experiment a step toward a potentially long-term change pathway to address a societal challenge?

**Table 5.** Impacts of “ciclovias/open streets”.

Impacts	Findings and source
Physical activity	<ul style="list-style-type: none"> <li>- In Los Angeles, 45% of respondents would have been sedentary without event (Cohen et al., 2016)</li> <li>- In Brownsville, Texas, three-quarters of respondents would have been sedentary without event (Salazar-Collier, Reininger, Gowen, Rodriguez, &amp; Wilkinson, 2018)</li> <li>- Cost–benefit ratio for health benefit from physical activity was 3.23–4.26 in Bogotá, 1.83 in Medellín, 1.02–1.23 in Guadalajara, and 2.32 in San Francisco (Montes et al., 2012)</li> <li>- In Bogota, 59.5% of participants met the physical activity recommendation in leisure time, compared to 18% in the city (Torres, Sarmiento, Stauber, &amp; Zarama, 2013)</li> <li>- In San Diego, participants had on average 144 min physical activity, 97% met the 30 min/day guideline, and 39% met the 150 min/week guideline (compared to 26% county-wide); 27% would have been sedentary without event (Engelberg, Carlson, Black, Ryan, &amp; Sallis, 2014)</li> <li>- In rural Washington State, respondents stated they spent on average 2 hours at event; 79% would have been sedentary without event (Perry, Ko, Hernandez, Ortiz, &amp; Linde, 2017)</li> <li>- In Bogota, frequent children Ciclovía users had higher moderate-to-vigorous physical activity (65.6 vs. 59.2 min), and lower sedentary time (437.7 vs. 456.5 min) than sporadic and non-Ciclovía users on Sundays; there were no significant differences on weekdays (Triana et al., 2019)</li> </ul>
Walking	<ul style="list-style-type: none"> <li>- In Bogota and Temuco, respondents stated event increased ease of walking; in San Francisco and Bogota, respondents stated it had an overall positive impact on the likelihood of walking after event (Zieff et al., 2018)</li> <li>- In Los Angeles, 14% of respondents planned to walk to event (Cohen et al., 2016)</li> <li>- In Brownsville, Texas, walking was second most common activity (23%) at event (Salazar-Collier et al., 2018)</li> <li>- In rural Washington State, respondents spent on average 84 min walking at event (Perry et al., 2017)</li> </ul>
Cycling	<ul style="list-style-type: none"> <li>- In Los Angeles, 81% of respondents planned to bike to event (Cohen et al., 2016)</li> <li>- In Brownsville, Texas, cycling was most common activity (74%) at event (Salazar-Collier et al., 2018)</li> </ul>
Car traffic	<ul style="list-style-type: none"> <li>- In Bogota, San Francisco and Temuco, respondents stated that event reduced overall number of cars on city streets (Zieff et al., 2018)</li> <li>- In Los Angeles, 38% came to the area by car, 68% would have driven there on a regular day (Cohen et al., 2016)</li> </ul>
Safety	<ul style="list-style-type: none"> <li>- In Bogota and San Francisco, respondents stated event increased overall perception of safety (Zieff et al., 2018)</li> <li>- In San Francisco, respondents appreciated positive experience and safe environment (Zieff, Kim, Wilson, &amp; Tierney, 2014)</li> <li>- In Bogota, 51.2% of respondents stated feeling safe at event with respect to traffic and accidents and 42.4% with respect to crime (compared to 38% in city as a whole) (Torres et al., 2013)</li> <li>- In Bogota, frequent children Ciclovía users were more likely to perceive neighbourhood as safe than sporadic and non-Ciclovía users (40.6% vs 28.8% of respondents) (Triana et al., 2019)</li> </ul>
Social interaction	<ul style="list-style-type: none"> <li>- In Chicago, 15% of respondents viewed exposure to other communities as primary benefit (Mason et al., 2011)</li> <li>- In San Francisco, main reason to participate was having fun with family and friends (Zieff et al., 2014)</li> <li>- In Chicago, 15% of respondents stated networking with neighbours was what they liked best about event (Mason et al., 2011)</li> </ul>
Social capital/sense of place/ well-being	<ul style="list-style-type: none"> <li>- In Chicago, event planning process provided platform for development of collaborative relationships, both between local organisations and with residents (Mason et al., 2011)</li> <li>- In Bogota, 62.4% of respondents agreed Ciclovía participants are willing to help each other, 61.4% agreed Ciclovía participants get along with each other (Torres et al., 2013)</li> </ul>

*(Continued)*

**Table 5.** Continued.

Impacts	Findings and source
	- In San Francisco and Temuco, respondents stated event increased perceived number of places to see or walk to; in Bogota, San Francisco and Temuco respondents stated it improved friendliness of the environment (Zieff et al., 2018)
Business	- In San Francisco, 44% of surveyed businesses reported an increase and 22% a decrease in customer activity (Chaudhuri & Zieff, 2015) - In San Diego, more than 50% of business respondents stated overall impact was neutral or positive (Engelberg et al., 2014)
Barriers/tensions/challenges	- In the US, main challenge is striking balance between longer-term policy goals of improving physical activity, public health, and active transportation, and one-off, fun and entertainment-driven nature of event; impacts are limited due to low frequency (Hipp et al., 2017) - In the US, key challenges are communicating concept and lack of funding (Eyler et al., 2015) - In San Francisco and St. Louis, coordination within local government, support from residents and stakeholders, and consistent and sufficient funding are key challenges (Zieff, Hipp, Eyler, & Kim, 2013)

- **Feasible:** Is it possible to realise the experiment in the short term and with readily available resources?
- **Strategic:** Can the experiment generate lessons about how to reach the envisioned fundamental changes? Can the agents needed for such changes access these lessons?
- **Communicative/mobilising:** Can news about the experiment reach and possibly mobilise the broader public?

The notion of transition experiments can help structure an inquiry into how street experiments can trigger system-wide transformations. The five outlined characteristics can be assessed and their relationships with system change can be explored. While the current body of published information does not yet allow for such an assessment and exploration, I will use the reviewed literature and additional sources to illustrate what looking at street experiments as potential transition experiments might entail.

### 3.1. How can street experiments be radical?

Street experiments can be radical, that is, they can foreground practices that are fundamentally different from dominant practices, because, and in the measure that they implement the proposition that “streets are for people, not for traffic” (Gehl, 2010). They can be radical because, and in the measure that they claim that streets are not primarily channels for motorised transport but rather serve a range of uses, including socialising, playing, exercising, and non-motorised transport. There are degrees in the implementation of this proposition: for instance, ciclovias/open streets and play streets might be considered more far-reaching than intersection repairs and parklets in prioritising humans above vehicles.

### 3.2. How can street experiments be challenge-driven?

Street experiments seem ambivalent to the degree to which they carve a pathway for greater societal change. The experiments catalogued above do stress the need for a transformation of

the urban mobility system toward reduced dominance of private motorised transport and enhancement of the public space function of city streets. However, their connection with a transition pathway does not seem always explicit. In other words, the idea that experiments represent a steppingstone toward system-wide change does not seem to be present, and there is in the literature hardly ever a mention of links to other actions that could achieve system-wide change when combined with street experiments. For instance, combining experiments with structural transport policy interventions (such as bicycle lanes, public transport services, car sharing schemes, parking regimes, or the possibility of making the temporary change permanent) might leverage greater impact. There seem to be differences in this respect. Some *ciclovias* are weekly events that extend over the entire city, while others are annual events limited to a couple of streets. The pavement to plazas programme in New York City was part of a full-fledged strategy to structurally shift the balance of city street use from motorised traffic to a variety of uses, in combination with the development of alternative mobility options that included new bike-sharing programmes and improved bus services (Sadik-Khan & Solomonow, 2017). However, this embedding in a broader strategy of change seems more the exception than the rule. Most street experiments discussed above seem to focus on the event itself rather than on a long-term change trajectory, and those involved even explicitly point at the risk that this focus on the occasion might be at the detriment of a longer-term change ambition (Hipp et al., 2017).

### ***3.3. How can street experiments be feasible?***

That the abovementioned street experiments are feasible is, of course, a tautology, as they all have been implemented. A more interesting analysis lies in the conditions that made them feasible despite their radical approach. One likely condition is that street experiments are of short duration, sometimes just limited to a few hours or one day, often on the weekend. There are, however, examples that span longer periods of time and that even become permanent (i.e. intersection repairs, parklets, and pavement to plazas). This seems to be achieved, however, by reducing their radical aspects (compare sub-section 3.1). Intersection repairs still allow motorised traffic to use the street as before; parklets arise at the expense of just a few parking spaces, and most pavement to plazas interventions do not radically disrupt motorised traffic or parking availability. A few examples seem to push the border, such as *ciclovias*/open streets or play streets that have become a weekly recurring or longer event.

### ***3.4. How can street experiments be strategic?***

There are three relevant aspects here. The first is the presence or absence of monitoring of the impacts and reflection on the findings. Initiators of city street experiments acknowledge the lack of evaluation as a major limitation (Eyler et al., 2015; Hipp et al., 2017). Much of the above-reviewed literature is triggered by this very awareness; however, it often documents the evaluation of a one-off effort, driven more by an academic motivation than a policy one, and seems to not be integrated within the initiative itself. A second aspect is the question of what to measure. The aim of diversifying street use for the benefit of more than motorised traffic flow alone requires a broadening of the mainstream methodology of collecting mobility data. Not just data on motorised traffic

flow or traffic crashes need to be counted but also impacts on physical activity, well-being, social capital, perceptions, and economic activity. The literature discussed above does document a wide range of impacts and ways of measuring them; however, these calculations do not seem to be routinely integrated into mainstream policy. Underlying both aspects, Sadik-Khan and Solomonow (2017) stress that the monitoring, publishing and publicly debating the effects of their experiments was an essential ingredient of their longer-term change strategy. They also emphasise the importance of broadening the scope of the measurements, to align them with both longer term policy aims and goals of the stakeholders that must implement the change. Third and finally, viewing street experiments as a steppingstone toward systemic change would require a broadening of the scope of the evaluation to the drivers and barriers of change that the experiment revealed. The current focus of many evaluations is on use, users, and changes in their personal behaviour and perceptions. A focus on drivers and barriers to change would also ask questions as the following: What are the opportunities for and what stands in the way of making the change permanent or radically enlarging its scope? What has the experiment revealed regarding the potential winners and losers of systemic change? Which unexpected issues have emerged, and what are potential ways to address them?

### ***3.5. How can street experiments be communicative and mobilising?***

Taking place in a public space is perhaps the strongest communicative and mobilising asset of street experiments. First, the experiments can be seen by anyone passing by, whether aware or not of their existence beforehand. Some have such a broad scope that almost the entire city takes note that “something special” is going on. Also, any passer-by is also free to join in, which further enhances the communicating/mobilising effect. Second, the public event aspect seems a further communicative and mobilising asset because anything happening in public space is bound to attract the attention of news outlets and social media, thus generating “virtual awareness”. Most of the discussed examples go beyond this simple, but crucial, step. Because public participation is seen as key – if not the most important indicator of success (Hipp et al., 2017) – great effort is put in advertising the event. Many initiatives have professional websites and adopt a sophisticated media outreach campaign spread via local government outlets, news, social media, leaflets, and word of mouth. The initiators emphasise the importance of the breadth and depth of communication (Eyler et al., 2015), and, indeed, the overall high participation rates are a testimony to its effectiveness. So, while there are obvious differences in scope and scale (a 100-kilometre-long *ciclovía* versus an intersection repair in a residential neighbourhood), this communicating and mobilising aspect is potentially a unique strength of street experiments. A possible nuance, however, is that the emphasis on the nature of the experiment might be detrimental to its ability to be integrated into a long-term strategy of change. It could prevent the initiative from being framed as an active exploration of a new urban mobility norm, rather than just an exceptional, one-off suspension of the existing urban mobility norm, with the expectation that the norm will be reinstated the following day. US open streets organisers explicitly recognise the risk that an excessive focus on the event itself might distract from longer term change aspirations (Hipp et al., 2017).



## 4. Conclusion: a research and policy agenda

The challenges and tensions of contemporary urban mobility play out on city streets, and experimenting with alternative designs, regulations and uses of streets might provide new ways to cope with these challenges and tensions. The awareness of this potential is visible on the ground; following the lead of a handful of pioneers, various street experiments have burgeoned in cities across the world. They all have in common that they seek a different balance between motorised and non-motorised traffic in city streets, and, even more fundamentally, between traffic and non-mobility-related, “stationary” uses of public space.

In order of ascending functional complexity, the backgrounds, main characteristics and reported impacts of the re-marking of streets, the re-purposing of car parking, and the re-purposing of sections of or entire streets have been highlighted. The literature documents significant positive impacts on physical activity, a shift of mobility away from the car and towards walking, cycling and public transport, increased safety, enhanced social interactions and social capital, and at least the absence of negative impacts on local business. These impacts illustrate the potential benefits of these alternative arrangements of city streets; however, the literature also stresses that impacts depend on the scope of the experiments (much more sizable in experiments aiming at re-purposing the whole street, not just part of it) and are severely limited by the often very short duration and low frequency of city street experiments. Also, the strong focus on the success of a single event can come at the cost of delaying or failing to achieve longer-term, transformative policy goals.

In order to allow digging deeper into the potential of city street experiments to act as a trigger of systemic change in urban mobility, they have been examined through the lens of the five defining characteristics of transition experiments, identified by Roorda et al. (2014). Despite differences in degree, potential strong points of street experiments seem their ability to be both radical and feasible, and to have high communicating and mobilising power. Potential weak points seem feeble or non-existing links with broader and longer-term urban policies and with social and organisational learning processes that reach beyond the event.

The current state of research does not allow a full-fledged assessment of the transformative potential of street experiments. The identification of potential strong and weak points, let alone of ways of capitalising on the former and improving on the latter, must therefore be speculative. Rather, the discussion points at the contours of a future research and policy agenda.

To researchers, there is a need to bring the comparative assessment of city street experiments, including their transformative potential and system-wide impacts, to the centre of their analyses. Such analyses would enquire into the ways in which street experiments fulfil the five defining characteristics of transition experiments discussed in section 3, seeing these as potential triggers of transformative change. They would relate these findings about characteristics of the experiments to their actual impacts, and most importantly to the degree to which temporary impacts have resulted in permanent change. These analyses would have as overarching aim the generation and refinement of hypotheses about the enablers and barriers of this process of change, from temporary to permanent.

To policymakers, there is a need to better understand and eventually harness the elements of city street experiments that can be integrated into long-term plans and

policies. In this way, such interventions can be employed more systematically, understanding the related potential and limitations in an effort to reach the ultimate goal of systemic change. The key challenge seems finding ways to not just tolerate, but rather proactively shape institutional and physical space for experimentation, and for learning from it. Ideally, street experiments can thus become an arena where the assumptions of mainstream plans and policies about what and how can be changed are continuously questioned, and borders are pushed, in an ongoing, transformation-seeking, evolutionary process of trial and error (Bertolini, 2007; Smith & Raven, 2012).

## Notes

1. <https://www.theguardian.com/cities/gallery/2018/sep/20/goodbye-cars-hello-colour-the-great-reinvention-of-city-intersections>
2. [www.cityrepair.org](http://www.cityrepair.org)
3. <https://playingout.net/about/playing-story/>
4. <https://playingout.net/inspiration-ideas/an-international-movement/>
5. See e.g. <https://sustainabledevelopment.un.org/topics/sustainabletransport>

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