



Senseable City Lab :::: Massachusetts Institute of Technology

This paper might be a pre-copy-editing or a post-print author-produced .pdf of an article accepted for publication. For the definitive publisher-authenticated version, please refer directly to publishing house's archive system

The trade-off between sustainability and social segregation in the 15-minute city

Using large-scale global positioning system (GPS) mobility data, we examined the feasibility and societal impact of the '15-minute city' model across US urban areas. Our findings highlight the environmental benefits of localized living but also its risk of intensifying socioeconomic segregation.

This is a summary of:

Abbiasov, T. et al. The 15-minute city quantified using human mobility data. *Nat. Hum. Behav.* <https://doi.org/10.1038/s41562-023-01770-y> (2023).

Publisher's note

Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Published online: 05 February 2024

The question

As urbanization continues rapidly and environmental concerns grow, a clear need exists to rethink urban development models. Without constraints, cities have been expanding into suburbia, and this has led to increasing car use and greenhouse gas emissions. In this context, the '15-minute city' has emerged as a promising alternative that proposes that residents access most of their daily needs within a short walk or bicycle ride from home^{1,2}. Although this model presents potential advantages, questions regarding its measurability, applicability and practicality remain^{3,4}. Our research uses large-scale GPS mobility data to assess the feasibility and impact of the 15-minute city model in US cities.

The observation

Our study leverages a large-scale dataset of mobile GPS traces to explore the use of essential amenities and services within a walkable distance from individual homes. By analysing data on visits to points of interest by over 40 million mobile phone users, our methodology enables insights into urban mobility patterns beyond what is possible using smaller case studies or surveys. Our comprehensive analysis of '15-minuteness' across over 400 urban areas in the USA provides a unique lens to evaluate the proximity to amenities and their actual usage for different socioeconomic groups (Fig. 1a,b).

Our findings show a strong association between the accessibility of amenities within a 15-minute walk from home and their actual use (Fig. 1c). These observations provide evidence in support of the foundational premise of the 15-minute city model: the presence of amenities is proportional to usage. Additionally, we developed the '15-minute usage' index, which shows that the median US resident makes only 14% of trips to essential amenities within a 15-minute walking radius. Furthermore, by examining historical zoning regulations such as the 1961 New York Zoning Ordinance, we found suggestive evidence of a causal link between amenity accessibility and local usage.

Finally, we also document that local trips might exacerbate socioeconomic segregation, especially among low-income residents (Fig. 1d). Taken together, these insights underscore the interplay among urban planning, environmental sustainability and social dynamics in cities.

The implications

The broader implications of our findings are twofold. From an environmental perspective, our results suggest that 15-minute city planning strategies could potentially reduce trip lengths and associated emissions by enhancing local mobility. However, although local living might foster community cohesion, it could inadvertently intensify socioeconomic segregation – particularly among less-affluent neighbourhoods. This dichotomy emphasizes the need for nuanced urban planning models that consider both sustainability and social inclusion.

Our research has some limitations. First, although we explored the potential for walkable trips, our dataset does not allow us to determine the actual mode of transportation used. Second, the study primarily centres on income-based segregation and leaves out other forms, such as racial or ethnic segregation. Finally, our observations in New York offer insights into the relationship between amenity access and local usage, but their applicability to other US regions might be limited owing to differences in varying zoning constraints and density demands.

Future research could explore the racial and ethnic dimensions of segregation within the 15-minute city context in increased detail, and analysing the time spent at different points of interest could further refine our understanding of social interactions among different groups. Our next aim is to use our empirical measures to assess policy interventions and monitor how cities implement this model over time to achieve sustainable mobility and social integration.

Arianna Salazar-Miranda & Carlo Ratti

Senseable City Lab, Massachusetts Institute of Technology, Cambridge, MA, USA.

EXPERT OPINION

“The paper represents a significant evidence-based advance in our understanding of the concept of 15-minute cities. Key features include the massive dataset on which the analysis is based, the development and use of a 15-minute usage measure, and analysis of the link

between 15-minute usage and experienced segregation. The results will be of immediate interest to many people in my own discipline and in related disciplines.”

Susan Handy, University of California, Davis, Davis, CA, USA.

FIGURE

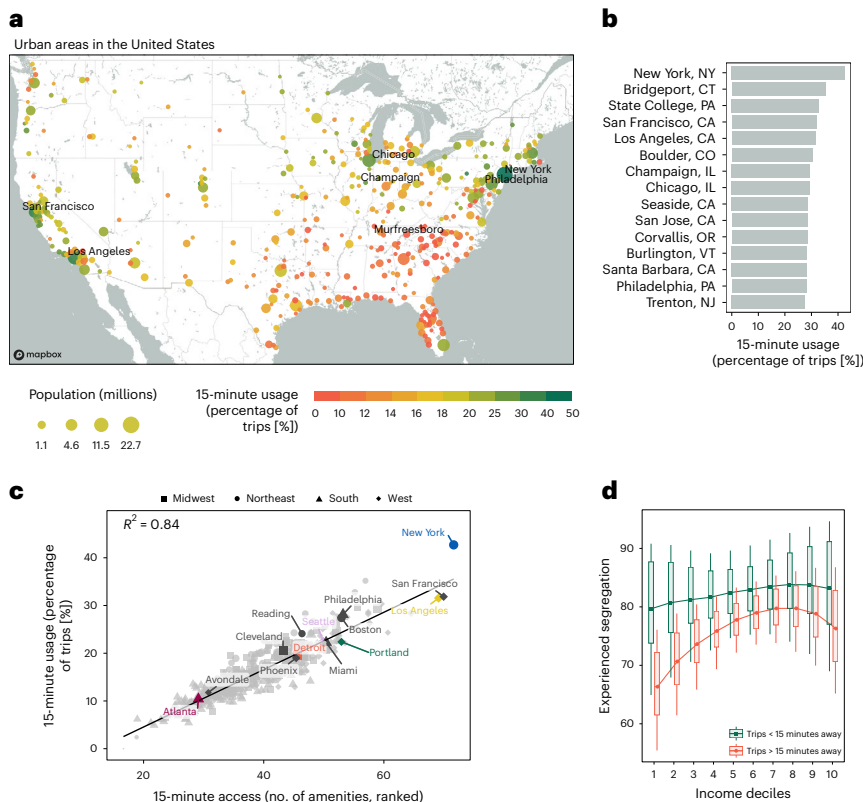


Fig. 1 | Local trips in the USA. a, Fifteen-minute usage for urban areas in the USA. **b**, Fifteen-minute usage for those urban areas that demonstrate the highest proportion of local trips. **c**, Increase in 15-minute access to amenities is associated with their increased use in urban areas. **d**, Residents of low-income neighbourhoods see a large reduction in experienced segregation when making long journeys compared with short journeys, whereas residents of high-income neighbourhoods see a much smaller reduction in experienced segregation. © 2023, Abbasov, T. et al.

BEHIND THE PAPER

The idea of 15-minute cities received an unexpected boost from the COVID-19 pandemic. Mayors and city councils took advantage of lockdowns to reimagine city spaces by re-greening neighbourhoods and reducing spaces devoted to roads. Local living sprang up in new developments from Paris to Portland to Melbourne, weaving districts of the city together into a walkable, liveable whole. Yet, we were struck by the fact that in most cases the definition of 15-minute cities was not

precise or evidence-based. The concept's lack of quantifiability resulted in its sudden emergence as the target of far-right conspiracies, which presented it as creating dystopian, quarter-hour prisons that threatened personal freedom. We therefore thought that it would be important to start using mobility big data to add evidence to the conversation. That starting point led us to generous funding from the MIT Senseable City Consortium and to a collaboration with Harvard University. **C.R.**

REFERENCES

1. Moreno, C. et al. Introducing the “15-minute city,” sustainability, resilience and place identity in future post-pandemic cities. *Smart Cities* **4**, 93–111 (2021). **This paper outlines the 15-minute city concept.**
2. Allam, Z. et al. The ‘15-Minute City’ concept can shape a net-zero urban future. *Humanit. Soc. Sci. Commun.* **9**, 1–5 (2022). **This paper argues for the 15-minute city model as a solution for sustainability.**
3. Bertaud, A. The last urban utopia: the 15-minute city. *Urban Reform Institute*, <https://urbanreforminstitute.org/wp-content/uploads/2022/02/15minicity-bertaud.pdf> (2022). **This article offers a critical perspective of the 15-minute city.**
4. Glaeser, E. The 15-minute city is a dead end — cities must be places of opportunity for everyone. *LSE Blogs*, <https://blogs.lse.ac.uk/covid19/2021/05/28/the-15-minute-city-is-a-dead-end-cities-must-be-places-of-opportunity-for-everyone/> (2021). **This article offers a critical perspective of the 15-minute city.**

FROM THE EDITOR

“The study uses behavioural data to expose a striking trade-off between the sustainability goals of the 15-minute city and social goals of reducing urban segregation — an observation that urban planners, policy makers and voters will need to take into account when making future decisions.”

Arunas Radzvilavicius, Senior Editor, Nature Human Behaviour.