

E-mobility: The broader context

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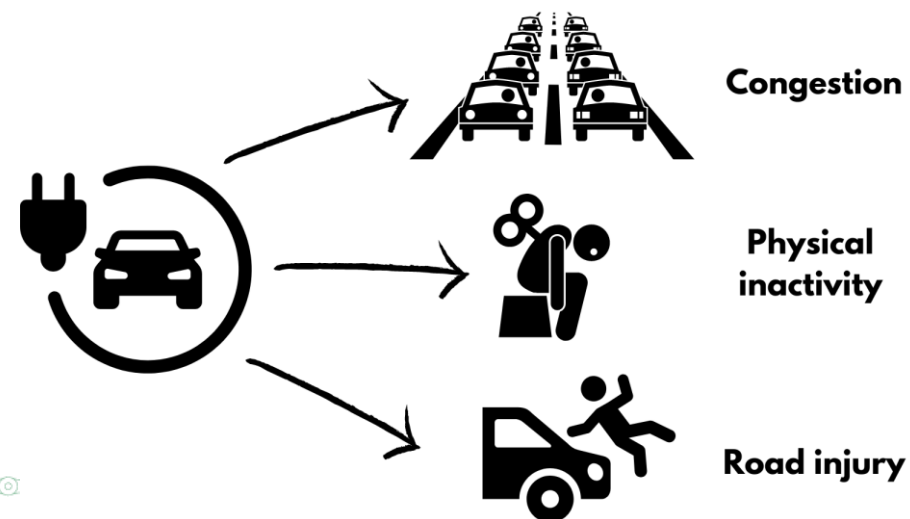
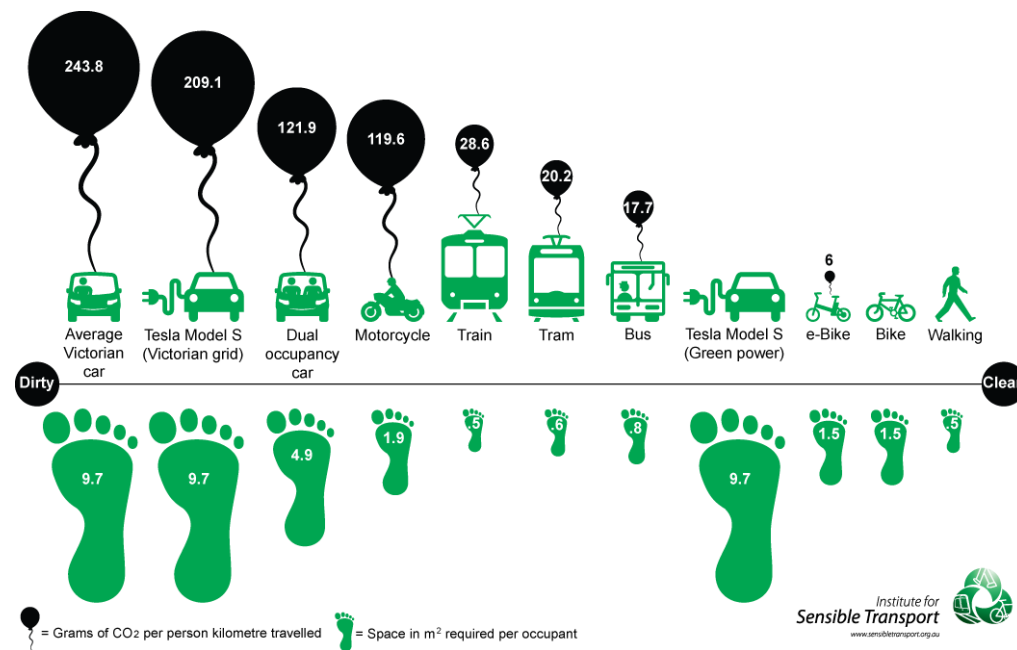
Health and climate challenges

• Health

- More than half of Australian adults do not meet physical activity guidelines
- Two-thirds of Australian adults are overweight or obese
- Australian kids are among the least-active in the world, recently ranked 140th out of 146 countries for physical activity

• Climate

- Transport is the second largest source of emissions and the fastest growing sector
- Tailpipe and non-tailpipe emissions
- Fixation on electric vehicles as the solution
- But electric vehicles won't solve our problems

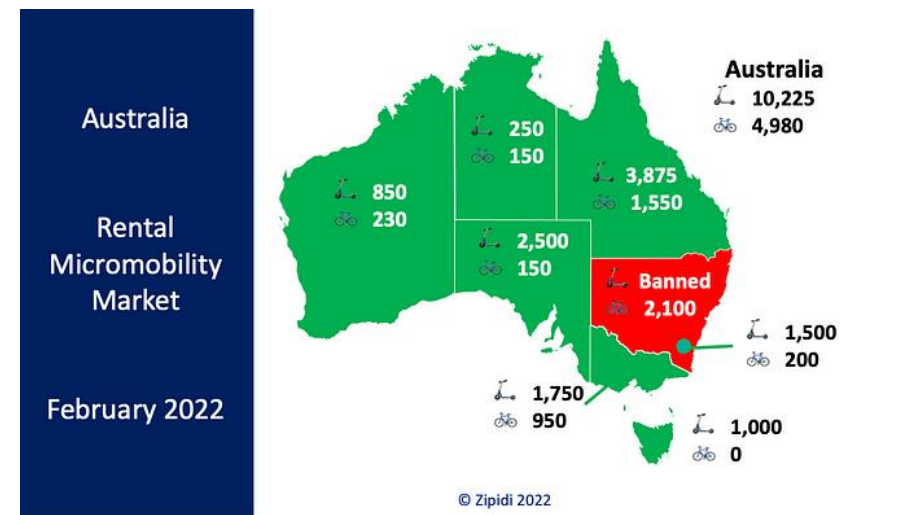


The benefits of active and sustainable mobility



Sales

- E-bikes
 - Australia
 - In 2017, ~9,000 e-bikes were sold
 - In 2022, ~193,000 e-bikes were sold, and sales continue to grow
 - E-bikes represent ~10% of bike sales and this is expected to grow to 20% in the coming years
 - Globally
 - There are an estimated 36 million e-bikes globally
 - Expected to rise ~10% per year to ~77 million e-bikes by 2030
- E-scooters
 - Australia
 - Estimated 250,000 – 300,000 e-scooters in Australia, with a growth rate of 20%
 - Globally
 - Global electric scooter market is currently worth ~\$15 billion USD, and this is expected to grow to \$31 billion USD by 2028

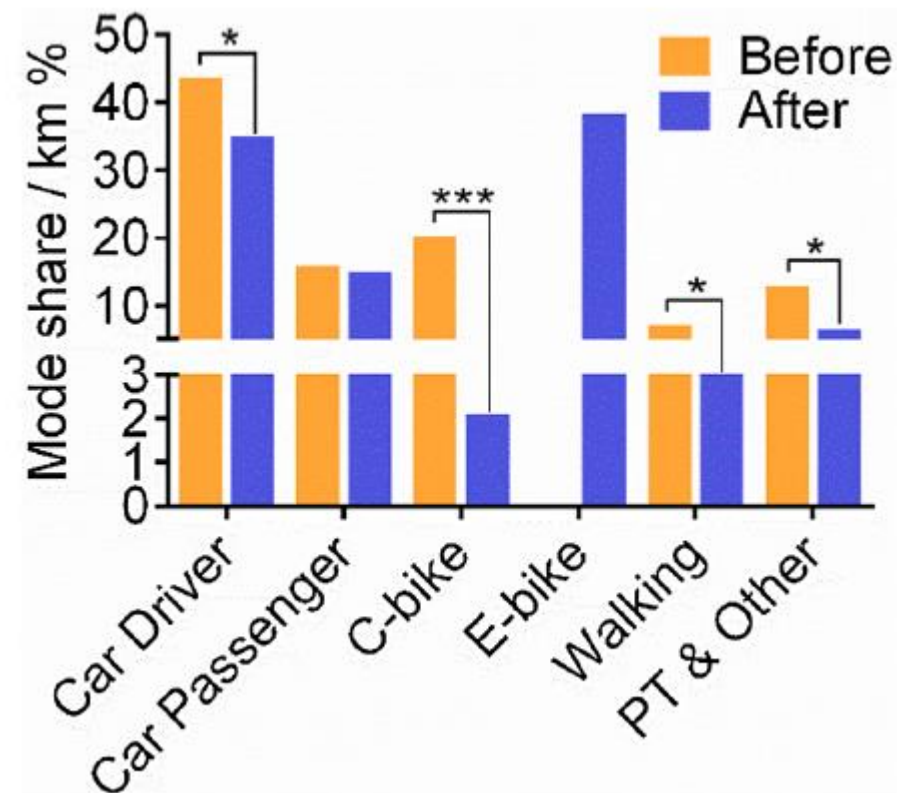


The diversity of e-bikes



Health benefits and modal shift

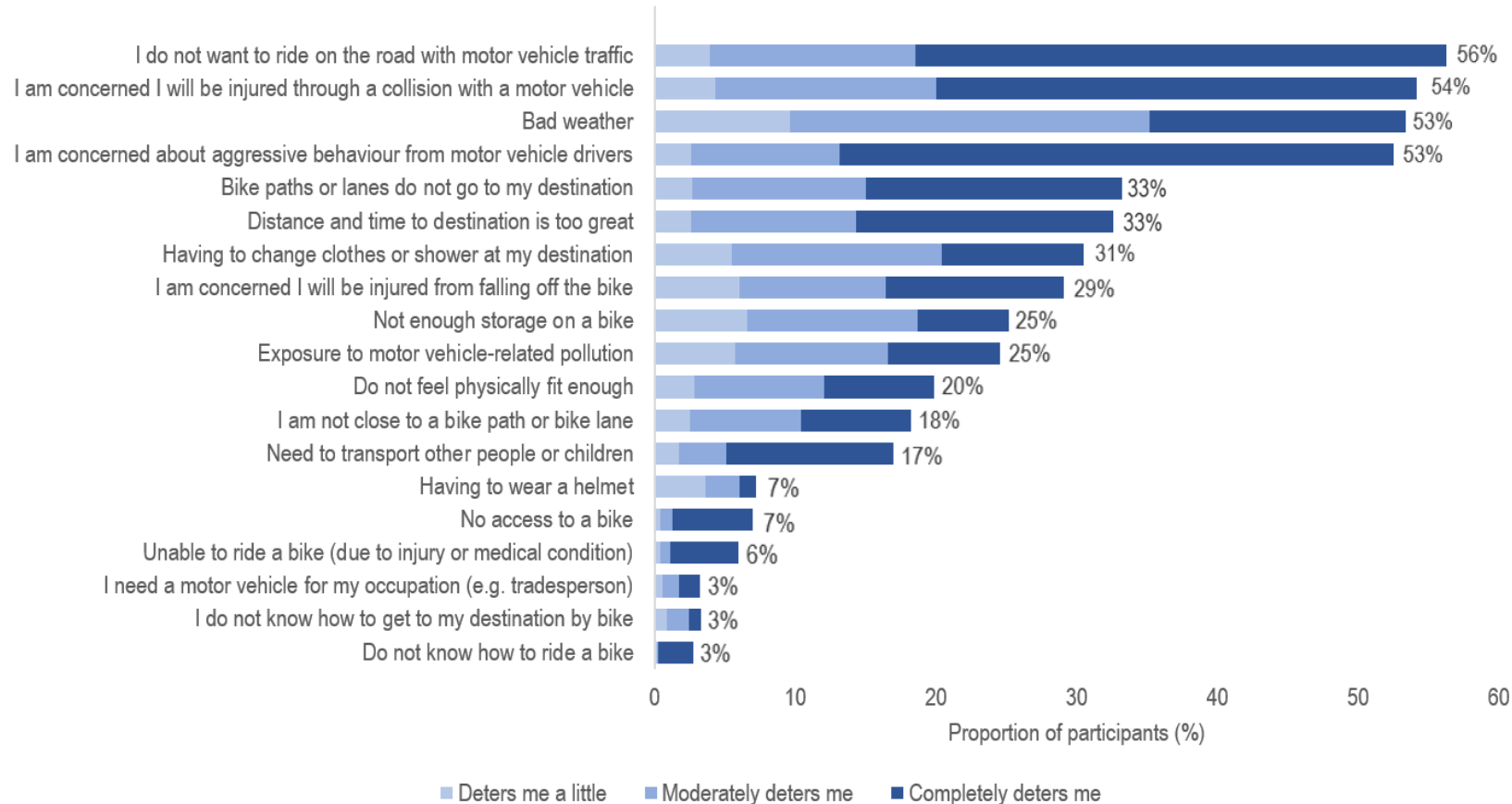
- E-bikes and health
 - E-bike riding provides physical activity of at least moderate intensity¹
 - Less than conventional cycling per km, but more than walking¹
 - E-bike riding can improve cardiorespiratory fitness¹
 - Physical activity levels have been reported as similar between e-bike riders and conventional riders²
 - There is a need for data on longer-term health outcomes
- E-bikes and modal shift
 - In order to maximise health gains, we need to shift people out of cars onto e-bikes
 - Limited data on this, but European data indicates a 16-37% drop in car travel, and a doubling in bike travel³



Health benefits and modal shift

- E-bikes and overcoming barriers

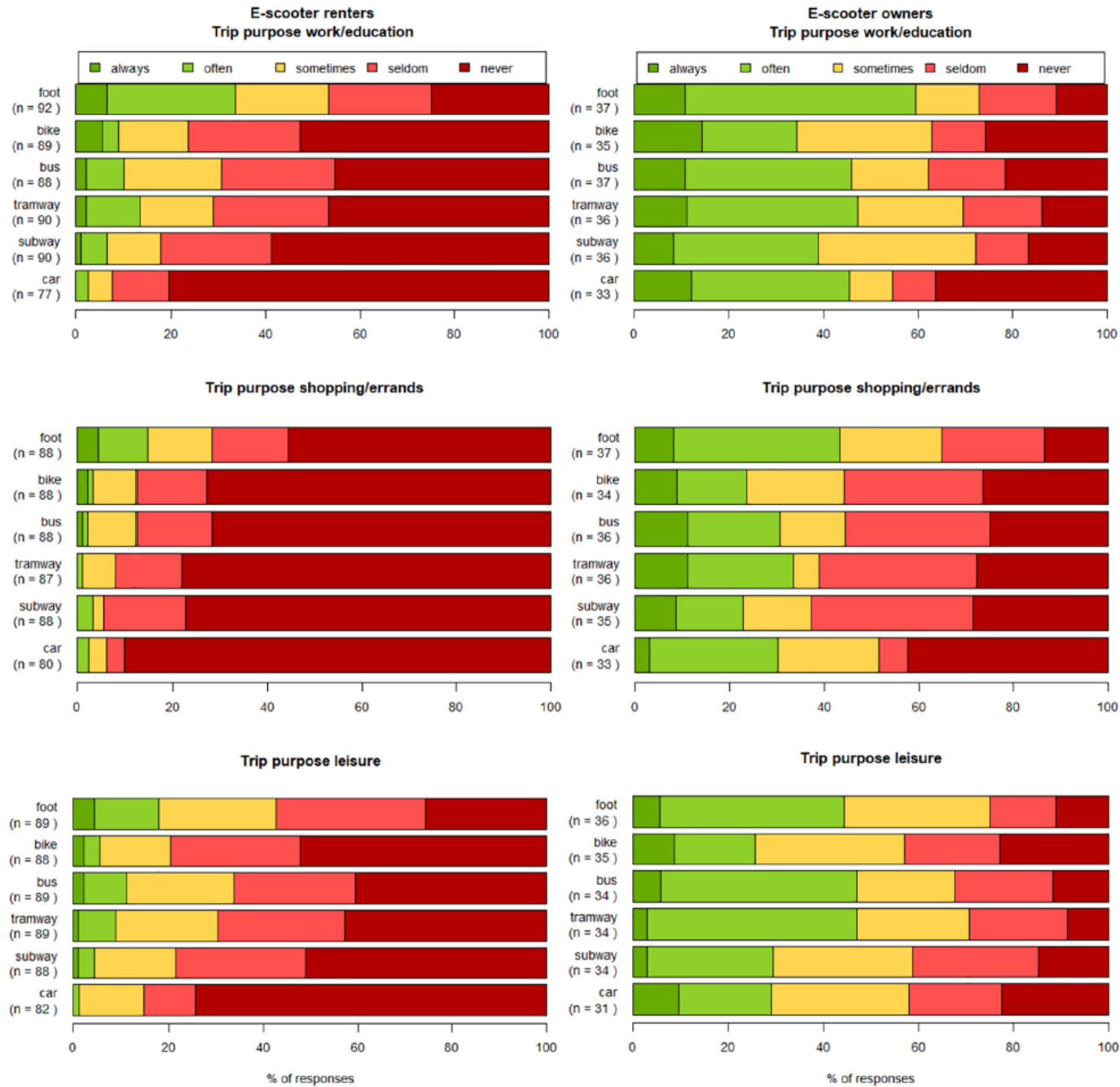
Barriers to riding a bike for transport



Health benefits and modal shift

- E-scooters and health
 - Confer very little physical activity benefits¹
 - But there may be substantial mental health and wellbeing benefits (no evidence to date)
- E-scooters and modal shift
 - Internationally²
 - Shared e-scooters commonly replace walking trips (range: 30-60%)
 - Shared e-scooters replace car trips at a rate of 5-40%
 - Public transport trips are rarely replaced by shared e-scooter trips (range: 3-18%)
 - Australia
 - Limited data
 - Beam reported that 67% of their users (both e-scooter and e-bike) report using their car less
 - Neuron reported that 45% of Neuron scooter trips replaced a car trip
 - Very limited data for private scooters³
 - (But likely to have greater levels of modal shift from car-based travel, particularly integrating with public transport)





1. Laa, B., & Leth, U. (2020). Survey of E-scooter users in Vienna: Who they are and how they ride. *Journal of transport geography*, 89, 102874

Health benefits and modal shift

Summary

- E-bikes
 - Clear health benefits and significant modal shift potential
- E-scooters
 - Limited health benefits (but potential mental health and wellbeing benefits)
 - Current implementation leads to large modal shift from walking (particularly in shared schemes)
 - But there is potential to significantly contribute to modal shift away from car-based travel



Weighing up health benefits against injury burden

	Melbourne	São Paulo	Delhi	London	Boston	Copenhagen
Cardiovascular disease (ICD-AM I00-I99)	622 (312 to 1071)	363 (14 to 915)	565 (169 to 1117)	582 (244 to 1053)	765 (355 to 1386)	337 (4 to 832)
Type 2 diabetes (ICD-AM E10-E14)	86 (40 to 159)	55 (-9 to 155)	28 (-10 to 91)	27 (7 to 61)	94 (41 to 189)	53 (-4 to 146)
Respiratory disease (ICD-AM J30-J98)	2 (1 to 4)	3 (1 to 5)	22 (8 to 42)	8 (4 to 14)	3 (-1 to 5)	2 (1 to 4)
Road trauma (ICD-AM V00-V89)	-34 (-64 to -7)	-4 (-71 to 62)	2 (-48 to 51)	-41 (-64 to -19)	-34 (-66 to -1)	-1 (-22 to 20)
Total	679 (330 to 1181)	420 (12 to 1029)	620 (167 to 1233)	581 (216 to 1084)	826 (352 to 1553)	393 (5 to 967)

Data are 50th percentile estimates (95% CI). Aggregated individual estimates may not equal the total due to rounding and Monte Carlo estimation. ICD-AM=International Classification of Diseases, Australian modification.

Table 4: Disability-adjusted life-years (DALYs) gained per 100 000 population under the compact cities model

- Do we need to accept that shifts to active and sustainable modes of travel may result in increases in injury rates, until our infrastructure catches up?

Emissions reductions

- E-bikes
 - Because the vast majority of modal shift to e-bikes is from cars, the emissions reductions are substantial (between 250 – 750 kg CO₂ per person per year)^{1,2}
 - This is lower in shared e-bikes³
- E-scooters
 - Current international evidence indicates life cycle greenhouse gas emissions are 65% higher in shared e-scooters compared to the modes of transport they displace^{4,5}
 - But this is largely because of the high displacement of walking trips
 - If e-scooters largely replace car trips, the net benefit is significant^{4,5}
 - Limited data for private scooters, but emissions reductions are generally higher than shared schemes⁵
- The potential of both modes to reduce emissions is substantial – if we can ensure a focus on modal shift away from car-based travel

1. Philips, I., Anable, J., & Chatterton, T. (2022). E-bikes and their capability to reduce car CO₂ emissions. *Transport Policy*, 116, 11-23.

2. McQueen, M., MacArthur, J., & Cherry, C. (2020). The E-Bike Potential: Estimating regional e-bike impacts on greenhouse gas emissions. *Transportation Research Part D: Transport and Environment*, 87, 102482.

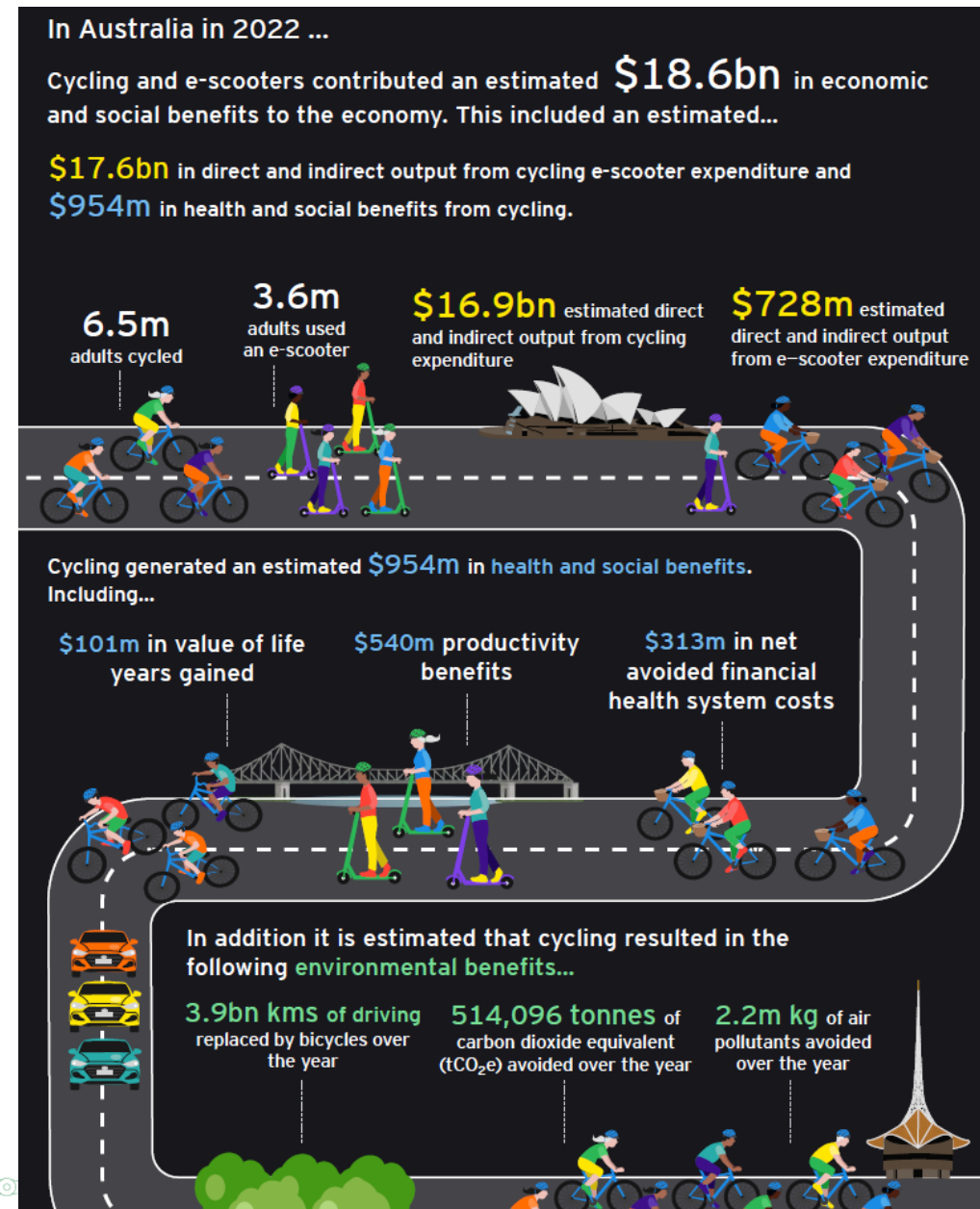
3. Li, Q., Fuerst, F., & Luca, D. (2023). Do shared E-bikes reduce urban carbon emissions?. *Journal of Transport Geography*, 112, 103697.

4. Hollingsworth, J., Copeland, B., & Johnson, J. X. (2019). Are e-scooters polluters? The environmental impacts of shared dockless electric scooters. *Environmental Research Letters*, 14(8), 084031.

5. Bozzi, A. D., & Aguilera, A. (2021). Shared E-scooters: A review of uses, health and environmental impacts, and policy implications of a new micro-mobility service. *Sustainability*, 13(16), 8676.

Economic benefits

- At an individual level
 - Time and productivity benefits
 - Significantly lower purchase and maintenance costs relative to a private car
- At a societal level
 - Cycling (conventional and electric) contributed \$16.9bn in direct and indirect output from cycling expenditure
 - E-scooters contributed \$0.7bn in direct and indirect output from e-scooter expenditure



Equity impacts

- Transport costs are rising, and this in the context of a significant cost-of-living crisis
 - Transport costs for people in capital cities were 9% higher in June 2023 relative to June 2022, and 10% higher for people in regional areas¹
- Transport disadvantage is experienced by specific population sub-groups, including:
 - Young people, people in lower socioeconomic areas, older people, Indigenous people, and people with disability²
- Starting to see increasing recognition of the need for more equitable approaches to e-mobility
 - Lime introduced a reduced-fare program for qualifying riders
 - Beam has implemented programs in lower socioeconomic areas
 - Financial incentive programs are being introduced with an equity focus³
 - E-bikes are being designed to suit the needs of people with disability⁴
- But there is still a long way to go in this space

1. <https://www.aaa.asn.au/newsroom/transport-cost-rises-ease-in-june-quarter/>

2. Currie, G., & Stanley, J. (2007). *No way to go: Transport and social disadvantage in Australian communities.*

3. <https://micromobilityreport.com.au/uncategorised/large-incentives-targeting-low-income-households-bring-best-results/>

4. Lee, K., & Sener, I. N. (2023). E-bikes toward inclusive mobility: a literature review of perceptions, concerns, and barriers. *Transportation research interdisciplinary perspectives*, 22, 100940.

Have we lost sight of the bigger picture?



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