

Eight years of research on transport-related community severance

What we now know and what can we do with it

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Transport and Health Science Group
Annual Meeting

13/12/2022

What is community severance?



The **negative impact**

of the presence of transport **infrastructure** or motorised **traffic** on the perceptions, behaviour, and wellbeing of **people**

who use the surrounding **areas**

or need to **walk or cycle** along or across that infrastructure or traffic

Transport infrastructure



Infrastructure design

Road width
(many lanes, wide lanes)



Additional barriers



Vehicles using the infrastructure

High traffic volume



High traffic speed



Unsuitable crossing facilities

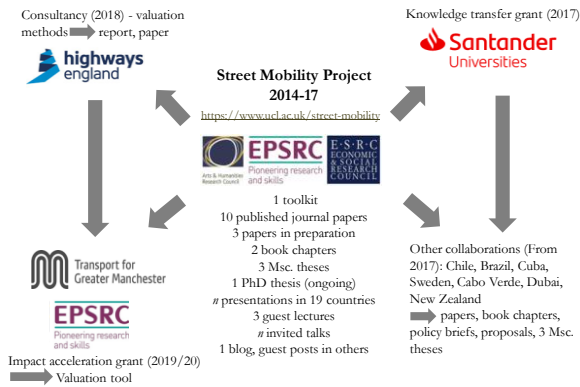
Underpasses



Footbridges



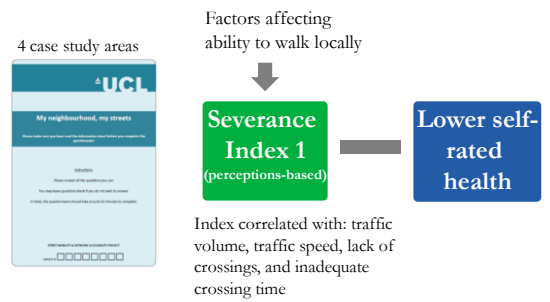
Eight years of research on severance



1. What we knew

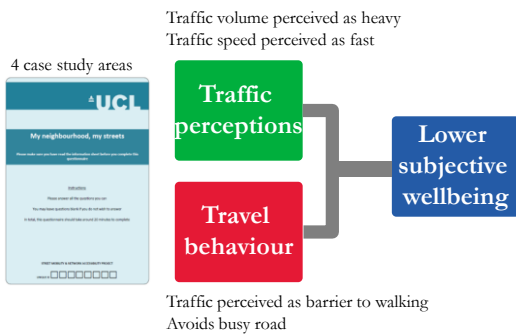
3. What we know now? After using the household survey in 4 areas

Severance is associated with poorer health



Higgsmith et al (2022) Community severance and health: a novel approach to measuring community severance and examining its impact on the health of adults in Great Britain. *Journal of Transport and Health* 25:101368

Severance is associated with lower wellbeing



Anciaes et al 2019 Perceptions of road traffic conditions along with their reported impacts on walking are associated with wellbeing. *Travel Behaviour and Society* 15, 88-101.

3. What we know now? After using the stated preference survey in 6 areas

Stated preference survey

Informal road crossing (varying road characteristics) vs. walking time

Now please look at this screen. Looking at the road conditions on the left, which of the three options would you choose?

Number of lanes in each direction	2
Central reservation?	Not present
Traffic density	Medium
Traffic speed	30mph

Option A	Option B	Option C
		Don't make this trip
Cross at this point (not at pedestrian crossing)	Use covered over road Adds 8 minutes to your journey	

Option A

Option B

Option C

Stated preference survey

Formal road crossing (varying types of facilities) vs. walking time

Looking now at this road scenario and the four available options, what would you choose to do?



Option A	Option B	Option C	Option D
			Don't make this trip
Use footbridge (with steps and ramp)	Use pedestrian refuge	Use covered over road	
Adds 3 minutes to your journey	Adds 10 minutes to your journey (plus 1 minute waiting time)	Adds 16 minutes to your journey	

Pedestrians are willing to make detours to avoid severance

To avoid certain road conditions

(vs. a 1-lane, low traffic, 10mph road with median strip)

3 lanes in each direction	5.8
2 lanes in each direction	5.0
No central reservation	4.8
Medium traffic density	2.1
High traffic density	9.7
20 mph speed	3.8
30 mph speed	5.7

Anciaes et al 2018 A stated preference model to value reductions in community severance caused by roads. *Transport Policy* 64, 10-19.

To avoid certain crossing facilities

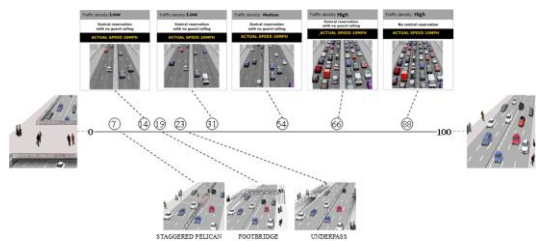
(vs. signalised crossing)

Footbridge	1.3
Underpass	3.9

Anciaes and Jones 2018 Estimating preferences for different types of pedestrian crossing facilities. *Transportation Research F: Traffic Psychology and Behaviour* 52, 222-237.

Severance Index 2
(preferences-based)

Barrier effect of roads



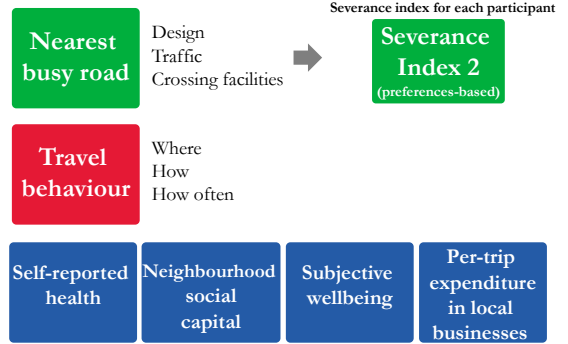
Barrier effect of crossing facilities

Anciaes and Jones A comprehensive approach for the appraisal of the barrier effect of roads on pedestrians. *Transportation Research A: Policy and Practice* 134, 227-250

3. What we know now?

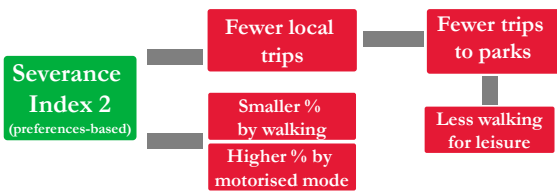
Using a national survey combining questions from the household and stated preference survey

National study (GB) Representative sample of 3000+ participants

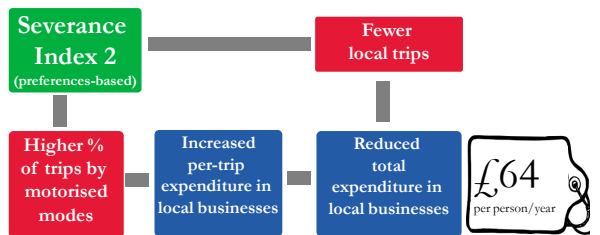


Anciaes, P., Jones, P., Mindell, J S., Scholes, S. (2022) The cost of the wider impacts of road traffic on local communities: 1.6% of Great Britain's GDP. Transportation Research A: Policy and Practice 163:266-287.

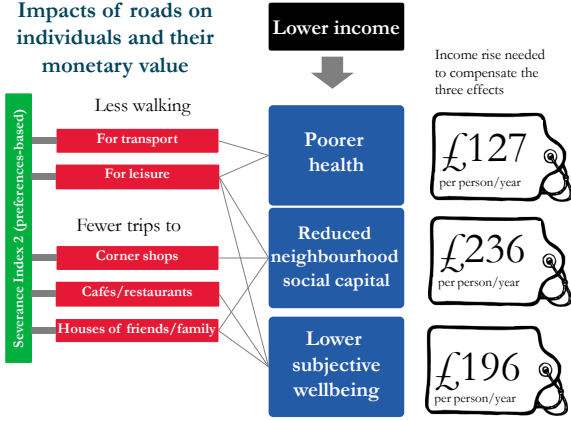
Impacts of roads on travel behaviour



Impacts of roads on local businesses and their monetary value



Impacts of roads on individuals and their monetary value



Total cost of wider impacts of severance in Great Britain



4. What we can do about it

Improve ease of crossing

More and better crossing facilities, reducing delays, detours and risks of crossing



Redesign the infrastructure

Fewer road lanes, wide central reservation, more pleasant road environment



Reduce traffic barriers

Regulation



Design



Source: Richard Dohle, <https://commons.wikimedia.org/wiki/index.php/File:1719526>

Remove the barrier

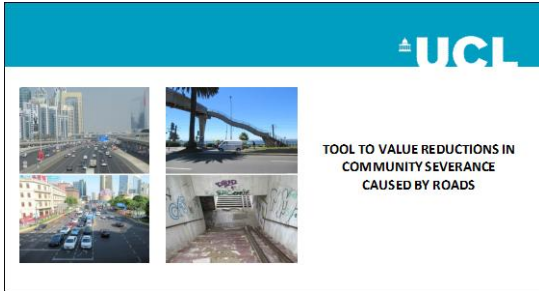
Before



After

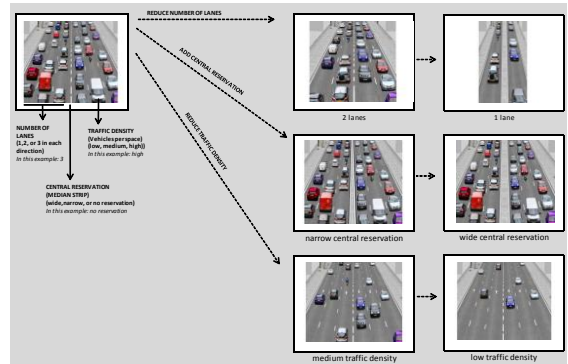


5. How?
Measuring benefits of reducing severance



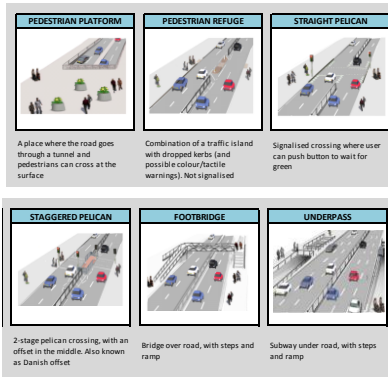
<https://discovery.ucl.ac.uk/id/eprint/10144318>

Assess changes to road characteristics



Or changes to traffic speed (10, 20, 30, or 40 mph)

Assess changes to type and location of crossing facilities



Input

For each option to redesign road

Segments along the road →

Characteristics of road	EXTREME POINT								
	0	50	50	50	100	100	150	200	400
Distance from left extreme point (m)									
Number of lanes	3	3	3	3	3	3	3	3	3
Central reservation	no	no	no	no	no	no	no	no	no
Traffic density	high	high	high	high	high	high	high	high	high
Traffic speed (mph)	40	40	40	40	40	40	40	40	40
Guard railings									
Type of crossing	U								
Waiting time (0-5 mins.)									

Can also specify location of demand for crossing the road

Main output

	Do-nothing	Option 1	Option 2	Option 3
Overall severance index (0-100)	87	59	71	52
Severance cost per trip	£2.78	£1.76	£2.18	£1.57
Average detour to walking trips	287	229	278	244
Average delay to walking trips	3.5	2.8	3.4	3.0
Trips crossing informally/year	497,778	1,284,509	1,040,511	282,818
Trips crossing in crossing facilities/year	1,712,095	1,479,061	1,677,893	2,486,405
Suppressed trips/year	571,079	17,382	62,548	11,725
Total severance cost/year	£6,937,351	£4,870,125	£6,006,163	£4,357,637
Benefit of the option (1st year)	-	£2,067,226	£931,188	£2,579,714
Present value of full benefit	-	£9,397,507	£4,233,136	£11,727,253

Detailed output

For each option to redesign road

Segments along the road
→

	33	38	44	49	54	60	65	(...)
Severance index	£0.95	£1.12	£1.29	£1.46	£1.64	£1.81	£1.98	
Cost per trip								
What was the demand to cross here (per year)	173,810	173,810	173,810	173,810	173,810	173,810	173,810	
How many of those trips cross here (informal)	5	8	14	23	37	61	101	
How many of those trips cross here (using facilities)	173,800	0	0	0	0	0	0	
How many cross in other places (informal)	0	0	0	0	0	0	0	
How many cross in other places (using facilities)	0	173,793	173,783	173,765	173,737	173,691	173,616	
How many trips are suppressed	5	8	13	21	35	57	93	
Average detour of trips (m)	0	50	100	150	200	250	300	
Average delay of trips (mins.)	0.0	0.6	1.2	1.9	2.5	3.1	3.7	
How many trips from other places cross here	2,407,865	0	0	0	0	0	0	
Total number trips crossing here	2,580,870	8	14	23	37	61	101	

Thank you for your attention!

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Thanks to:

Jenny Mindell

Peter Jones

Laura Vaughan

Shaun Scholes

Nora Groce

Muki Haklay

Ashley Dhanani

Jemima Stockton

Sadie Boniface

Mapping for Change

Many collaborators around the world