



Is 20 Plenty For Health?

Evaluation of the 20 mph speed limit networks in Edinburgh and Belfast on a range of public health outcomes

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Project overview

- Evaluation commenced in March 2017
- Funded for 3.5 years by the National Institute for Health Research (Grant number 15/82/12)
- Consists of four work packages (WP) looking at different aspects of 20mph in Edinburgh and Belfast

Success of Edinburgh's 20mph road safety limit to be examined



Edinburgh Council 20mph mascot The Reducer with PC Ben Wray. Picture: Greg Macvean

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Study objectives

What led to it being implemented?

Policy lessons and transferability to other cities

Policy and informant analysis

How much do outcomes change (or not)?

Quantitative, natural experiment

Why do outcomes change (or not)?

Qualitative

What is the economic value of 20mph?

Economic evaluation and modelling



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Study team

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Health Research

Initial Programme theory for 20mph (in Edinburgh and Belfast)

Inputs

- Bus companies
Sustrans,
Living Streets
- Local and national government
- Roads Service,
Department for
Infrastructure (DfI)
- 20mph
Implementation Team
Edinburgh and
contractors
- Neighbourhood
Partnerships,
Community Councils
and Schools
- Police
(enforcement officers)

20mph Activities



- 20mph network
- Signage and road markings
- Awareness raising and education
- Enforcement

Attitudes and behaviour Outcomes

- Self-enforcement of limits
- Awareness of 20mph speed limit
- Changing attitudes to speed limit/speeding

Traffic Outcomes

- Traffic flow
- AVERAGE SPEED**
- Braking and acceleration
- Driver attention
- Speed differential (between motorised and non motorised)

Attitudes and behavioural outcomes

- Speed limits of others imposed by self-enforcers
- Drivers copy self-enforcers
- Perceptions of longer journey time and effort
- Perceptions of safety and traffic related dangers
- Judgement of speeds by pedestrians
- Experiences of driving

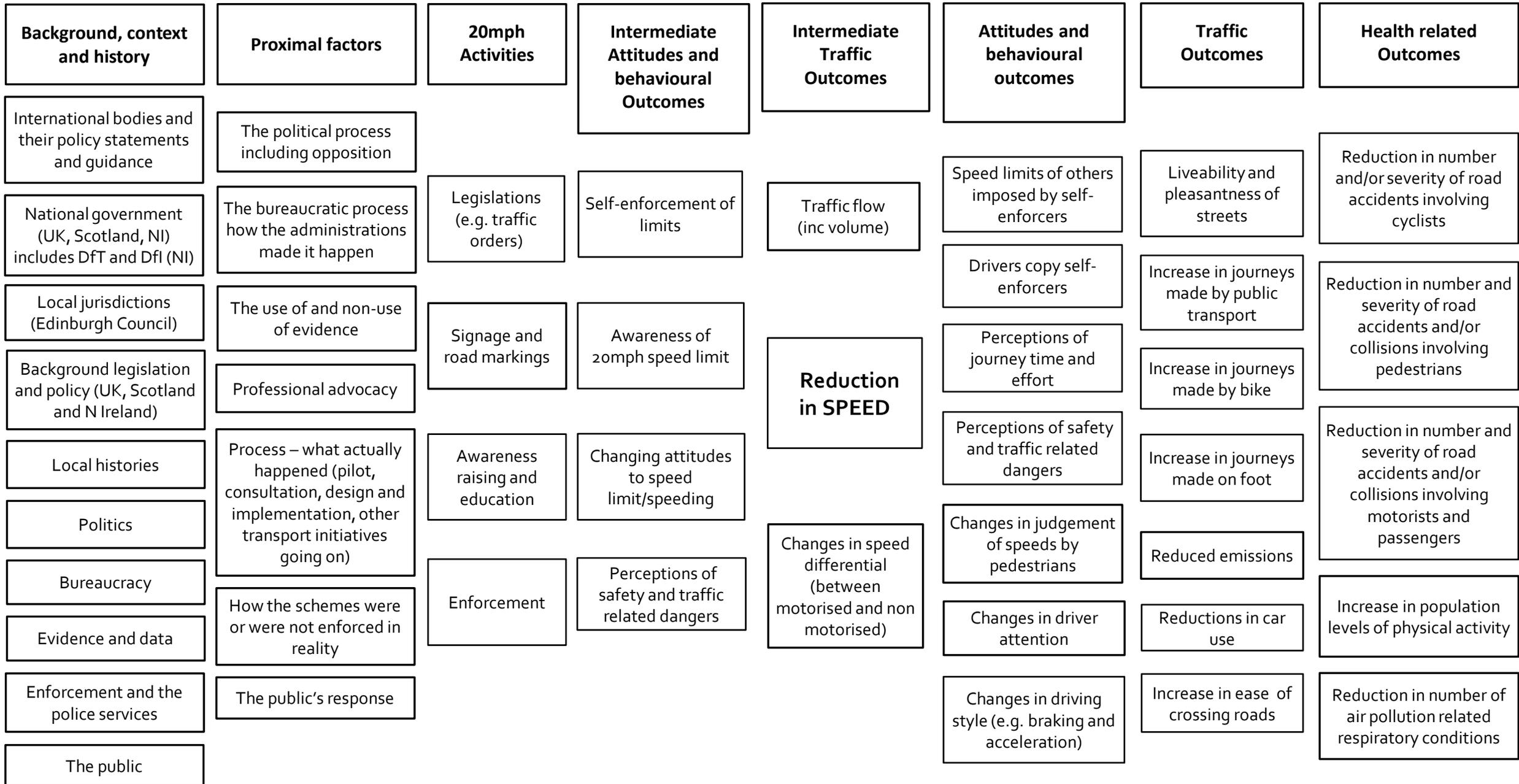
Traffic Outcomes

- Journeys made by public transport
- Journeys made by bike
- Journeys made on foot
- Level of air pollution indicators change
- Car use

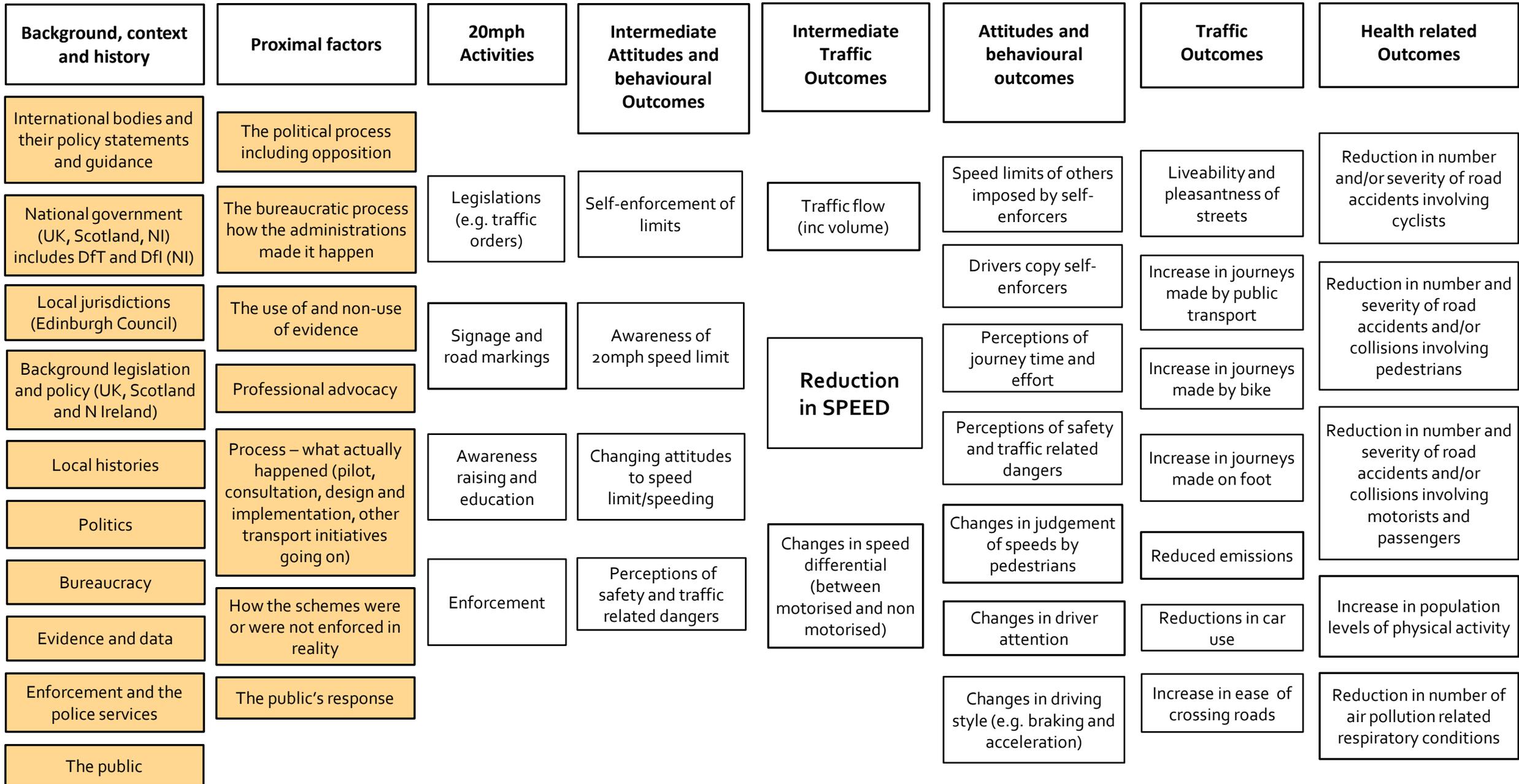
Health related Outcomes

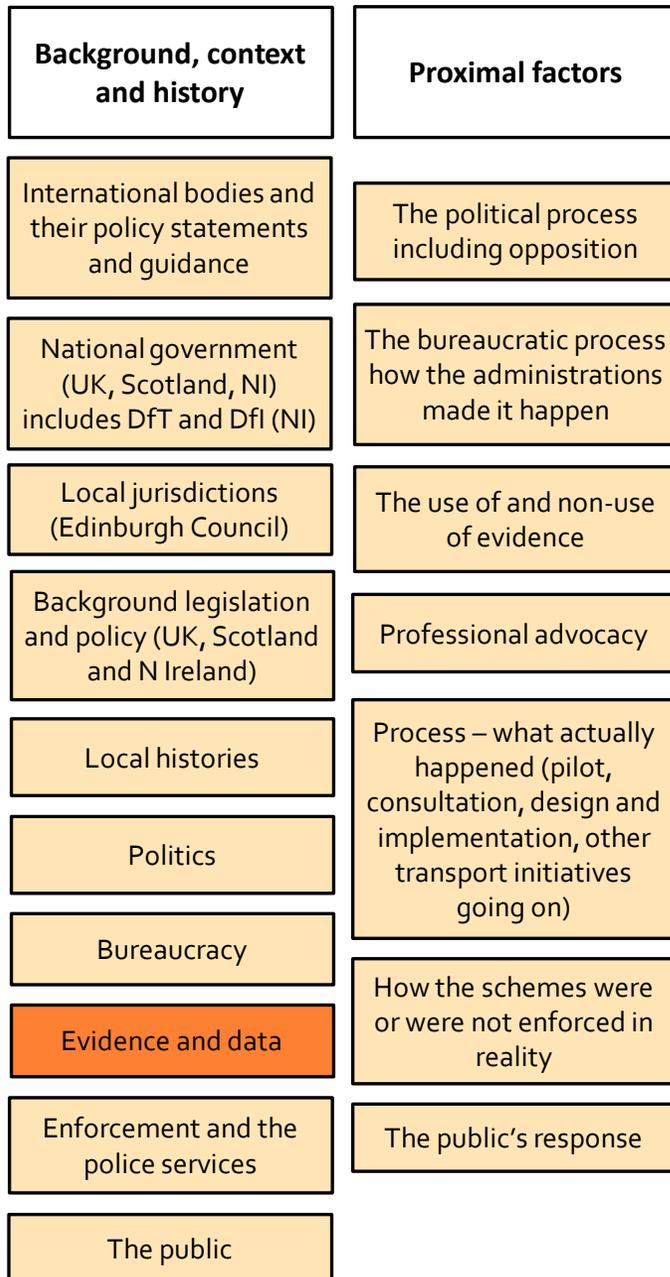
- Number and severity of road accidents involving cyclists
- Levels of physical activity
- Number and severity of road accidents and collisions involving pedestrians
- Number and severity of road accidents and collisions involving motorists
- Liveability and pleasantness of streets

20MPH EXPLANATORY MODEL

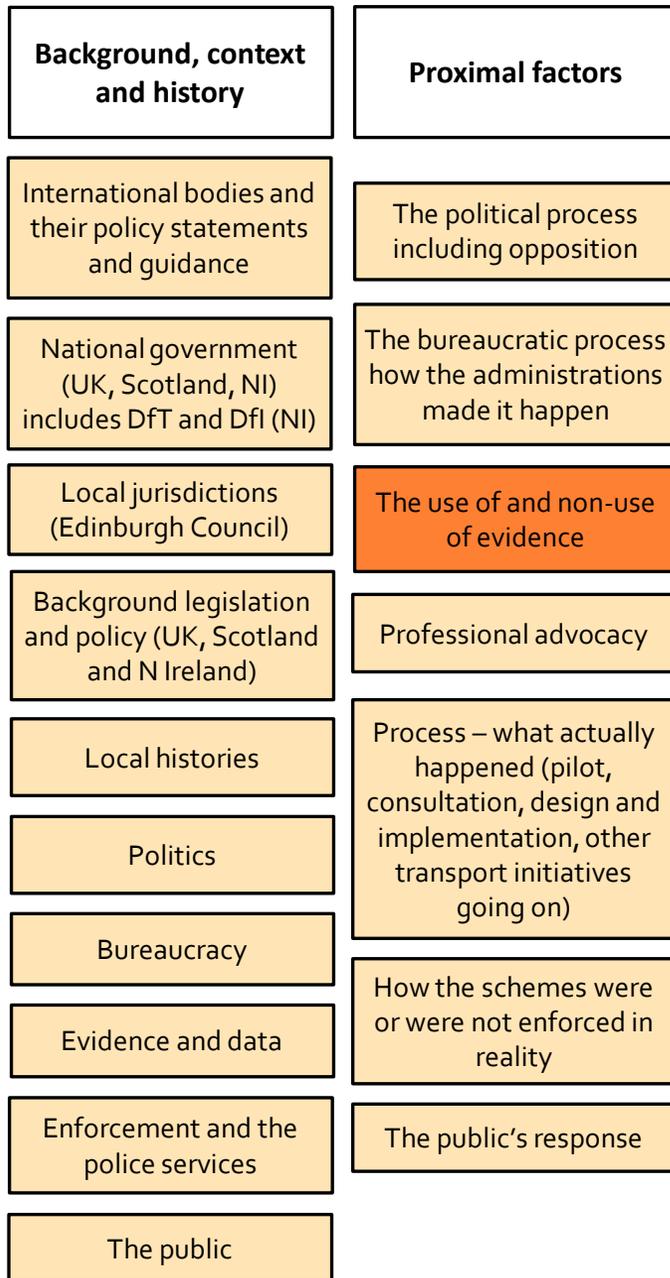


20MPH LOGIC MODEL





- Background evidence on effectiveness of 20mph restrictions was important early days when idea initially proposed.
- Without firm evidence to justify adopting a 20mph intervention is it likely that the idea would never have 'taken off'.



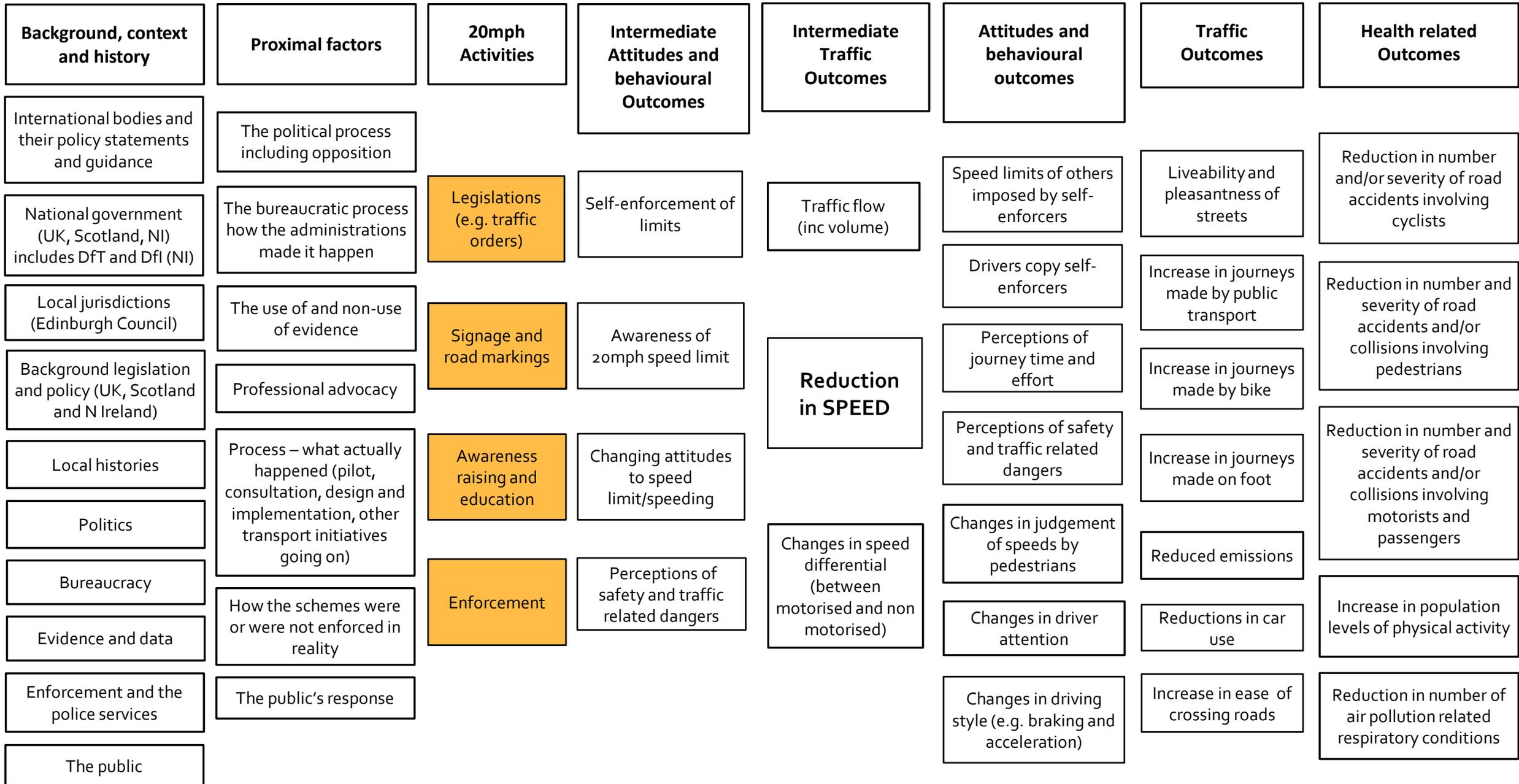
- Once zomph made it onto political agenda, evidence played only a small role in decision making.
- Other types of data became of interest to specific stakeholder groups, for example the impact that lower speed limits would have on bus timetabling or carbon emissions, and even pizza delivery times!

Background, context and history	Proximal factors
International bodies and their policy statements and guidance	The political process including opposition
National government (UK, Scotland, NI) includes DfT and DfI (NI)	The bureaucratic process how the administrations made it happen
Local jurisdictions (Edinburgh Council)	The use of and non-use of evidence
Background legislation and policy (UK, Scotland and N Ireland)	Professional advocacy
Local histories	Process – what actually happened (pilot, consultation, design and implementation, other transport initiatives going on)
Politics	
Bureaucracy	
Evidence and data	How the schemes were or were not enforced in reality
Enforcement and the police services	The public's response
The public	

In Edinburgh and Belfast the approach was gradualist.

- Typically small schemes were implemented around schools as a first step - child safety was an 'easy-win'.
- Over time, the narrative shifted from road safety to a broader ideological vision of better communities and supporting wider economic and environmental agendas.
- There were a range of steps in the build up to implementation including consultations with the public, a pilot scheme (in Edinburgh) and discussions around the design and implementation of the schemes.
- The *pilot scheme* in Edinburgh was critical in gaining wide-spread public support for the wider roll-out.

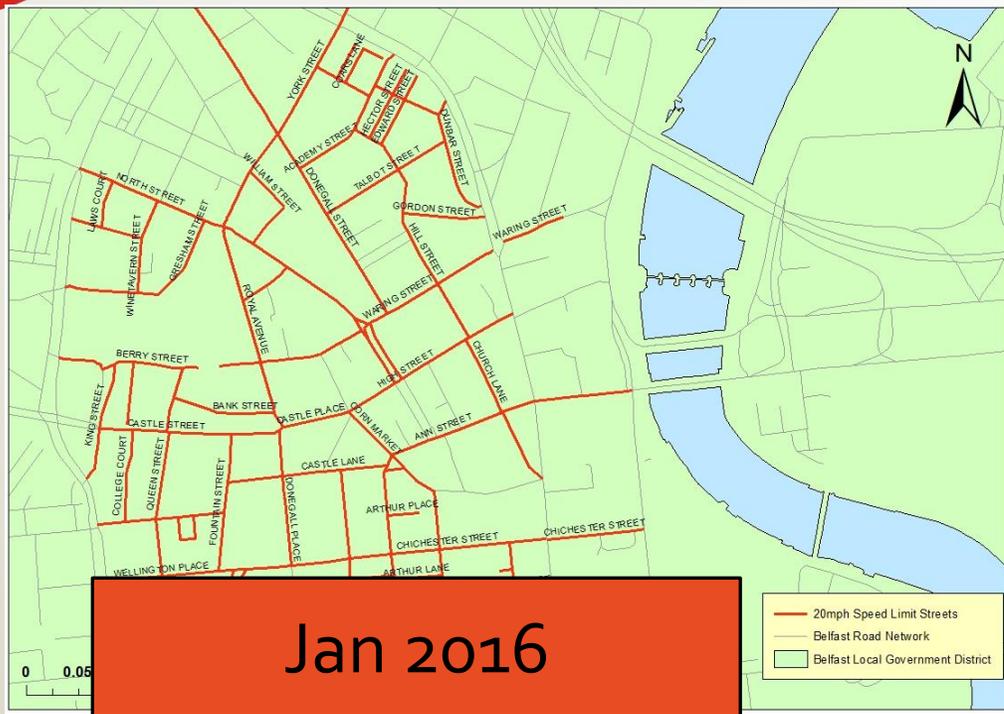
20MPH LOGIC MODEL



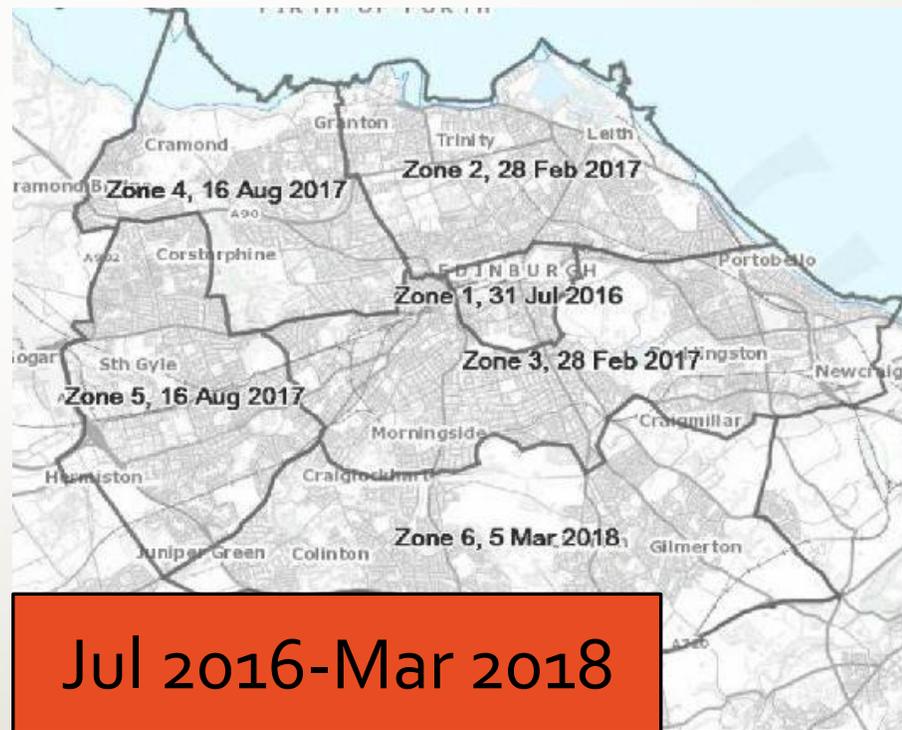
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Study sites - implementation

Belfast



Edinburgh



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20mph
Activities

- **Belfast** – city centre scheme covering 76 streets
 - Introduced as one Speed Limit Order in Oct '15, but signage introduced Feb '16
 - Introduced by devolved Department for Infrastructure ; Termed a 3 year pilot

Legislations (e.g.
traffic orders)

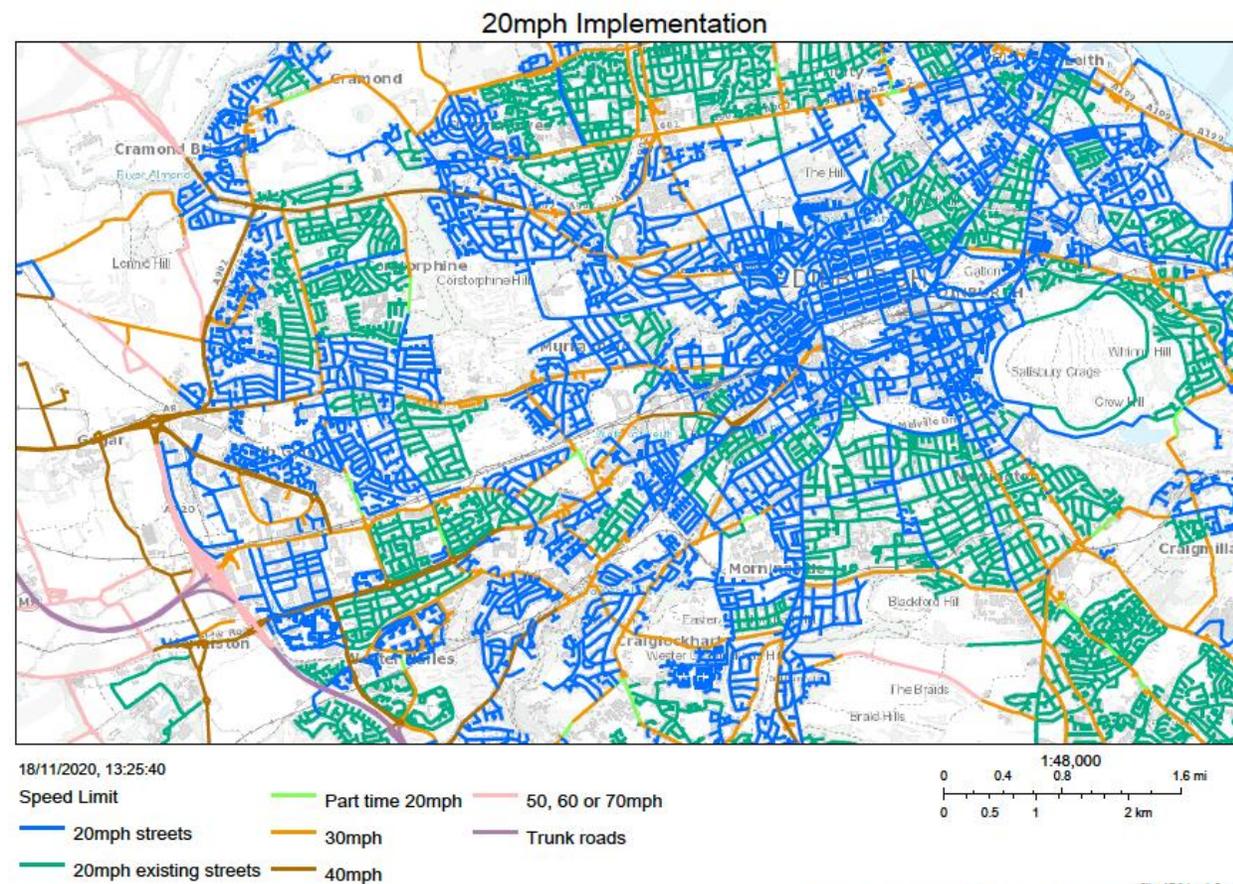
- **Edinburgh** – citywide, introduced in 6 geographical areas over 4 time-points 2016-18.
 - 50% streets already had 20mph zones
 - Signage-only legislation to make 80% of streets 20mph
 - One initial citywide Traffic Regulation Order (TRO) – several smaller ones for each subsequent phase

Signage and
road markings

Awareness
raising and
education

Enforcement

TRO process burdensome at this scale
– perception 'default' 20mph limit
more efficient



20mph
Activities

Legislations (e.g.
traffic orders)

Signage and
road markings

Awareness
raising and
education

Enforcement

Edinburgh – terminal entrance/exit signage, repeater signage, and carriageway roundels

- Previous 20mph zones were signed to ensure consistency
- Additional signage installed at points where reinforcement useful



Belfast – entrance and exit signage, repeaters, no carriageway roundels

- Signage changed to yellow backing
- Issue of signage clutter



Focus group (general public) finding:
carriageway roundels most effective for
driver behaviour change



20mph
Activities

Edinburgh – formal awareness-raising campaign

- Dedicated official
- Each phased introduction had specific campaign
- Vehicle activated signage

Legislations (e.g.
traffic orders)

Belfast – no formal awareness-raising campaign

- Signage in advance of scheme, news releases
- Identified as something to be addressed if scheme done again, as well as introducing steering group
- *Road safety education and Roads service sat in different govt depts*

Signage and
road markings

Awareness
raising and
education

Focus group (general public) finding:

public became aware through bus backs, lamppost wraps; both negative and positive views around engagement

Enforcement



20mph
Activities

Both sites – police services keen that 20mph seen as self-enforcing

Operational priorities and competing resources

Legislations (e.g. traffic orders)

Belfast – initially no speed awareness course

Since become available, but PSNI indicated this not a priority

Signage and road markings

Edinburgh – trained up >100 officers in speed detection

Educational/engagement approach with drivers early on
Speed awareness events since introduction of final phase

Awareness raising and education

Enforcement

Focus group (general public) finding:

perception enforcement insufficient/lack of fines



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SUMMARY OF FINDINGS

DECISION MAKING

Different levers influenced decision making over scale and timing and purpose of intervention in the two cities, but research evidence only played a small part after initial arguments had been won. Some 'health by stealth' approaches

IMPLEMENTATION

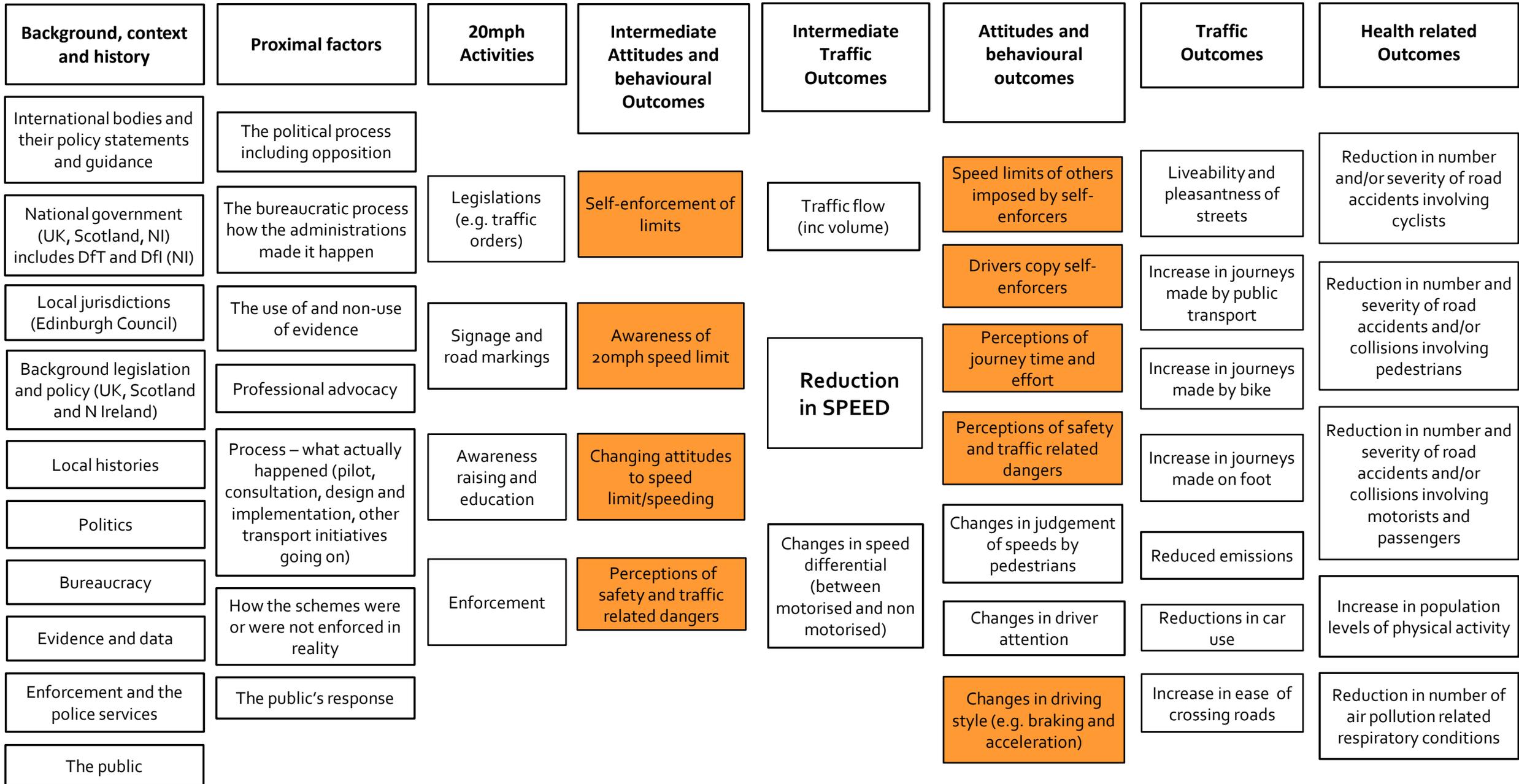
Same intervention but very different approaches to implementation

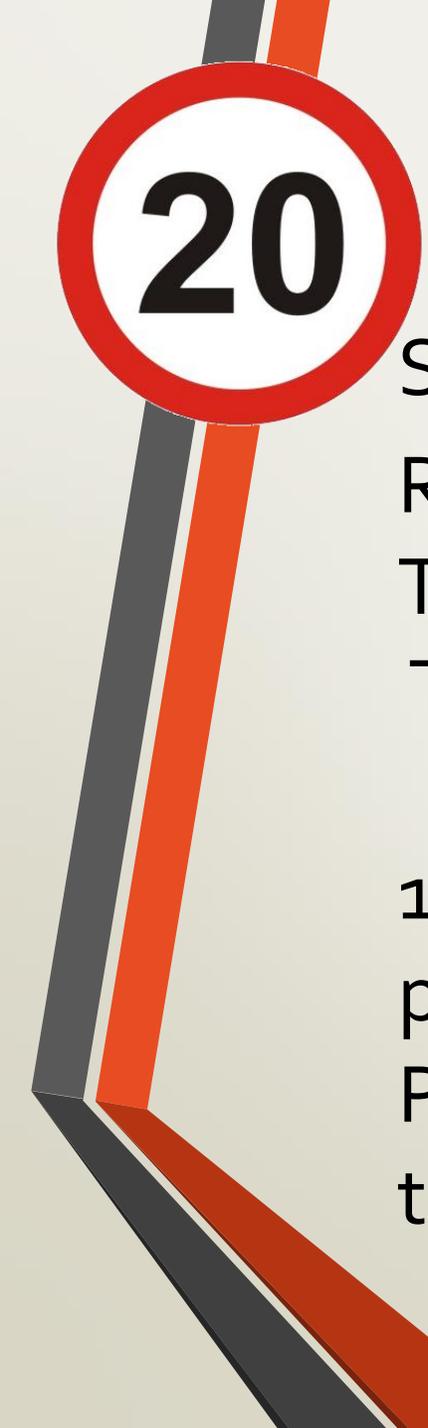
- City centre vs city wide
- Focused Education campaign vs no education campaign
- Some difference in signage
- Similar approaches to enforcement (very little in both cities)



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20MPH LOGIC MODEL – Public perceptions





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Perceptions of zomph in Edinburgh

Study design:

Repeat cross-sectional survey:

Time point 1: pre-implementation, n= 1018

Time point 2: one year post-implementation, n=636

15 in-depth qualitative focus groups

postimplementation; n = 100

Participants: Adults working, living, or travelling through zomph network regularly

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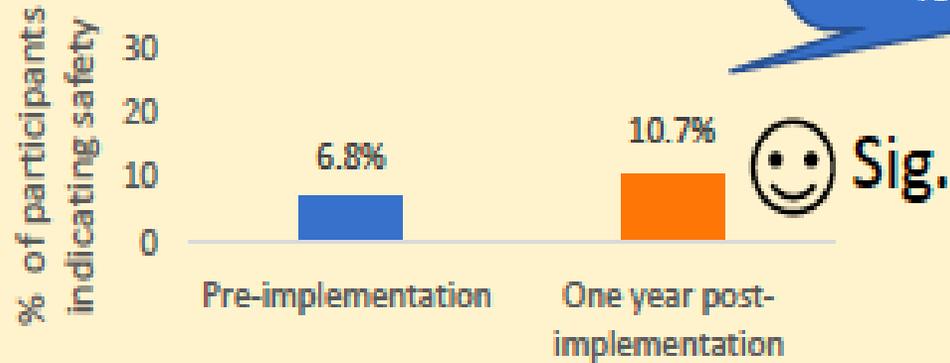
Perceptions of 20mph in Edinburgh

Factor analysis identified 5 clusters of questions

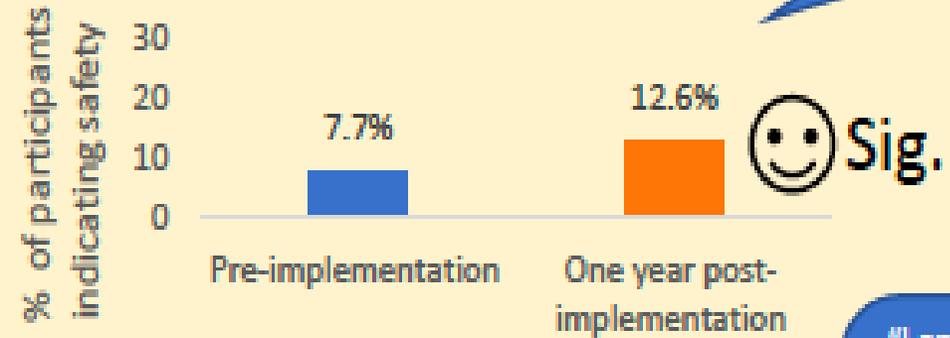
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|------------------------------|-----------------------------|
| i) Detraction and resistance | No significant change |
| ii) Support for 20mph | Significant increase |
| iii) Rule following | Significant increase |
| iv) Child safety | No significant change |
| v) Perceptions of safety | No significant change |

KEY FINDINGS

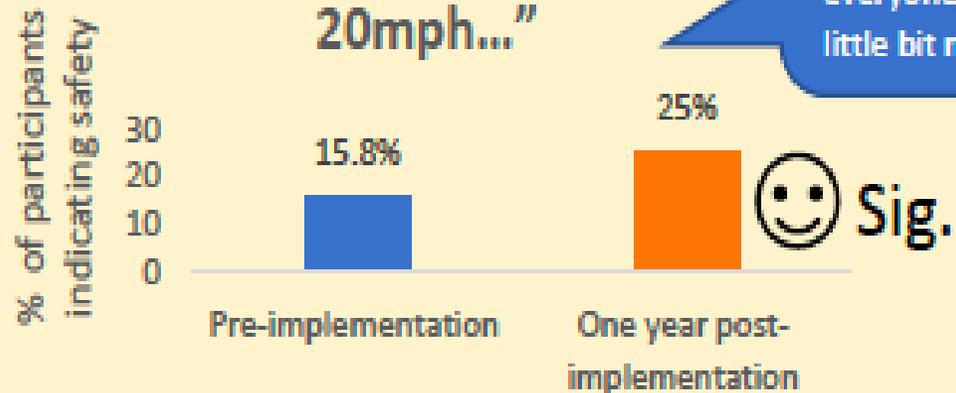
“I feel safe cycling on roads with a speed limit of 20mph...”



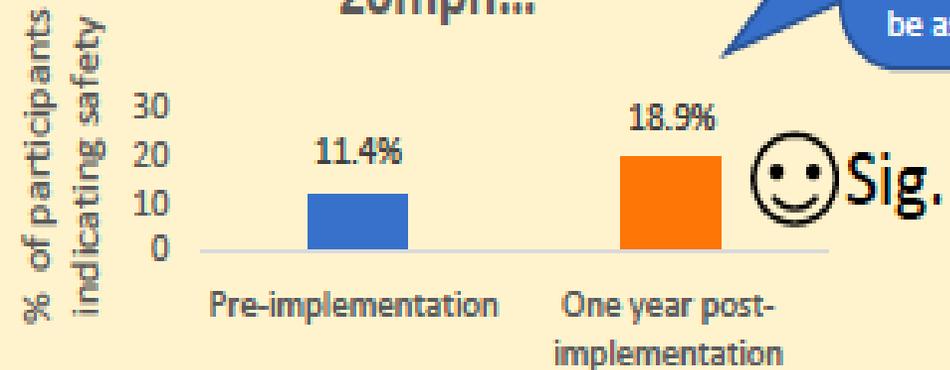
“I feel safe walking near roads with a speed limit of 20mph...”



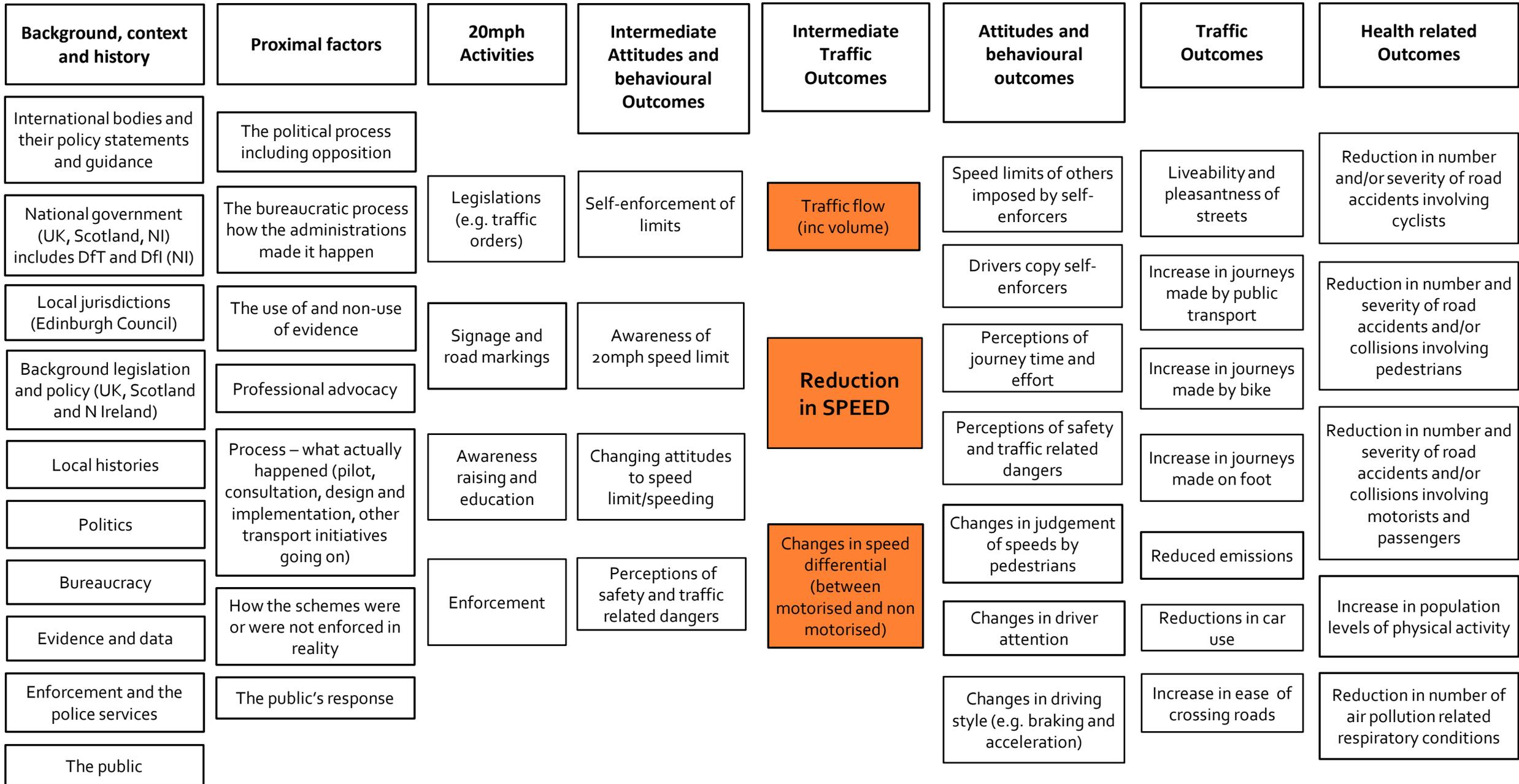
“I feel children are safe near roads with a speed limit of 20mph...”



“I feel children are safe crossing roads with a speed limit of 20mph...”



20MPH LOGIC MODEL



Belfast-summary

Outcome	Pre-20mph	Post-20mph 1yr(3yr)	Difference 1yr (3yr)	95%C.I. (lower) 1yr (3yr)	95%C.I (upper) 1yr (3yr)	P 1yr (3yr)
Traffic speed (mph)	20.36 (n=20)	19.45 (19.38) (n=10)	-0.91 (-0.98)	-1.18 (-0.78)	3.01 (2.73)	0.38 (0.27)
Traffic volume (per hour)	337.00	203.48	-133.53	15.28	251.77	0.03
	Counts pre- 20mph	Counts 3yrs post-20mph	Difference in counts	% Difference in rates		
Road traffic collisions (annual rates)	3868	4881	-44	-3		

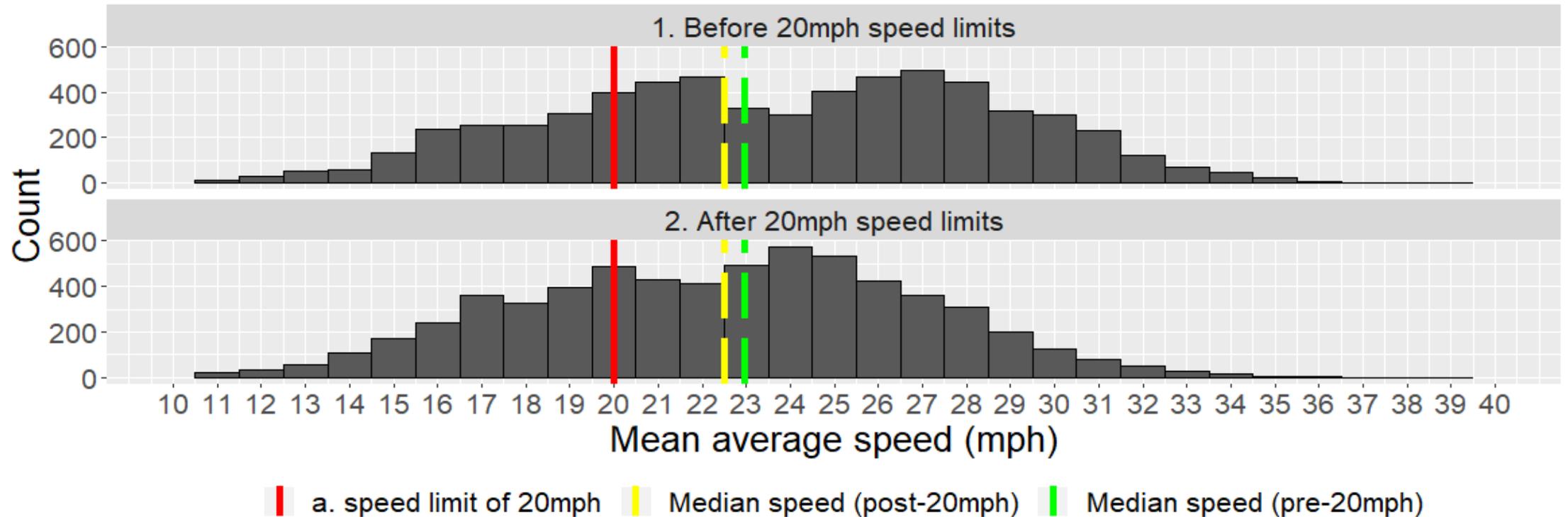
Edinburgh: traffic speed & volume pre and post 20mph

Category	Before	After	Difference	SD	Lower CI	Upper CI	p
All data (n=66)	23.63	22.29	-1.34	1.57	-1.72	-0.95	0.00
<24mph (n = 35)	20.09	19.37	-0.72	1.62	-1.28	-0.16	0.01
>=24mph (n =31)	27.63	25.60	-2.03	1.19	-2.47	-1.60	0.00

Category	Before	After	Difference	SD	Lower CI	Upper CI	p
all zones	23.63	22.29	-1.34	1.57	-1.72	-0.95	0.00
zone 1a (City Centre)	24.14	22.07	-2.07	1.58	-3.54	-0.61	0.01
zone 1b (Rural West)	23.84	21.43	-2.41	1.00	-3.46	-1.36	0.00
zone 2 (North)	23.53	22.20	-1.33	1.57	-2.11	-0.55	0.00
zone 3 (S. Central/East)	25.40	23.89	-1.51	1.32	-2.28	-0.75	0.00
zone 4 (North West)	26.54	25.75	-0.79	1.15	-1.86	0.28	0.12
zone 5 (West)	20.14	18.97	-1.18	1.39	-2.24	-0.11	0.03
zone 6 (South)	20.25	20.66	0.41	2.40	-2.57	3.39	0.72
Main	24.26	22.68	-1.59	-1.16	-2.02	-1.16	0.47
Residential	23.61	22.23	-1.38	-0.98	-1.78	-0.98	0.19

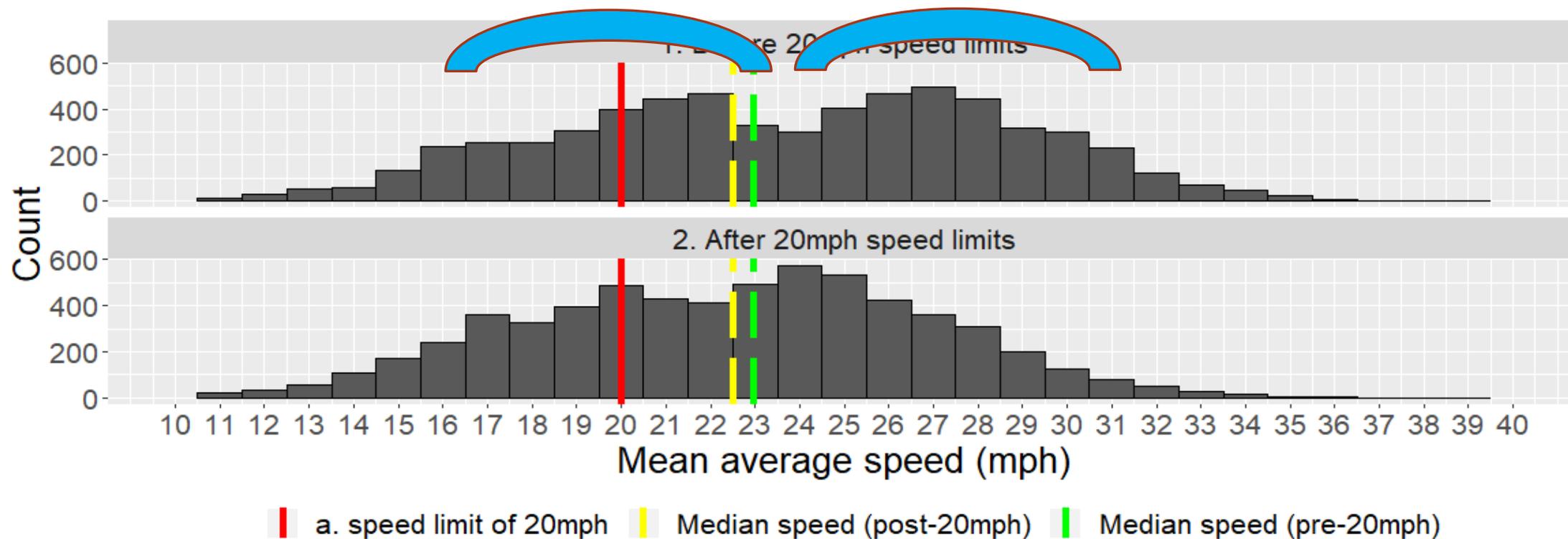
Edinburgh– visualization of traffic speed

Figure 1: Summary of average traffic speed – time series



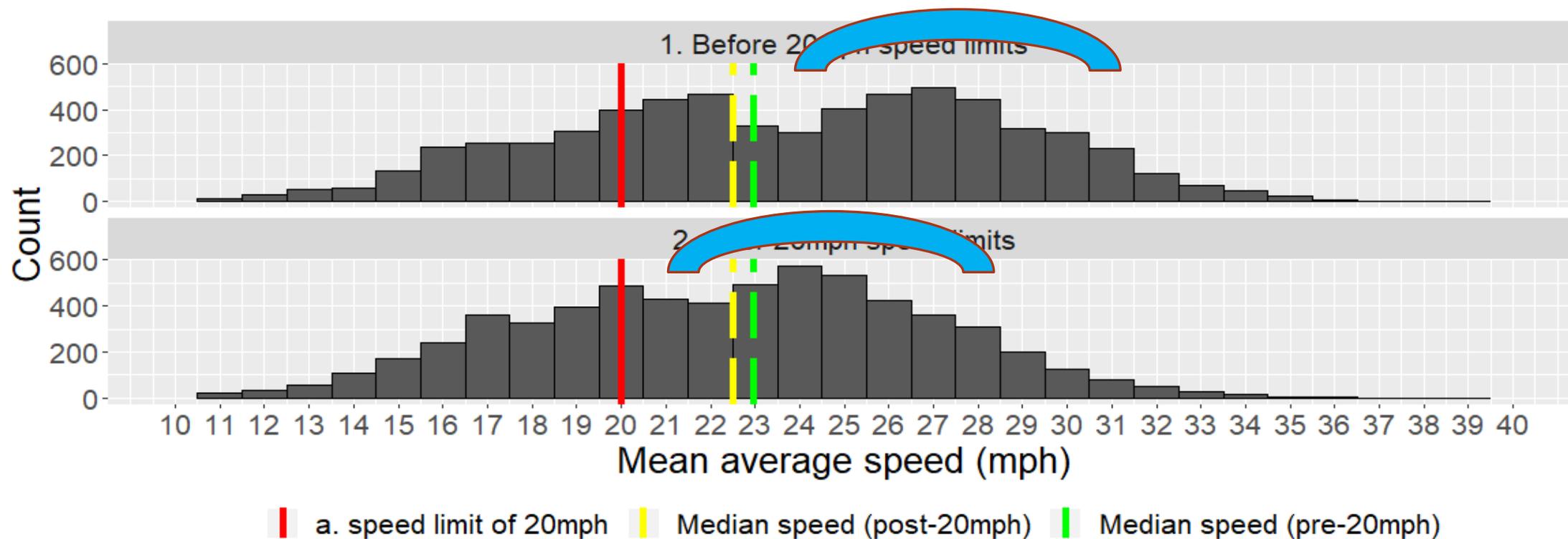
Edinburgh – visualization of traffic speed

Figure 1: Summary of average traffic speed – time series



Edinburgh – visualization of traffic speed

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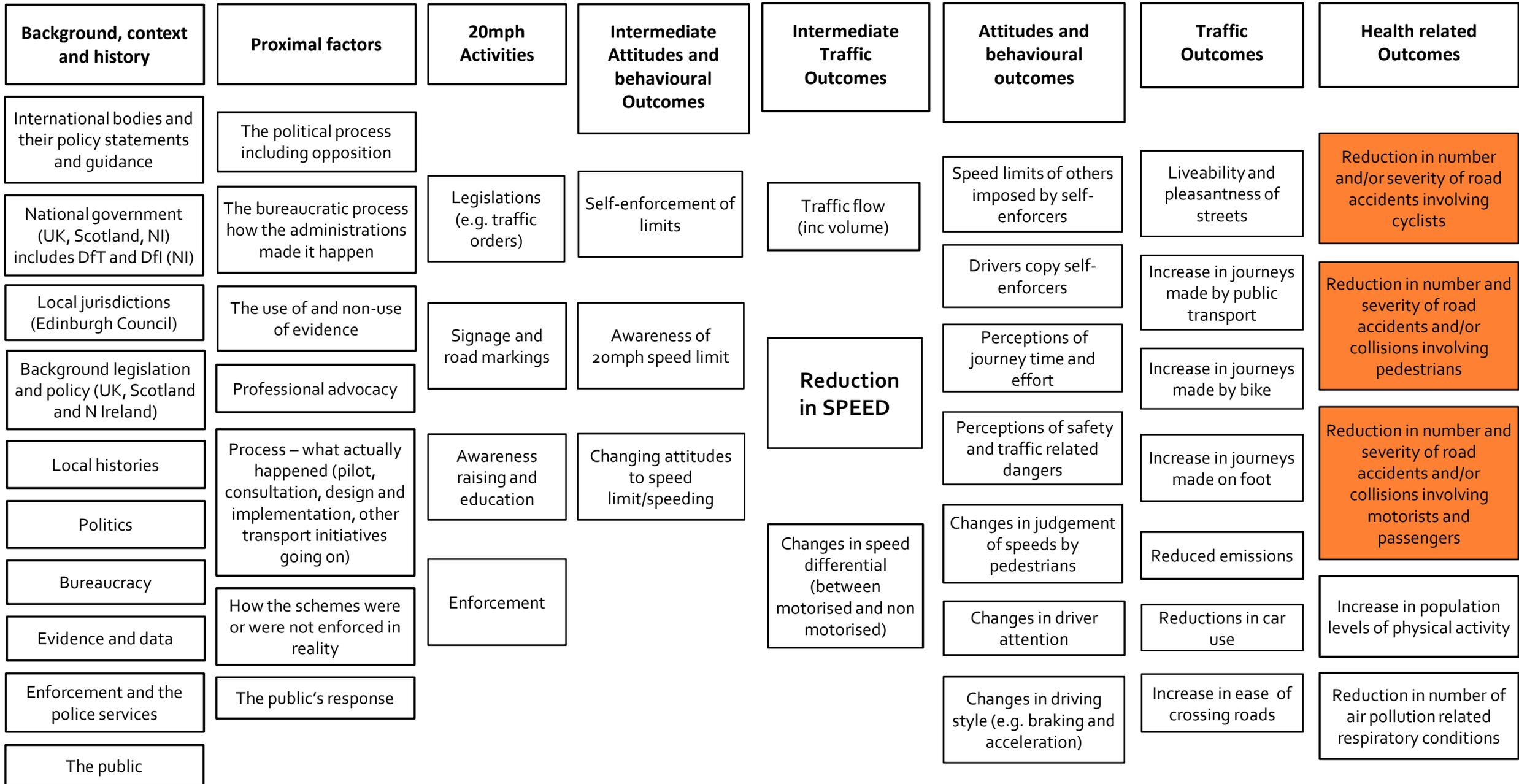


Edinburgh – volume

Summary of traffic volume pre- and post-20mph speed limits in the City of Edinburgh
(7-day average volume over 66 sites)

Category	Mean	Standard deviation	Median
Volume before	3641	2633	3738
Volume after	3555	2592	3391
Difference	-87	810	-347

20MPH LOGIC MODEL



Edinburgh – Road traffic collisions

Table 5: Implementation phases of 20mph speed limits in the City of Edinburgh

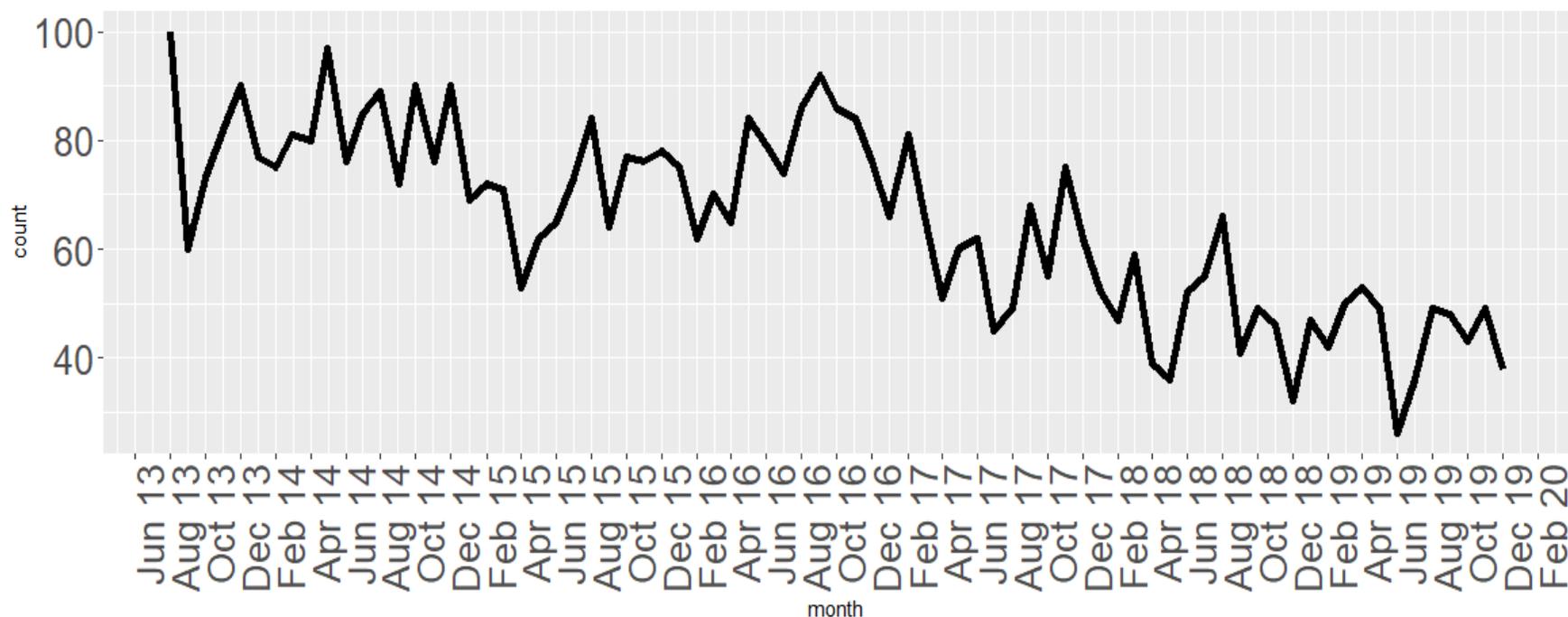
2013/14	2014/15	2015/16	2018/19	2019/20	rate.pre	rate.post	%diff	secular trend	%diff rates
973	884	888	576	426	915	548	Rates -unadj -40	-4	-adj -36

Table 6: Implementation phases of 20mph speed limits in the City of Edinburgh

Zone code	Implementation zones	Control zones	Diff.in.Diff
1a	-26	-23	-3
1b	-10	-13	3
3	-33	-18	-15
4	-31	5	-36
5	-47	-13	-34
6	-43	-8	-35

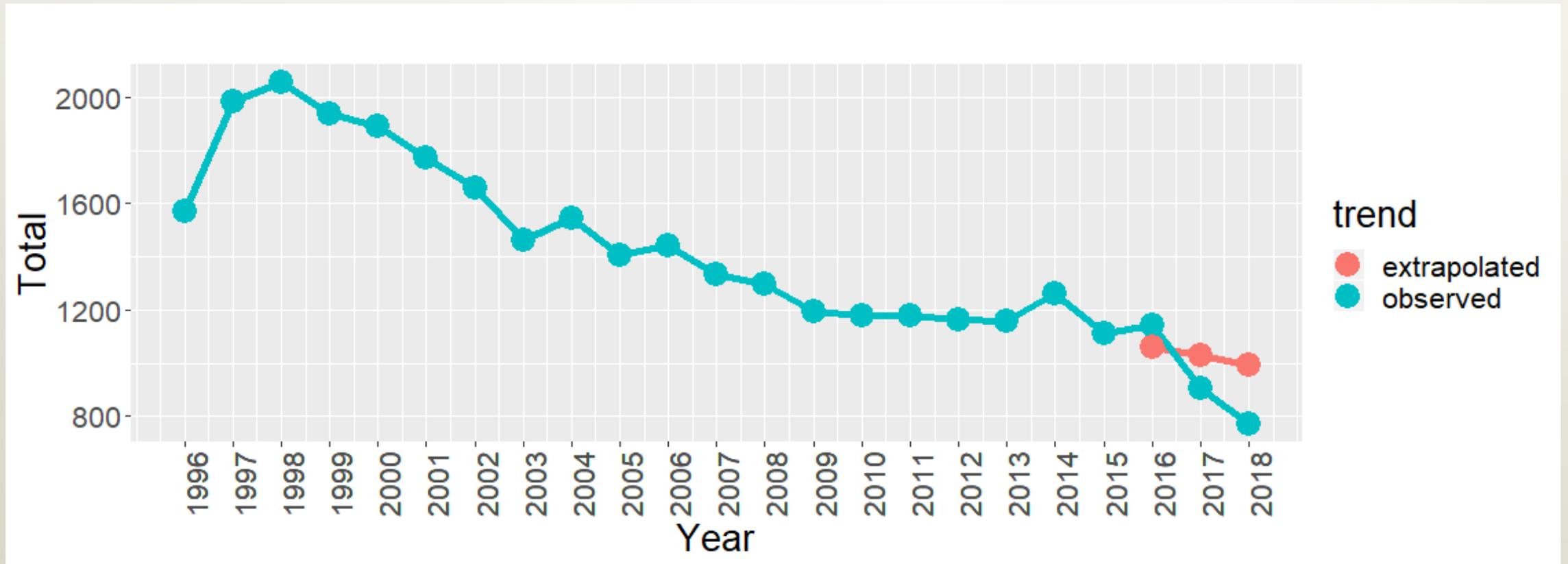
Results – visualization of road traffic collisions

Figure 2: Monthly time series of road traffic collisions from June 2013 to December 2019



Results – visualization of road traffic collisions

Figure 3: Monthly time series of road traffic collisions from June 2013 to December 2019



Results – Road traffic casualties

Average annual road traffic casualty rates - citywide

	casualties pre-20mph	casualties post-20mph	rate pre- 20mph	rate post- 20mph	diff in rates	Perc. diff.rates
city wide	3105	1146	1035	626	-409	-39

Citywide average annual casualty severity rates

severity	before	after	diff	Rates_ before	Rates_ after	Diff.rates	Perc. diff.rates
Fatal	14	3	11	5	4	-1	-23
Serious	365	68	297	122	82	-40	-33
Slight	2726	474	2252	909	571	-338	-37



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Progress on economic evaluation

- Costs (from Edinburgh)
- Active travel – no data so no CUA
- Casualty data – modelled estimates to inform partial CBA
- Non-health benefits (excl. emissions) – to inform CCA

- Challenges in finalising synthesis of these data in the DTA due to Covid pressures and changed roles

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Summary

Significant barriers and facilitators to getting 20mph on the agenda – Edinburgh used a slow approach – zones around Schools followed by pilot study. Focussed on issues over and above safety (e.g. cleaner and greener place to live)

Belfast results were not as significant as Edinburgh in relation to main outcomes.

Reason may include:

- 1) Low speeds in City Centre
- 2) City Centre rather than city wide
- 3) Minimal education and enforcement

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- ❑ City wide, statistically significant decrease in traffic speed by **-1.34mph**.
- ❑ A larger decrease was observed for streets for which the average speed pre-20mph was ≥ 24 mph.
- ❑ Reductions in traffic speed for **6 of the 7 implementation zones**.
- ❑ City wide, there was **no evidence of a statistically significant change in traffic volume** post-20mph speed limits.
- ❑ Reductions in road traffic collisions and casualties
- ❑ Reduction in **average annual road traffic collision rates** was found to be **36 collisions per year**.

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