

The health benefits of pedestrian and cyclist commuting: evidence from the Scottish Longitudinal Study



*Friel C, Walsh D, Whyte B, Dibben C, Feng Z, Baker G, Kelly P, Demou E, Dundas R.
The health benefits of pedestrian and cyclist commuting: evidence from the Scottish Longitudinal Study. 2023 (under review)*



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PHINS, 3rd November 2023

Overview

- Policy and key trends
- Health benefits
- Methods
- Findings
- Cost savings
- Infrastructure, investment and challenges
- Conclusions



Update to the Climate Change Plan 2018 - 2032

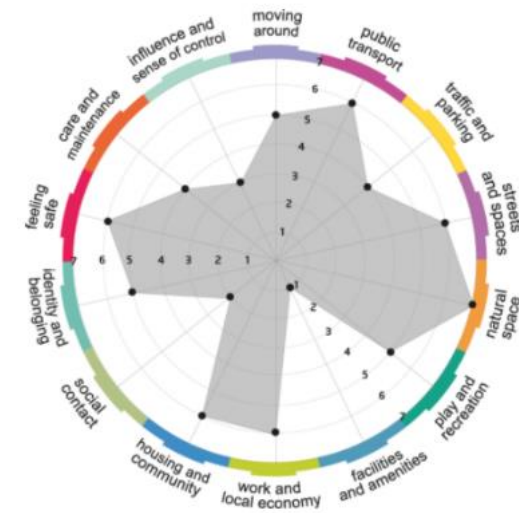
2018 - 2032

Securing a Green Recovery on a Path to Net Zero



Scottish Government
Riaghaltas na h-Alba
gov.scot

Place Standard



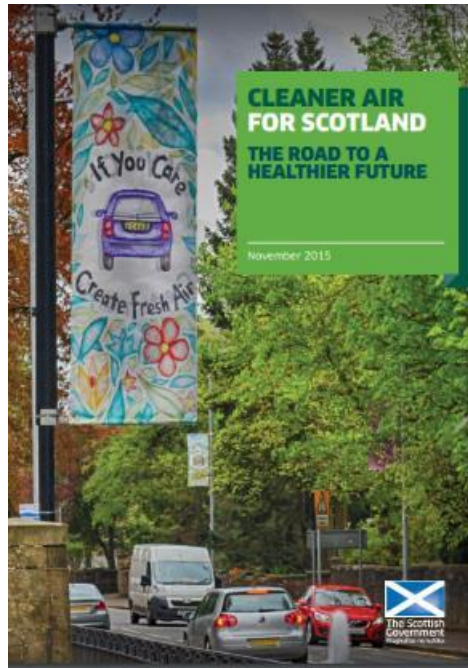
CYCLING ACTION PLAN
FOR SCOTLAND



Consultation



Policy context



Reducing car use for a healthier, fairer and greener Scotland

A route map to achieve a 20 per cent reduction in car kilometres by 2030

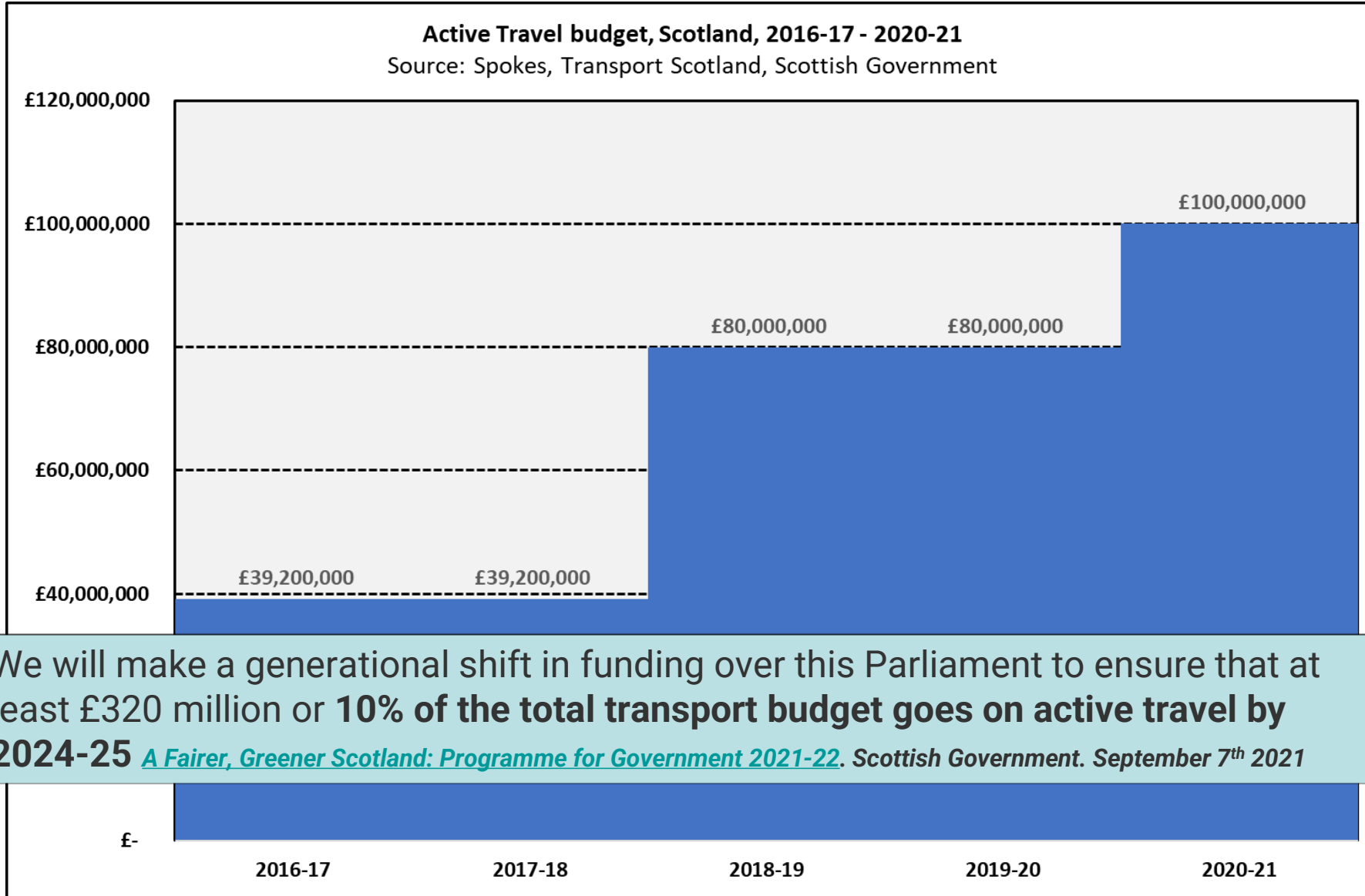


Picture by Sarah Tokou (P7), from St Mary's Primary School in Largs.

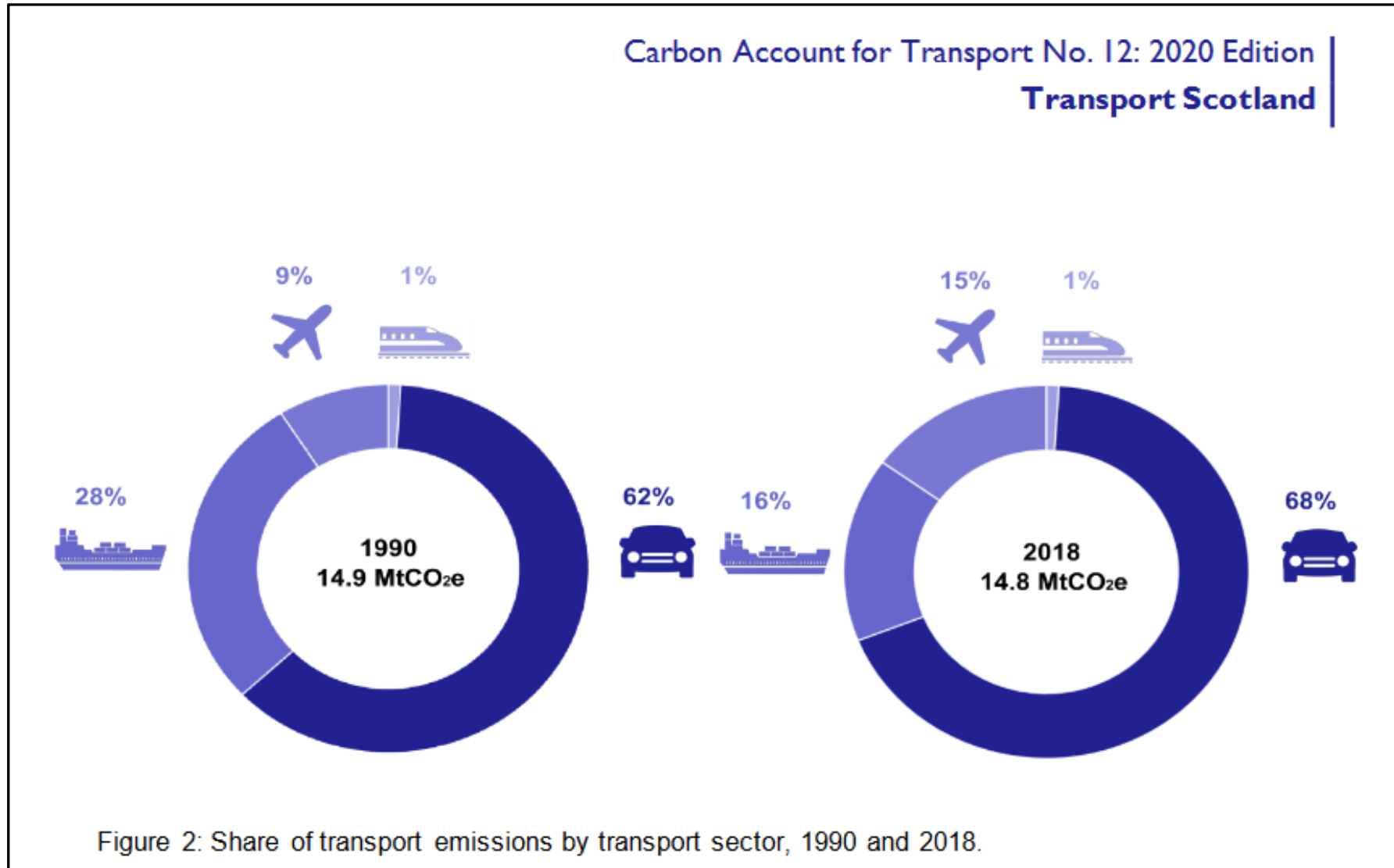
Vision: A More Active Scotland							
Physical activity is about getting people moving. Daily walking, playing in a park, going to a gym, training with a team or aspiring to win a gold medal - it really doesn't matter how people get active, it just matters that we do.							
Being physically active contributes to our personal, community and national wellbeing. Our vision is of a Scotland where more people are more active, more often.							
National Outcomes							
Business	Employment	Research and innovation	Young People	Early Years	Healthier	inequalities Tackled	Life Chances
Safe from Crime	Sustainable Places	Healthier Communities	Environment Valued	National Identity	Impact on Environment	Older People Supported	Public Services
Active Scotland Outcomes							
We encourage and enable the inactive to be more active		We encourage and enable the active to stay active throughout life		We develop physical confidence and competence from the earliest age			
We improve our active infrastructure – people and places		We support wellbeing and resilience in communities through physical activity and sport		We improve opportunities to participate, progress and achieve in sport			
Equality: Our commitment to equality underpins everything we do							

Indicators will be updated annually, where new data is available. A range of evidence accounts for the outcomes are in development and will be available on this site in due course.

Increasing budget for Active Travel

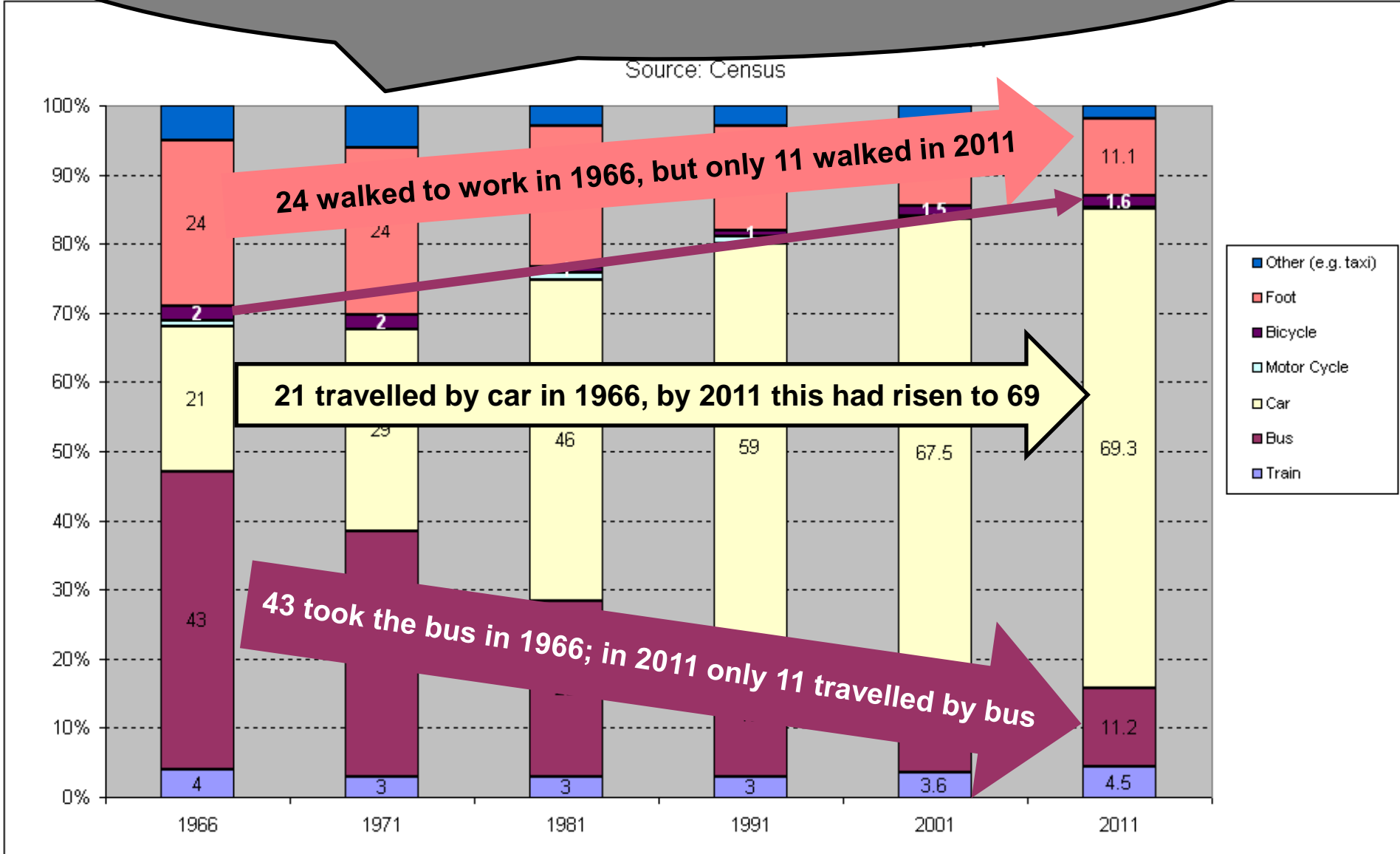


Transport emissions



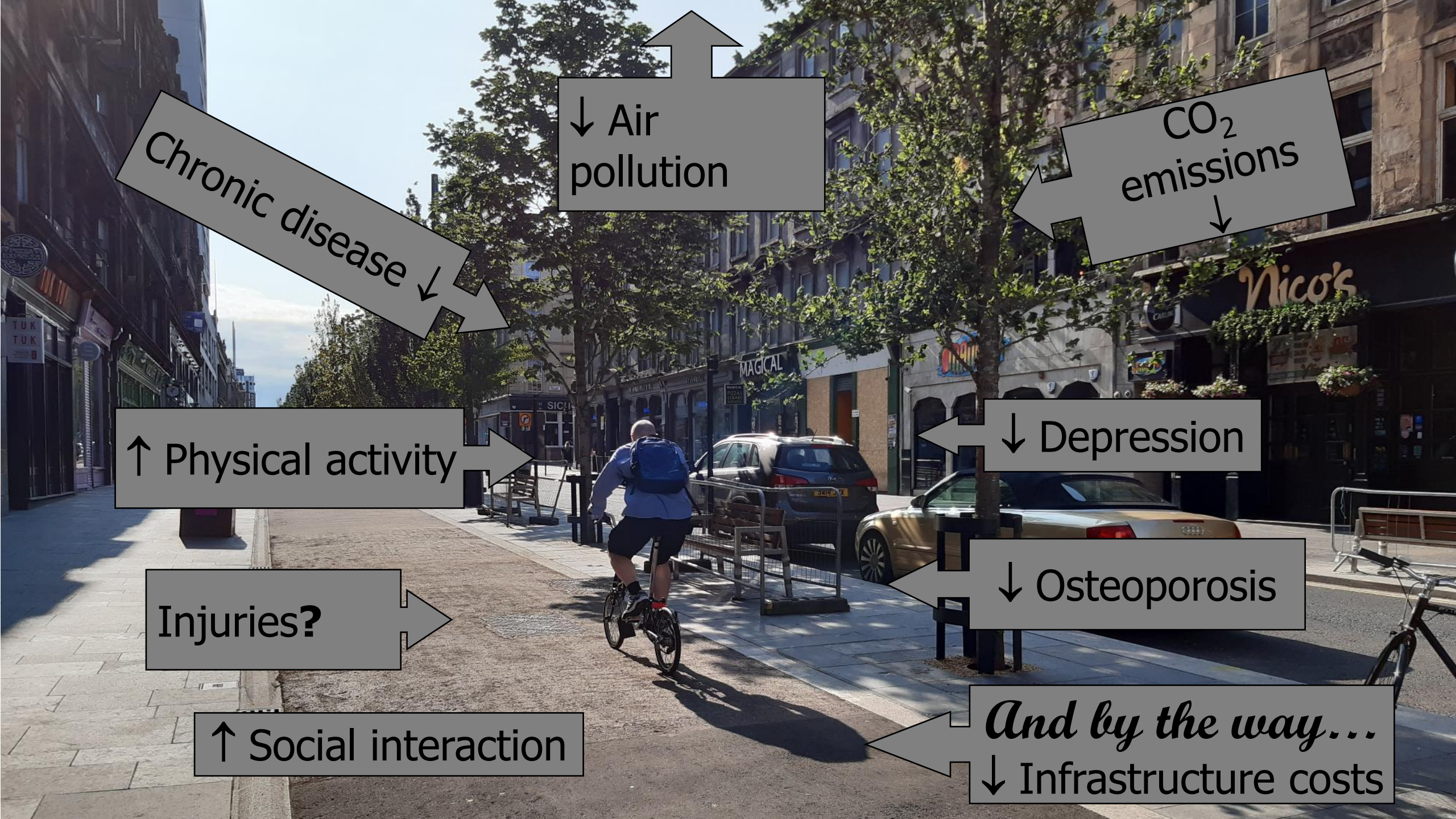
Out of 100 commuters...

Source: Census



Health benefits





Chronic disease ↓

↓ Air pollution

CO₂ emissions ↓

↑ Physical activity →

↓ Depression ←

Injuries? →

↓ Osteoporosis ←

↑ Social interaction

And by the way...
↓ Infrastructure costs

Active commuting in Scotland

Quantifying the health and economic benefits

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 Rebecca Pillinger¹
 Paul Kelly¹
 Bruce Whyte²

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² Glasgow Centre for Population Health, Scotland

Research Aims

1. Quantify annual economic values of the health benefits associated with levels of active commuting at a population-level for Scotland using the WHO HEAT tool.
2. Estimate the proportion of active commuters who meet a daily equivalent (30 mins per day) of the weekly target for moderate intensity physical activity.

Study Design

Repeat cross-sectional

2001 and 2011 waves of the Scottish Census

Participants

Adults in Scotland, aged 16 to 74 years, who commute for work or study by walking or cycling



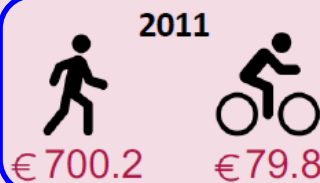
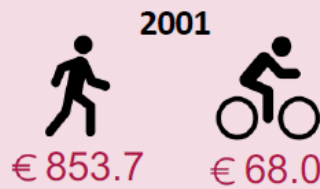
2001	$n = 244,009$ (13.5% modal share)
2011	$n = 286,145$ (14.5% modal share)

Analysis

At national level and for 32 Local Authority (LA) areas

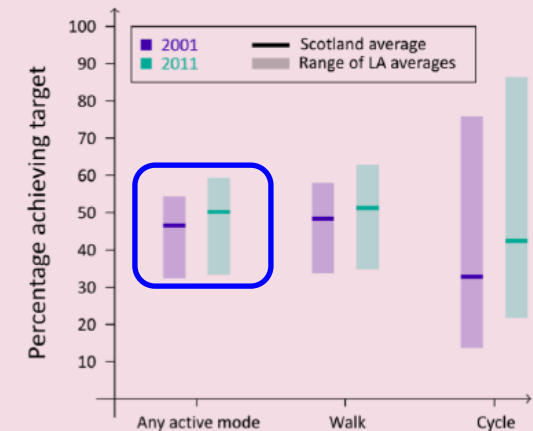
Result 1

Annual economic value (EUR millions)



Result 2

% of active commuters achieving a minimum target of 30 mins/day moderate intensity activity



Key take home message

This study demonstrates the substantial health and economic benefits that active commuting provides to Scotland, even at a relatively modest modal share.



...other co-benefits of regular active travel:

Reduced hospitalisation for chronic diseases

Mental health benefits

Lower sickness levels

Weight-control

(If active travel replaces car journeys) reductions in congestion, road noise and air pollution

More vibrant local economies

Aims and research questions

Our study was designed to assess the health benefits of active commuting in Scotland.

We aimed:

- to address some of the limitations of previous studies (e.g. incorporating much longer follow-up, a more representative sample with a broader age group, and examining a wider set of outcomes);
- to produce new evidence in a Scottish context for policy makers and planners.

Main research question:

How does the risk of various physical and mental health outcomes differ between pedestrian commuters and cyclist commuters versus non-active commuters, over an 18 year period?

Methods: Data source and study design

- The Scottish Longitudinal Study (SLS) is a nationally representative sample based on 5.3% of the Scottish population which was begun in 1991. Study participant records are linked prospectively to their hospital admission, prescription and mortality data. For this study our focus was on the 2001 cohort.
- We use responses to one question in the Scottish Census: “*How do you usually travel to your main place of work or study (including school)?*” Respondents are asked to select which mode of travel they use for the longest part, by distance, of their usual journey.
- We focused on working age participants who were 16-74 years in 2001 and followed-up them until 2018. We excluded people not working, people working from home, records with missing cases, offshore workers and those working outside the UK.

Methods - Statistical analysis

- Descriptive analysis of the characteristics of different types of commuter: non-active, cyclists, pedestrians
- Cox proportional hazard models were used to estimate the effect mode of travel on nine outcomes: all-cause mortality, acute hospital admission (any diagnosis), Cardiovascular Disease (CVD) death, CVD hospitalisation, CVD prescription medication, cancer death, cancer hospitalisation, prescription medication for mental health, traffic casualty hospitalisation
- The models controlled for a range of demographic, socioeconomic and area-based variables; including distance of commute.
- The reference category for all analyses was non-active commuters

Description of pedestrian and cyclist commuters

Pedestrian commuters
(n= 11,561)

- More likely to be female (62%) than cyclists and non-active
- Younger age profile than cyclists and non-active
- More likely to be a shift worker (40%)
- Commuted shorter distances (98% < 5KM)
- More with no qualifications and less with a degree than cyclists and non-active
- Less likely to be a home owner than cyclists and non-active
- Less likely to be in higher managerial and professional occupations and more likely to be in routine occupations than non-active
- More likely to live in a city than cyclists and non-active.

Cyclist commuters
(n= 1,363)

- More likely to be male (77%) than non-active and walkers
- Slightly older age profile than walkers
- Commuted longer distances than walkers (19% commuted >5 Km)
- Similar qualifications and occupations to non-active
- Slightly less likely to be a home-owner compared to non-active
- Slightly more likely to live in an urban settlement than non-active.

Findings for cyclist commuters

Compared to non-active commuters, people who cycle to work had:

47% lower risk of death from any cause

10% lower risk of any hospitalisation

24% lower risk of CVD hospitalisation

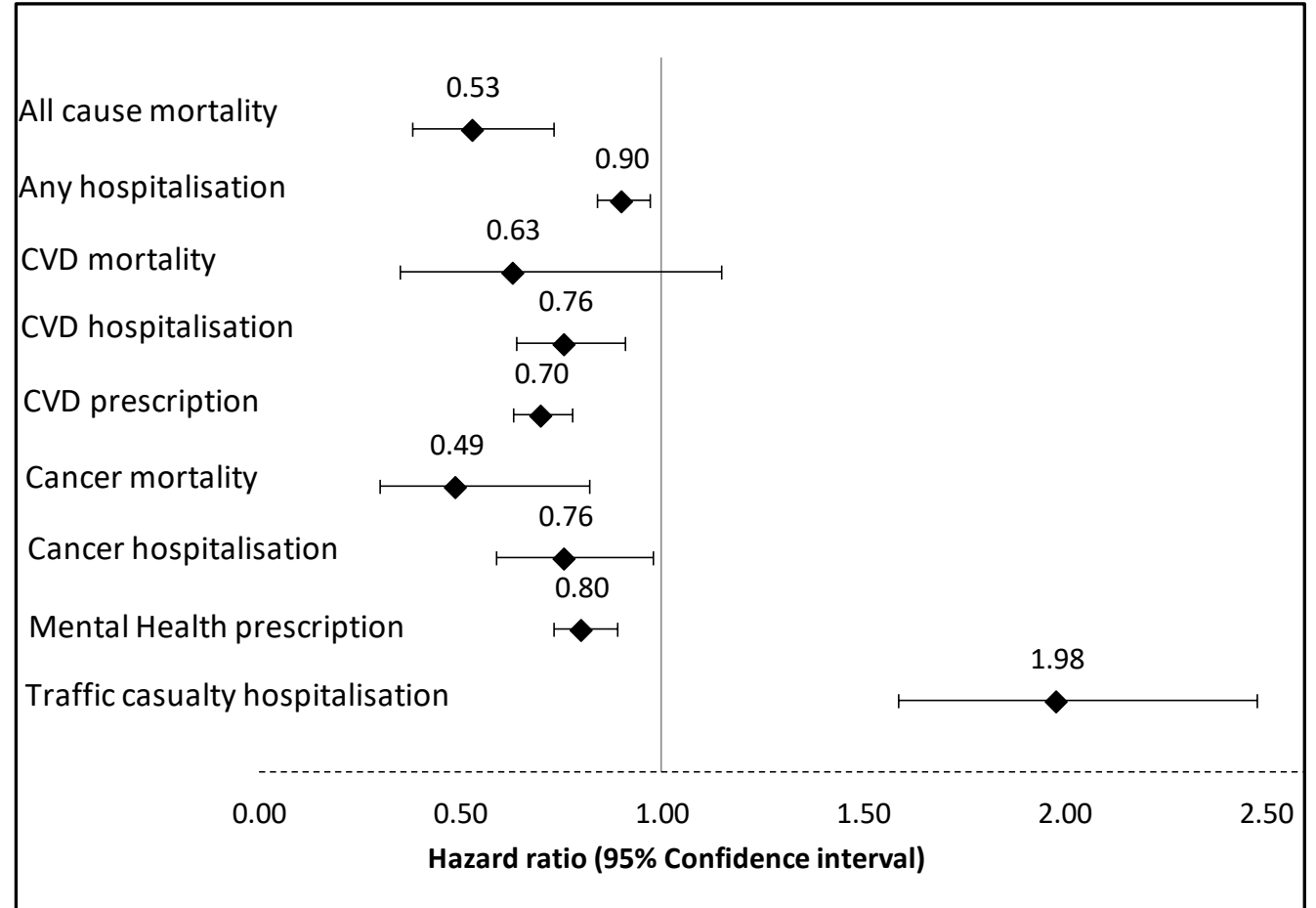
30% lower risk of receiving a CVD related prescription

24% lower risk of cancer hospitalisation

51% lower risk of cancer death

20% lower risk of receiving a mental health related prescription.

But were twice as likely as non-active commuters to be hospitalised due to a traffic collision (n=83 casualties in 18 years of follow up; 6% of the cohort)



Findings for pedestrian commuters

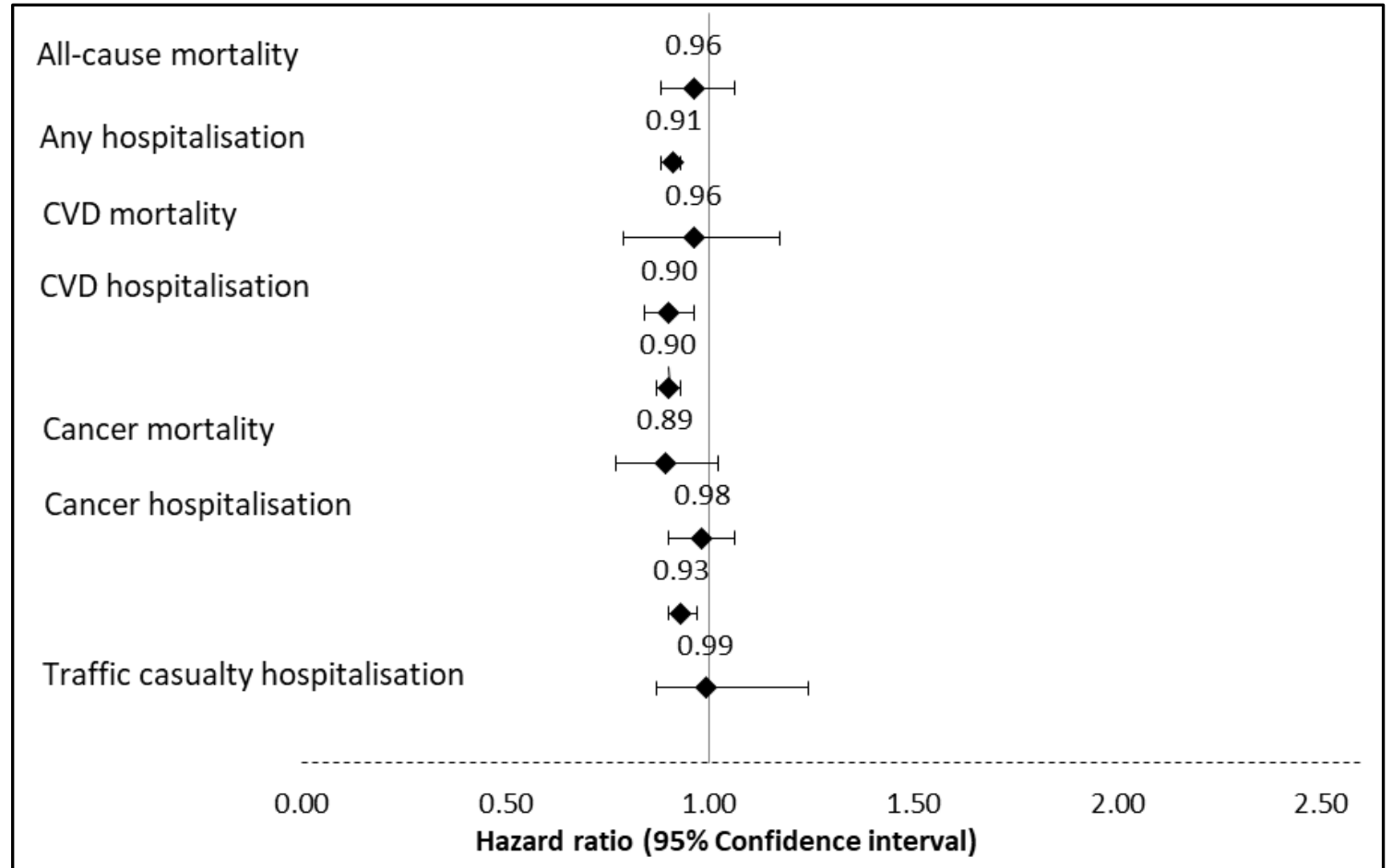
**Compared to non-active commuters,
people who walked to work had:**

9% lower risk of any hospitalisation

10% lower risk of CVD hospitalisation

10% lower risk of receiving a CVD-related
prescription

7% lower risk of receiving a mental health
related prescription.



Summary points

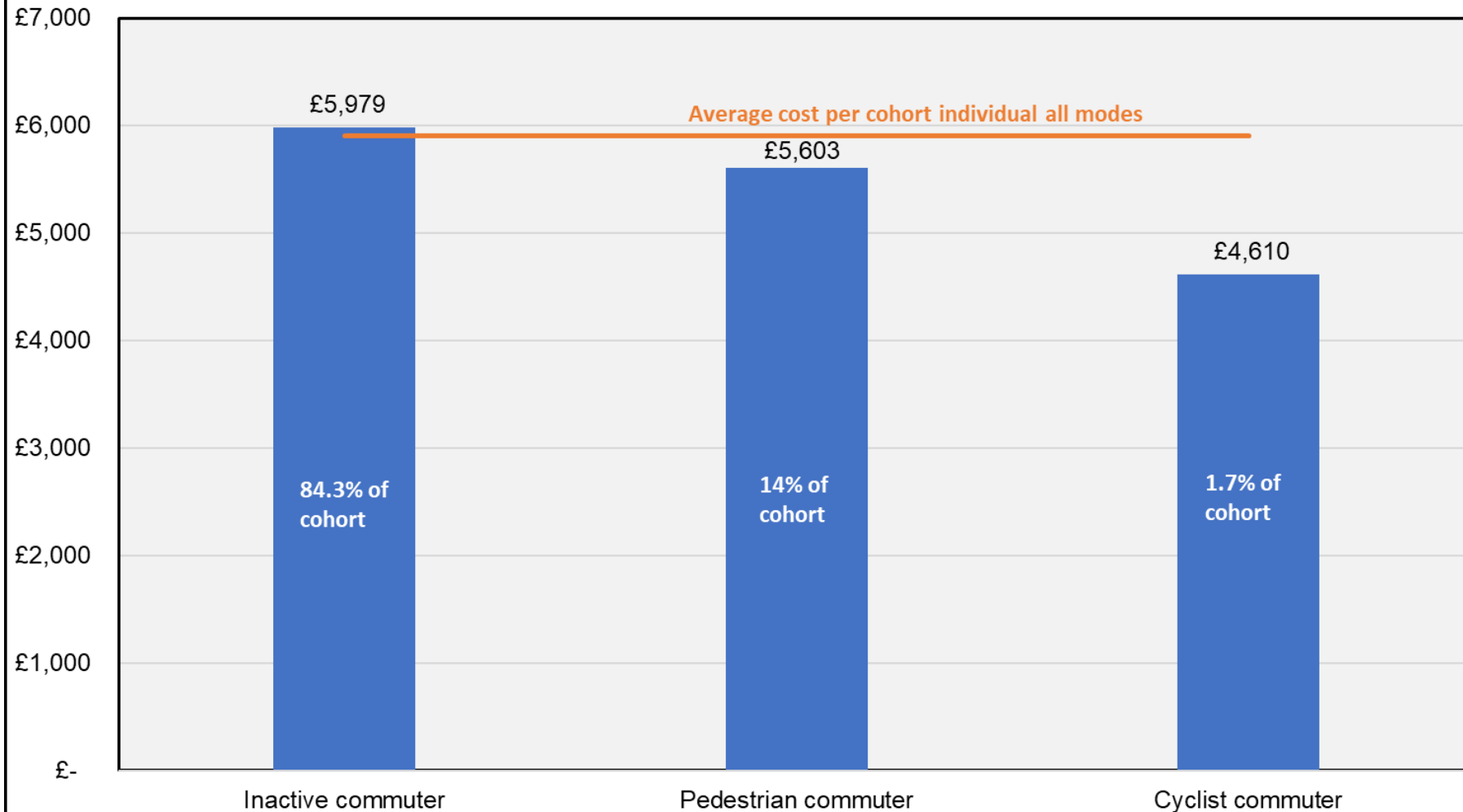
This study provides direct evidence of the association between active commuting and health outcomes over a long period in a Scottish context.

We demonstrate the independent positive associations between pedestrian commuting and cyclist commuting and a range of health outcomes.

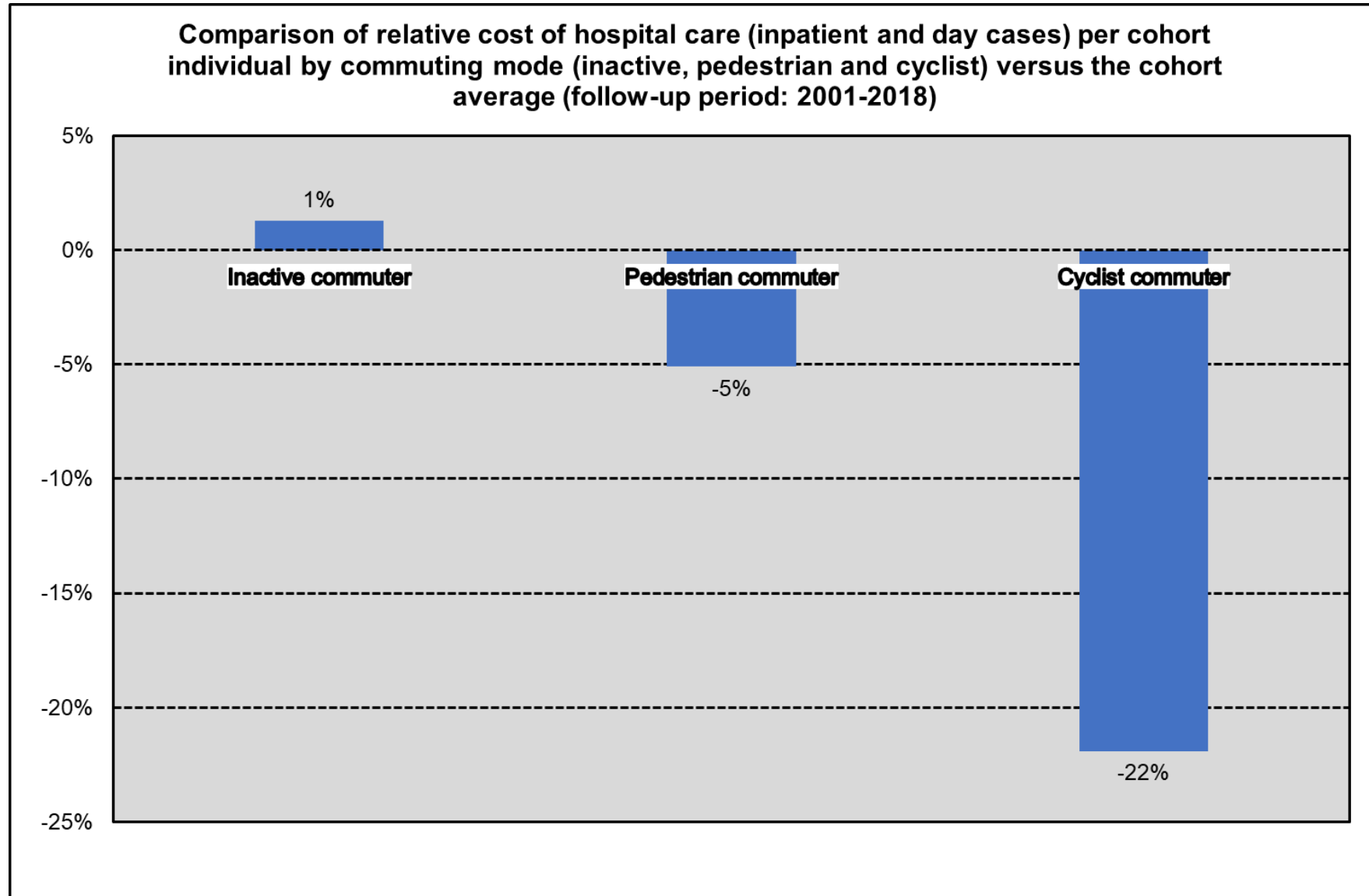
Given these benefits what can we say about the potential impacts on NHS costs?

NHS hospital costs

Average cost of hospital care (inpatient and day cases) per cohort individual compared between inactive, pedestrian and cyclist commuters over the follow-up period (2001-2018)

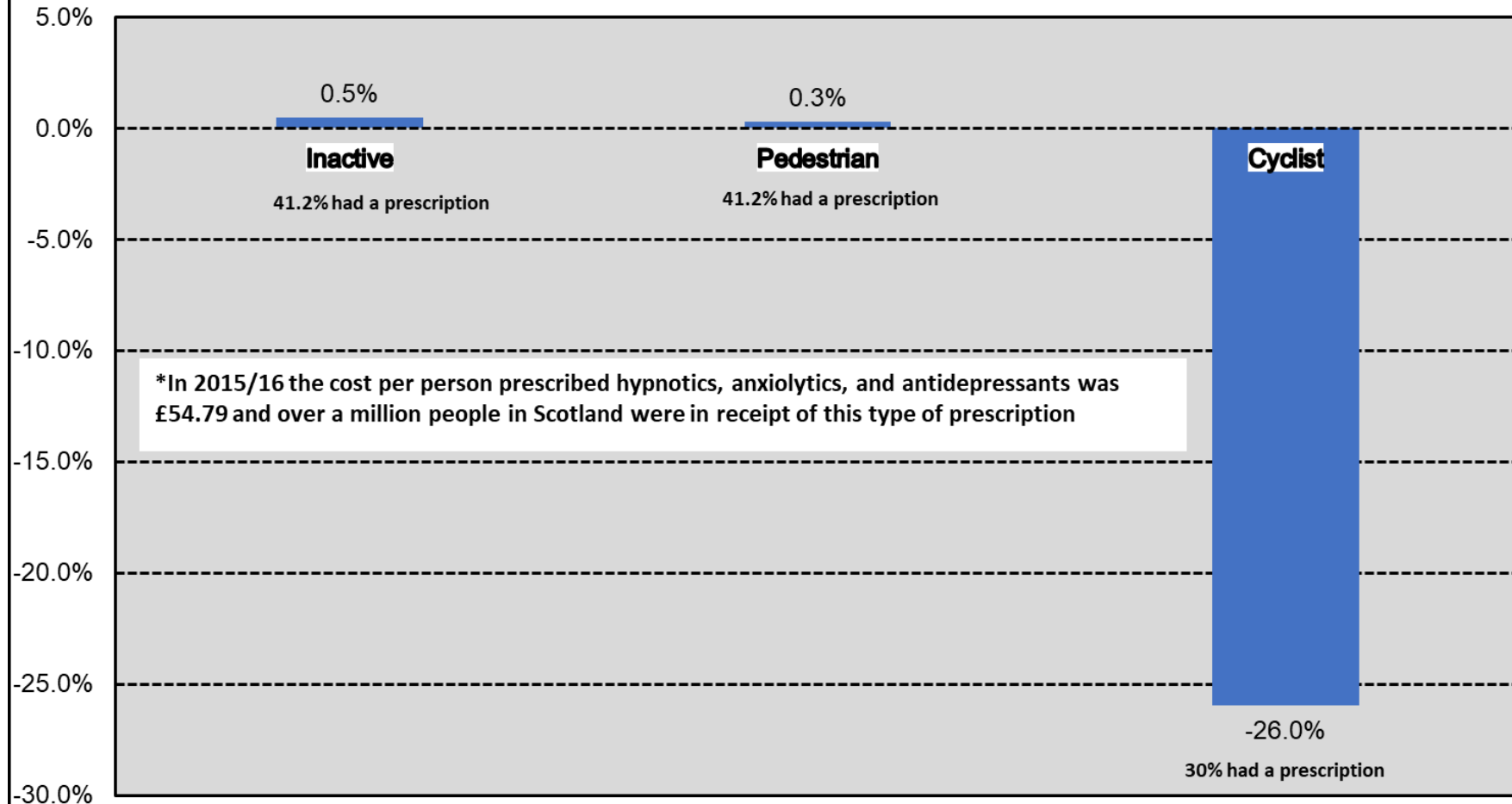


Relative hospital costs



Prescription costs

Comparison of relative cost of prescriptions for anxiety and depression* per cohort individual by commuting mode (inactive, pedestrian and cyclist) versus the cohort average (follow-up period: 2001-2018)



*In 2015/16 the cost per person prescribed hypnotics, anxiolytics, and antidepressants was £54.79 and over a million people in Scotland were in receipt of this type of prescription

*Prescriptions for hypnotics, anxiolytics, and antidepressants (BNF codes 4.1 and 4.3)

Strengths and weaknesses

Weaknesses

The main exposure variable is limited as it is recorded only at one point in time, 2001, and respondents may have subsequently changed their method of commuting or stopped commuting.

The Census does not capture multi-modal trips and so there may be overlap between active and non-active commuters which could underestimate the association between active travel and health.

The removal of records with missing covariate data may have introduced unknown bias, although the distribution of missingness was similar across modes of travel.

We were unable to adjust for some potential confounders, such as income, also other forms of physical activity (PA) that contribute to total PA levels.

Strengths

Use of the SLS: a large representative Census-based sample of the Scottish general population, which is not subject to healthy respondent bias that is inherent in surveys.

Long follow-up period of 18 years and a wider age range of participants (aged 16-74)

The prospective study design and adjustment for pre-existing health conditions allowed us to address reverse causality although residual confounding from undiagnosed conditions presenting early in the follow-up period cannot be ruled out.

The use of a large sample of census data linked to national health records, which have quality assured coding, has reduced the risk of attrition bias and improved the reliability of the outcome measures.

We measured a range of health outcomes, including mental health, thereby providing a broad assessment of the positive impacts of active commuting.

Infrastructure and investment



20 mph limit - city wide



Stockingfield Bridge



Sighthill Bridge



Bike hire scheme



Connecting Woodside



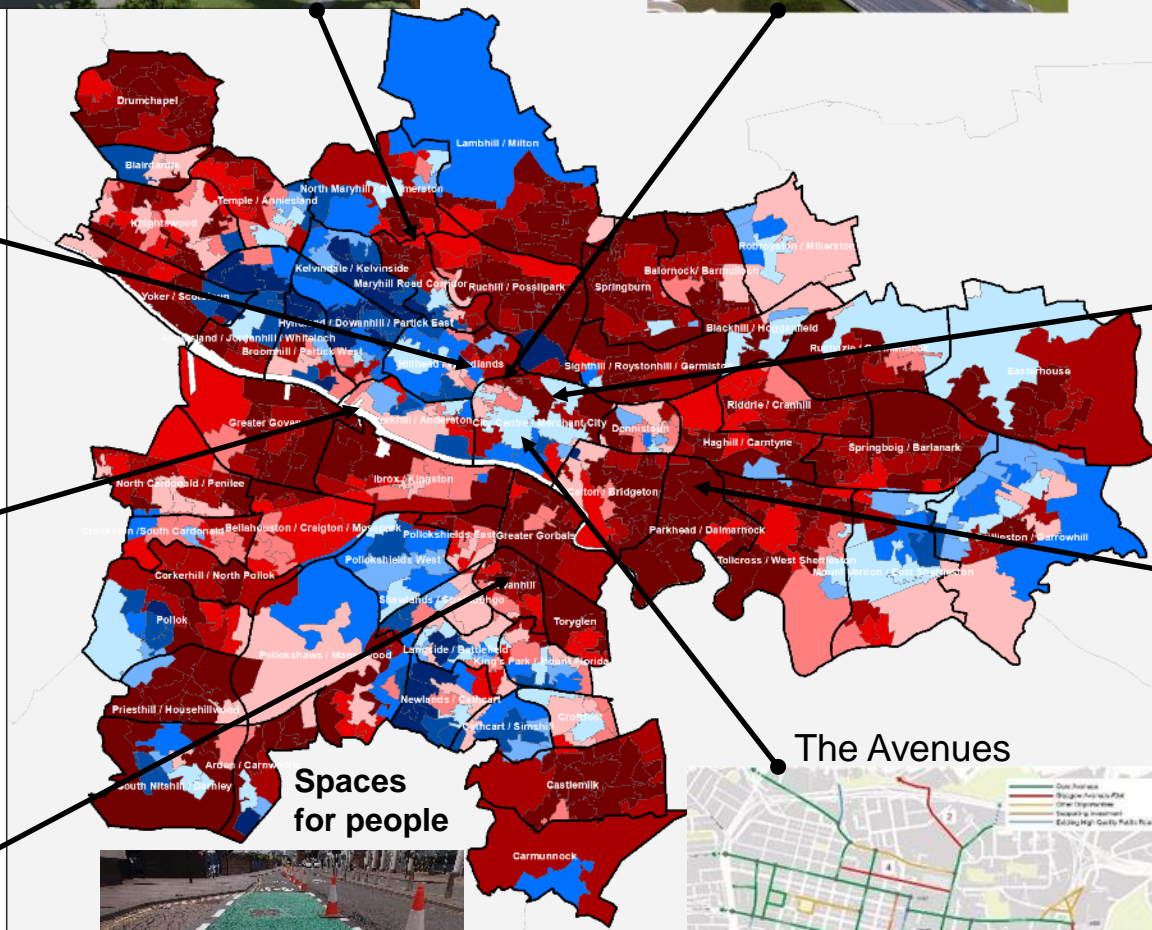
Govan-Partick Bridge



Low Emission Zone



Dalmarnock Smart Bridge



The Avenues



Spaces for people



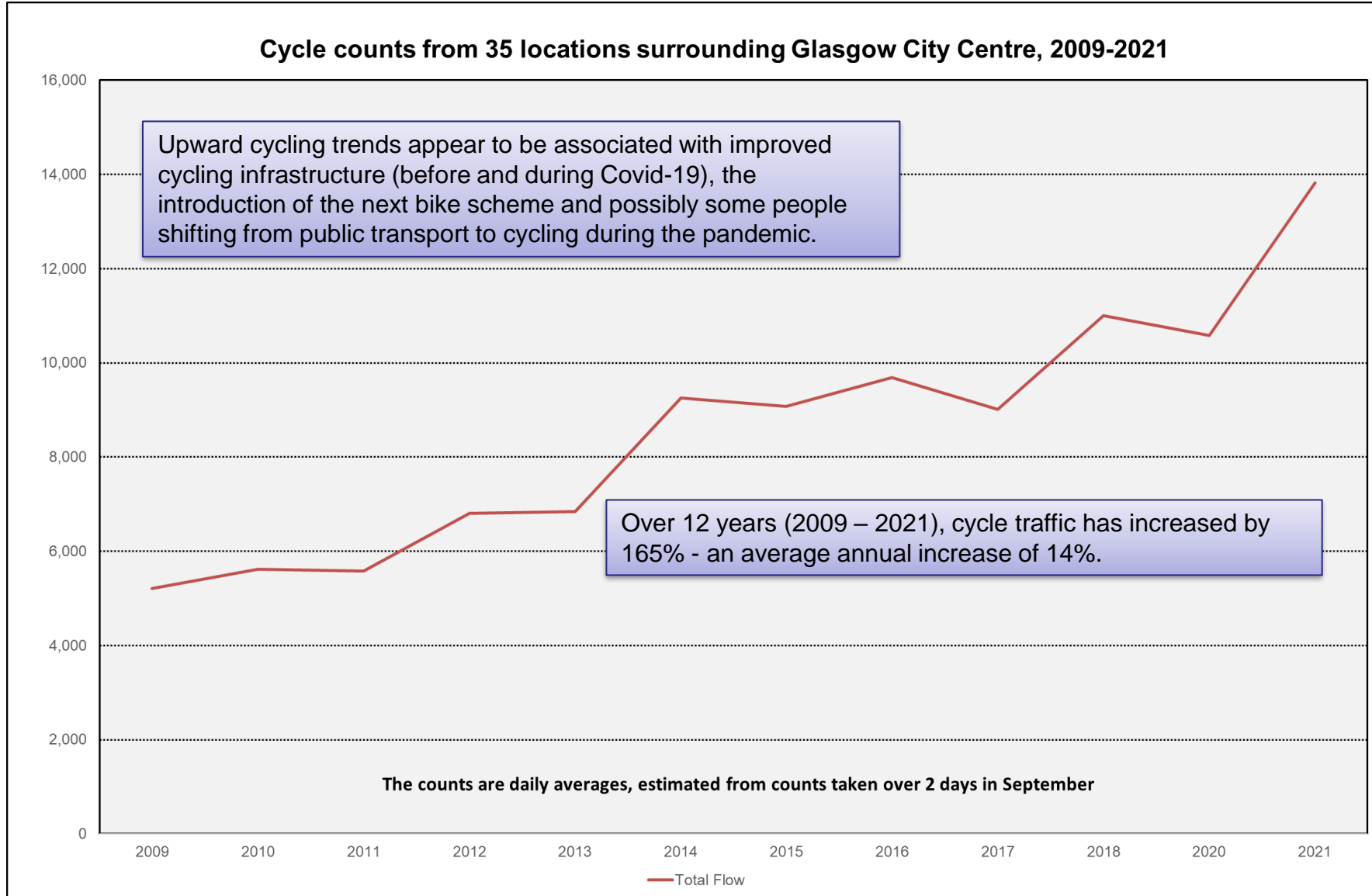
South City Way

Glasgow City Council
South City Way
COMMUNITY LINKS PLUS

ACTIVE - GLASGOW

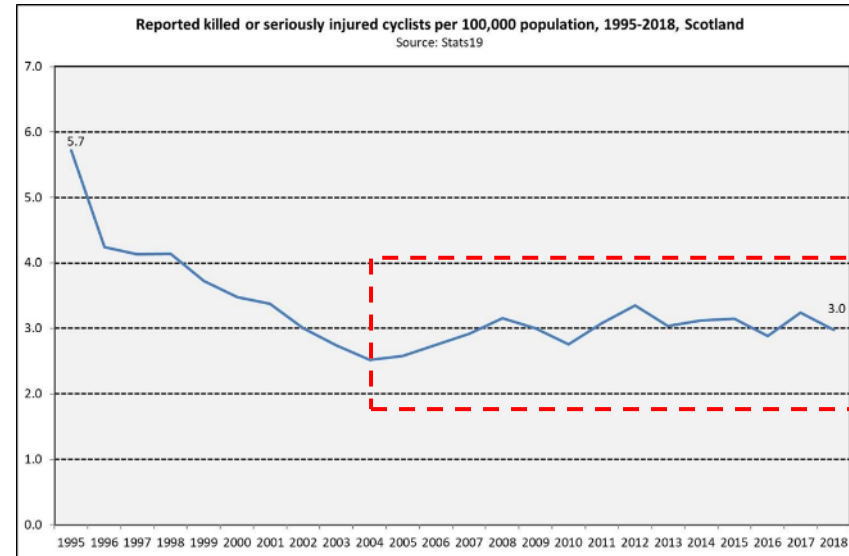
Our vision for Glasgow:
"To create a vibrant Cycling City where cycling is accessible, safe and attractive to all."

Cordon count trends



Challenges with respect to cycling

- Cycling & access to a bike is higher among **high income groups**
- Men much **more likely to cycle than women**
- Seriously injured cyclist casualties have risen in recent years
- Cyclist commuters twice as likely as non-active commuters to be hospitalised due to a road collision
- One in ten vehicles in collision with a cyclist (or a pedestrian) don't stop
- Cycling is not a dangerous activity. At a population level, cyclists have **lower overall mortality**. But, **perceived** and **real risks** contribute to low cycling uptake

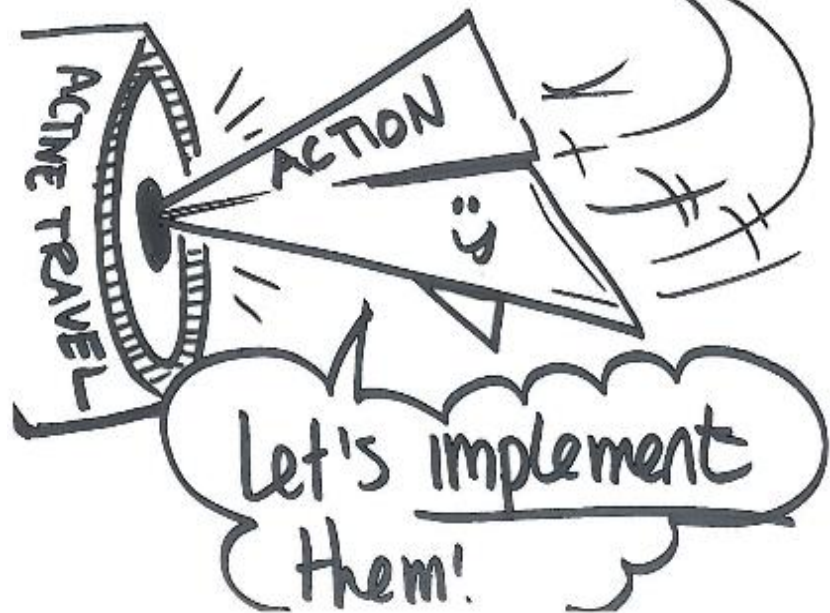


Summary points

- Active travel has multiple health benefits as well as wider social and environmental benefits.
- Increasing levels of active commuting from relatively low levels could take pressure off health services and save money in the medium to long-term.
- There is a need to invest in safer infrastructure for cycling, in order to address safety issues and to encourage more people to travel actively
- Policy is supportive but progress in building AT infrastructure is slow and there is resistance to lowering road speeds, reducing car use and shifting investment away from roads.



We are rich in policies
& strategies".....



Can we change the
priority...





Acknowledgements

The help provided by staff of the Longitudinal Studies Centre – Scotland (LSCS) is acknowledged. The LSCS is supported by the ESRC/JISC, the Scottish Funding Council, the Chief Scientist’s Office and the Scottish Government. The authors alone are responsible for the interpretation of the data. Census output is Crown copyright and is reproduced with the permission of the Controller of HMSO and the King’s Printer for Scotland

Friel C, Walsh D, Whyte B, Dibben C, Feng, Z, Baker, G, Kelly P, Demou E, Dundas, R. The health benefits of pedestrian and cyclist commuting: evidence from the Scottish Longitudinal Study. 2023 (Under review)