NSW Health

NSW Active Transport Health Model Reference Outcome Values

User Guide v1.0

18 December 2024

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Contents

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Glossary

Active transport	Modes of transport that involve physical activity such as walking or cycling to or from a destination, or walking and cycling to or from public transport stops.
Air pollution	Air pollution generated by traffic participants and other sources. For the purposes of the NSW Active Transport Health Model, this is particulate matter with a diameter of up to 2.5 micrometres ($PM_{2.5}$).
Chronic diseases	Also known as non-communicable diseases, these tend to be of long duration and are the result of a combination of genetic, physiological, environmental and behavioural factors. The main types are cardiovascular diseases, cancers, chronic respiratory diseases and type 2 diabetes (World Health Organization).
Cost benefit analysis	An appraisal and evaluation technique that estimates the costs and benefits of a project in monetary terms.
Discount rate	The rate at which future outcomes are discounted to reflect the fact that a benefit now, is worth more than one in the future.
Health Adjusted Life Years (HALYs)	Years of life lived in good health, without disease, disability or injury.
Incidence	The number of new cases (of an illness or event etc) occurring during a given period (Australian Institute of Health and Welfare).
Intervention decay	The decay in the effectiveness of an intervention over time.
Life years lived	A summary measure of population health that reflects the frequency of the occurrence of death in a defined population, during a specified interval of time that takes into account the age of death.
Mortality	The number or rate of deaths in a population during a given time period. Mortality rates are based on the number of deaths registered in a year divided by the size of the corresponding population (Australian Institute of Health and Welfare).
Outcome measures	Health-related outcomes of the project, e.g. $ per kilometre walked or cycled, health adjusted life years (HALYs), life years lived, health care costs, incidence, prevalence and mortality.
Physical activity	Any form of bodily movement performed by skeletal muscles that results in an increase in energy expenditure. Examples include walking, cycling, running, dancing, swimming, yoga, and gardening.
Physical activity displacement	When increases in physical activity in one domain (e.g. active transport) are compensated for by decreasing physical activity in another domain (e.g. structured exercise such as going to the gym).
Prevalence	The number or proportion (of cases, instances etc) in a population at a given time (Australian Institute of Health and Welfare).
Road trauma	All road transport crashes that were recorded by NSW police and resulted in injury or deaths in 2018 from the TfNSW Crashlink database.
Transport mode	The way in which people can be transported or travel, e.g. car, public transport, walking, cycling.
Travel demand management	An action, or a set of actions, to improve the efficiency of the transport system. Travel demand management strategies are aimed at influencing people’s travel behaviour so that alternative mobility options are presented and/or congestion is reduced.
Value of a Statistical Life (VSL)	An estimate of the value society places on reducing the risk of dying. By convention, ‘the life’ is assumed to be that of a young adult, with at least 40 years of life ahead (Office of Impact Analysis).
Value of a Statistical Life Year (VSLY)	An estimate of the value society places on a year of life (Office of Impact Analysis).
Years lived with disability	A measure of the years spent in less than full health due to living with disease and/or injury (Australian Institute of Health and Welfare).

About the NSW Active Transport Health Model

The NSW Active Transport Health Model (the Model) has been developed to provide a best-practice method, tailored to NSW, to value the health impacts of active transport infrastructure being proposed as part of state and/or local level projects.

The NSW Ministry of Health will be evaluating the use of the Model's reference outcome values in strategic business cases and evaluations over the first 12 months of implementation. The evaluation will help assess the utility and feasibility of the Model for use across NSW government agencies, by external consultants and for local projects. The reference outcome values from the Model are intended to support the 'case for change' as part of strategic business cases and cost-benefit analyses.

If you would like more information about the Model or its reference outcome values, please email the NSW Ministry of Health at moh-active.transport@health.nsw.gov.au

Background

Active transport offers a means of increasing physical activity at the population level. Based on up-to-date epidemiological evidence on multiple health conditions, the NSW Active Transport Health Model has been developed to provide a best-practice method to calculate and value the health impacts of active transport.

The Model provides a robust, evidence-based and adaptable tool to facilitate decision making on investment in active transport infrastructure in NSW. When used routinely during the strategic planning phase of infrastructure projects, the Model will enable a consistent approach to valuing the health and economic impacts of investment in active transport infrastructure.

The Model quantifies the health-related impacts of physical activity, air pollution and road trauma associated with active transport over the lifetime of a population. Estimates of the health impacts are also provided for a 30-year period. Using a central reference case based on current, NSW-specific travel patterns and modes, the Model derives active transport health-related benefits expressed as dollar per kilometre values for walking, cycling (on and off-road) and walking to and from public transport.

The health-related economic benefits of active transport are quantified by the Model via a three-step process:

1. The impact of infrastructure developments (e.g., walking paths, cycle ways) on active transport behaviour (e.g., walking, cycling) and the impact of changed transport behaviour on three exposures (physical activity, air pollution, road trauma) are estimated.
2. The impact of changes in exposure to physical activity, air pollution and road trauma on health outcomes (e.g., ischaemic heart disease, ischaemic stroke, type 2 diabetes, several cancers, depression, anxiety and all-cause mortality) are quantified.
3. The monetary value of health benefits (e.g. Health Adjusted Life Years (HALYs), life years lived, healthcare costs and the number of chronic disease cases prevented over the lifetime) are calculated.

Evidence

Numerous systematic reviews and meta-analyses of international evidence have reported on the health benefits of physical activity. Conversely, physical inactivity is one of the main contributors to the rise in non-communicable diseases such as type 2 diabetes, heart disease and some cancers. Active transport, which includes modes of transport that involve physical activity such as walking and cycling to and from destinations or public transport transit stops, has been shown to improve health outcomes through increased population level physical activity.[1]

[1] Zapata-Diomedi B, Knibbs LD, Ware RS, Heesch KC, Tainio M, Woodcock J, et al. A shift from motorised travel to active transport: What are the potential health gains for an Australian city? PLoS ONE. 2017 Oct 11;12(10):e0184799–e0184799; Woodcock J, Givoni M, Morgan AS. Health Impact Modelling of Active Travel Visions for England and Wales Using an Integrated Transport and Health Impact Modelling Tool (ITHIM). PLOS ONE. 2013 Jan 9;8(1):e51462; Creatore MI, Glazier RH, Moineddin R, Fazli GS, Johns A, Gozdyra P, et al. Association of Neighborhood Walkability With Change in Overweight, Obesity, and Diabetes. JAMA. 2016 May 24;315(20):2211–20; 1. King AC, Sallis JF, Frank LD, Saelens BE, Cain K, Conway TL, et al. Aging in neighborhoods differing in walkability and income: Associations with physical activity and obesity in older adults. Social Science & Medicine. 2011 Nov;73(10):1525–33.

Higher physical activity levels reduce the risk of chronic disease, all-cause mortality, depression and anxiety, high blood pressure and cholesterol and improve sleep, mood and cognition. Active transport is increasingly recognised as an effective means of reducing the burden of non-communicable diseases.[2]

Total physical activity and physical activity displacement

The question of whether people compensate for an increase in active transport by reducing their activity levels in other domains such as leisure, work, or around the home, has been considered. It is possible that as people are more active for transport, they might be less active in other domains. This could be because travel by active transport takes up time and energy that might otherwise be spent in leisure-time activity, or, because people perceive they have already achieved their daily dose of exercise and choose to skip additional planned activity. If that is the case, then less than 100 per cent of the benefits of extra travel-related physical activity should be attributed to active travel. The health benefits from active transport also vary depending on the age of the population that engage in it.

A systematic literature review found that physical activity from active transport is additional to any existing physical activity, except perhaps in older adults, although the evidence was limited.[3] This aligns with the evidence that most physical activity benefits are seen in the inactive category, where there is no existing physical activity that could be replaced.

Because the systematic literature review could not provide a definitive answer, further modelling was done to estimate a quality-weighted, average physical activity displacement figure of 12.45 per cent. This figure has been included in the reference case scenario, meaning that outcomes produced by the Model consider only 87.55 per cent of the benefits of extra travel-related physical activity that are attributed to active transport.

The physical activity displacement figure was estimated by assigning a displacement score of 0 for studies that found no displacement from the systematic literature review (n=27), 1 for those that found displacement (n=2) and 0.5 for those that reported mixed findings (n=6). The physical activity displacement estimates were weighted by study quality scores. From this, a quality-weighted, average displacement was calculated.

Physical activity displacement is included in the base-case for the Model and must be factored into the modelling of active transport health outcomes.

Model assumptions

There are several assumptions underpinning the Model, including that:

- New active travel (including public transport use) represents a shift away from car travel.
- People at all levels of physical activity and within each age and sex group (from inactive to highly active) benefit equally in terms of the amount of added activity.
- Health Adjusted Life Years are valued in accordance with current NSW Treasury and Commonwealth Office of Impact Assessment recommendations.
- Costs and benefits are discounted at 5 per cent per annum in accordance with the NSW Government Guide to Cost-Benefit Analysis.[4]

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[2] State of New South Wales (Transport for NSW) (2022) 'Active Transport Strategy'. Available at: https://www.future.transport.nsw.gov.au/sites/default/files/2022-12/Active_transport_strategy_0.pdf; Giles-Corti, B. *et al.* (2016) 'City planning and population health: a global challenge', *The Lancet*, 388(10062), pp. 2912–2924. Available at: https://doi.org/10.1016/S0140-6736(16)30066-6; Abate, K.H. *et al.* (2018) 'Global, regional, and national incidence, prevalence, and years lived with disability for 354 diseases and injuries for 195 countries and territories, 1990–2017: a systematic analysis for the Global Burden of Disease Study 2017', *The Lancet (British edition)*, 392(10159), pp. 1789–1858. Available at: https://doi.org/10.1016/S0140-6736(18)32279-7; Wanjau, M.N. *et al.* (2023) 'Physical Activity and Depression and Anxiety Disorders in Australia: A Lifetable Analysis', *AJPM Focus*, 2(2), pp. 100030–100030. Available at: https://doi.org/10.1016/j.focus.2022.100030.

[3] Wanjau, M.N. *et al.* (2023) 'Does active transport displace other physical activity? A systematic review of the evidence', *Journal of transport & health*, 31, p. 101631. Available at: https://doi.org/10.1016/j.jth.2023.101631.

[4] NSW Treasury (2023) 'TPG23-08 NSW Government Guide to Cost-Benefit Analysis'. Available at: https://www.treasury.nsw.gov.au/documents/tpg23-08-nsw-government-guide-cost-benefit-analysis.

Reference case assumptions

The central reference case assumes the following:

- 10,000 people replace five weekly single car trips with active transport over one year
- Trip lengths: walking = 0-2km; off/road cycling = 2-5km; walking to/from public transport = 6-16km
- Discount rate = 5 per cent
- Value of a Statistical Life Year = $235,000[5]
- Transport mode = shift away from private, motorised vehicles
- Target population age = 20-100yrs, all activity levels
- Risk factors = physical activity, air pollution (ambient and for active traffic participants) and road trauma (cyclist road injuries, motor vehicle road injuries, motorcyclist road injuries and pedestrian road injuries).
- Diseases and mortality = depression, anxiety, type 2 diabetes, colon cancer, breast cancer, lung cancer, ischemic heart disease, ischemic stroke, chronic obstructive pulmonary disease, lower respiratory disease, intracerebral and subarachnoid haemorrhage and all-cause mortality.
- Displacement of additional physical activity arises from active transport – a weighted figure of 12.45 per cent physical activity displacement is part of the reference case outcome values.

The reference case estimates the average value of an additional kilometre of walking at $5.24, a kilometre cycling at $2.95 on road and $2.97 off-road, and $4.88 a kilometre for walking associated with public transport use in 2023 Australian dollars (with 12.45 per cent physical activity displacement included).

The dollar per km values are determined largely by the value of health gains in Health Adjusted Life Years and to a lesser extent, health care cost savings. A rise in active travel-related road trauma is offset by the health benefits of physical activity at a population level. The positive effects of improvements in ambient air quality are negligible and offset by almost equally small negative effects of active transport participants inhaling more pollutants.

[5] The Office of Impact Analysis (2023) 'Value of statistical life'. Australian Government Department of the Prime Minister and Cabinet. Available at: https://oia.pmc.gov.au/resources/guidance-assessing-impacts/value-statistical-life.

Using the NSW Active Transport Health Model

The NSW Active Transport Health Model can be used by practitioners involved in the strategic planning and assessment of active transport in NSW, for which they would like to model active transport health outcomes for the adult population. For example:

- Active travel zones and shared zones
- New pathways within a road corridor or separate to a road corridor
- Path upgrades or retrofitting
- Ancillary infrastructure: signage, lighting, seating, shade
- Crossings, roundabout and intersection treatments
- Bike parking and other end-of-trip facilities
- Lower road speed limits and other traffic calming techniques
- Complete street design
- Pop-up bike lanes

Applying the Model with $ per km values

Physical activity displacement is factored into modelling of active transport health outcomes.

The reference outcome values in the table below, can be used to conduct cost-benefit analyses in similar ways that existing Transport for NSW outcome values are currently used. This approach will generate an estimated average $ per kilometre value of additional kilometres walked, cycled, walked to/from public transport. For examples of on road and off-road cycling facilities, refer to the Cycleway Design Toolbox by Transport for NSW.[6] Additional output values on physical activity, air pollution (ambient and participant) and road trauma are provided, as well as figures for Health Adjusted Life Years and health care cost savings, in Appendix A Table A1 and Appendix A Table A2.

Active transport mode	Average $ per km value[1]
Walking	5.24
Walking to/from public transport[2]	4.88
Cycling – on road[3]	2.95
Cycling – off-road[4]	2.97

PA: Physical Activity
[1] The weighted figure of 12.45% physical activity displacement is included.
[2] Assumes a one-way trip with public transport (of any distance) includes about 8 minutes of walking (depending on age and sex). The reference outcome values are lower than for walking alone since more younger people use public transport and are more likely to be more physically active compared to older people.
[3] Cycling – on road: shared with motor vehicle traffic (e.g. quietway, shared zone)
[4] Cycling – off-road: physically separated from motor vehicle traffic (e.g. bicycle path or lane, shared path)

[6] Transport for NSW. Cycleway Design Toolbox – Designing for cycling and micromobility. December 2020. Version 0.1 [Internet]. 2020 [cited 2024 Nov 18]. Available from: https://www.transport.nsw.gov.au/system/files?file=media/documents/2022/Cycleway-Design-Toolbox-Web_0.pdf

Appendix A: Reference outcome values of active transport health benefits

For the NSW Active Transport Health Model reference case, a mode-specific intervention scenario for walking, cycling and public transport was used. For the scenario, it is assumed that 10,000 persons switch 5 trips per week from car to active transport for one year and no effect thereafter, to give an estimate of the expected annual impact. The number of people does not affect the per-km values.

Table A1: Reference case of 10,000 travellers switching 5 trips per week from car to active transport for one year.

Outcome	Walking Number (95% CI)[3]	Cycling (on road) Number (95% CI)[3]	Cycling (off road)[1] Number (95% CI)[3]	Walking associated with public transport[2] Number (95% CI)[3]
$ per km	5.24 (4.73 to 5.70)	2.95 (2.71 to 3.17)	2.97 (2.72 to 3.21)	4.88 (4.30 to 5.40)
Extra kms walked/cycled per year	3,197,657 (3,171,152 to 3,223,747)	11,345,499 (11,281,212 to 11,409,850)	11,345,943 (11,278,848 to 11,409,324)	1,586,883 (1,555,894 to 1,617,767)
HALYs lifetime	70 (63 to 77)	142 (130 to 153)	143 (131 to 154)	32 (28 to 36)
HALYs in years 0-30	68 (62 to 75)	139 (128 to 150)	140 (128 to 151)	31 (27 to 34)
Life years added, lifetime	92 (83 to 100)	189 (173 to 204)	189 (173 to 205)	39 (34 to 44)
Life years added, years 0-30	89 (81 to 97)	185 (170 to 200)	185 (170 to 200)	37 (32 to 42)
Health care cost savings, lifetime	-370,347 (-452,457 to -296,367)	-418,912 (-505,142 to -340,333)	-434,080 (-523,676 to -351,342)	-248,006 (-298,879 to -201,268)
Health care cost savings, years 0-30	-365,171 (-446,388 to -291,956)	-414,323 (-500,226 to -336,466)	-428,723 (-517,214 to -346,639)	-244,763 (-295,247 to -198,384)
Cost of other health care in added years of life, lifetime	149,763 (136,373 to 162,536)	336,516 (307,234 to 362,688)	336,538 (307,509 to 364,661)	61,620 (53,169 to 69,957)
Cost of other health care in added years of life, years 0-30	148,330 (135,036 to 161,003)	334,691 (305,537 to 360,795)	334,714 (305,772 to 362,872)	60,726 (52,431 to 68,959)

Notes: Health discounted 5%. A weighted figure of 12.45% physical activity displacement is included. Costs discounted 5%. The reference case assumes 10,000 travellers switch 5 trips per week from car to active transport for one year. Exposures included are physical activity, air quality ($PM_{2.5}$, ambient and traffic participants) and road trauma. The conversion of VSL to VSLY is discounted at 5% and VSLY is $235,000 (OIA).

[1.] For the off-road cycling scenario, road traffic injury and air pollution for traffic participants are not included, leaving physical activity and ambient air pollution effects.

[2.] Walking to and from public transport transit stops.

[3.] Values are the average with a 95% confidence interval.

Table A2 shows how the $ per km values for walking, cycling (on and off-road) and walking to/from public transport are mainly due to the inclusion of a direct link with mortality. The inclusion of mental health outcomes also contributes considerably. The results vary systematically and substantially with age and activity level, with great benefits for the old and the inactive and much lower gains for the young, and almost none for the segment of the population that already achieves high levels of physical activity.

Table A2: Outcome values for additional scenarios (based on reference case unless otherwise indicated)

Scenario	Walking	Cycling (on road)	Cycling (off road)[1]	Walking associated with public transport[2]
	$ per km (95% CI)[3]	$ per km (95% CI)[3]	$ per km (95% CI)[3]	$ per km (95% CI)[3]
Exposures related to active transport (a single exposure is included in each scenario)				
Physical activity with 12.45% displacement	5.32 (4.87 to 5.79)	2.97 (2.76 to 3.21)	2.97 (2.76 to 3.21)	4.77 (4.23 to 5.26)
Air quality ($PM_{2.5}$) – ambient only	0.010 (0.007 to 0.013)	0.003 (0.002 to 0.004)	0.003 (0.002 to 0.004)	-0.005 (-0.007 to -0.004)
Air quality ($PM_{2.5}$) - traffic participants only	-0.013 (-0.017 to -0.009)	-0.025 (-0.032 to -0.018)	N/A	-0.012 (-0.016 to -0.008)
Road traffic injury only	-0.088 (-0.089 to -0.088)	-0.037 (-0.037 to -0.036)	N/A	0.147 (0.141 to 0.152)
Sex of active commuter				
Male	5.90 (5.39 to 6.42)	3.06 (2.81 to 3.30)	3.08 (2.82 to 3.34)	5.25 (4.54 to 5.91)
Female	4.67 (4.11 to 5.14)	1.98 (1.76 to 2.20)	2.00 (1.77 to 2.23)	4.48 (3.93 to 4.98)
Age of active commuter				
Age 20-29 years	0.63 (0.48 to 0.81)	0.29 (0.22 to 0.36)	0.30 (0.23 to 0.38)	0.94 (0.75 to 1.14)
Age 30-39 years	1.32 (1.09 to 1.55)	0.62 (0.52 to 0.72)	0.66 (0.56 to 0.76)	1.78 (1.49 to 2.09)
Age 40-49 years	2.38 (2.05 to 2.75)	1.08 (0.90 to 1.24)	1.13 (0.98 to 1.29)	3.13 (2.71 to 3.55)
Age 50-59 years	6.19 (5.23 to 7.09)	3.41 (2.96 to 3.89)	3.62 (3.06 to 4.12)	7.44 (6.39 to 8.53)
Age 60-69 years	11.64 (9.94 to 13.09)	6.72 (5.85 to 7.59)	6.88 (6.06 to 7.64)	13.40 (11.78 to 15.02)
Age 70+ years	27.59 (24.52 to 30.19)	9.75 (8.82 to 10.62)	9.90 (8.77 to 10.86)	30.25 (26.82 to 33.53)
Physical activity level of active commuter				
Inactive	8.10 (7.10 to 8.99)	5.00 (4.70 to 5.34)	5.08 (4.76 to 5.41)	7.74 (6.77 to 8.63)
Low active	7.53 (7.00 to 8.07)	3.29 (3.00 to 3.55)	3.35 (3.09 to 3.58)	7.60 (6.58 to 8.35)
Moderately active	1.84 (1.37 to 2.34)	1.21 (0.93 to 1.51)	1.25 (0.98 to 1.52)	1.74 (1.35 to 2.10)
Highly active	0.12 (0.02 to 0.22)	0.15 (0.06 to 0.27)	0.23 (0.11 to 0.36)	0.30 (0.30 to 0.30)
Intervention type (different to the reference case)				
3 trips per week to active transport[4]	5.77 (5.15 to 6.35)	4.12 (3.71 to 4.48)	4.16 (3.72 to 4.47)	5.04 (4.54 to 5.55)
Mode share +10 percentage points[5]	7.01 (6.25 to 7.73)	4.05 (3.63 to 4.45)	4.14 (3.70 to 4.49)	7.10 (6.34 to 7.86)
Intervention effect lasts lifelong	4.27 (3.94 to 4.63)	1.98 (1.84 to 2.08)	2.01 (1.89 to 2.12)	4.22 (3.70 to 4.60)

Scenario	Walking	Cycling (on road)	Cycling (off road)[1]	Walking associated with public transport[2]
	$ per km (95% CI)[3]	$ per km (95% CI)[3]	$ per km (95% CI)[3]	$ per km (95% CI)[3]
Diseases via respective related exposure(s)				
Ischaemic heart disease, via physical activity & $PM_{2.5}$	0.18 (0.13 to 0.24)	0.10 (0.07 to 0.13)	0.11 (0.08 to 0.14)	0.19 (0.13 to 0.25)
Ischaemic stroke, via physical activity & $PM_{2.5}$	0.08 (0.01 to 0.16)	0.04 (0.04 to 0.04)	0.03 (0.00 to 0.06)	0.11 (0.00 to 0.20)
Diabetes, via physical activity & $PM_{2.5}$	0.08 (0.04 to 0.12)	0.03 (0.01 to 0.05)	0.04 (0.02 to 0.05)	0.09 (0.05 to 0.14)
Colorectal cancer, via physical activity	0.14 (0.10 to 0.18)	0.06 (0.04 to 0.07)	0.06 (0.04 to 0.07)	0.19 (0.12 to 0.25)
Breast cancer, via physical activity	0.09 (0.06 to 0.12)	0.01 (0.01 to 0.02)	0.01 (0.01 to 0.02)	0.09 (0.06 to 0.13)
COPD, via $PM_{2.5}$	-0.001 (-0.001 to 0.000)	-0.008 (-0.013 to -0.004)	0.001 (0.000 to 0.002)	-0.01 (-0.01 to 0.00)
Lung cancer, via $PM_{2.5}$	-0.0001 (-0.0002 to -0.0001)	-0.0025 (-0.0037 to -0.0012)	0.0003 (0.0001 to 0.0004)	-0.0013 (-0.0020 to -0.0005)
Depression, via physical activity	0.12 (0.06 to 0.18)	0.05 (0.02 to 0.07)	0.05 (0.02 to 0.07)	0.12 (0.05 to 0.18)
Anxiety, via physical activity	0.16 (0.06 to 0.25)	0.05 (0.02 to 0.09)	0.05 (0.02 to 0.09)	0.15 (0.06 to 0.25)
Subarachnoid haemorrhage, via $PM_{2.5}$	-0.0001 (-0.0002 to 0.0000)	-0.0003 (-0.0006 to -0.0001)	0.0000 (0.0000 to 0.0001)	-0.0003 (-0.0006 to 0.0000)
Intracerebral haemorrhage, via $PM_{2.5}$	-0.0001 (-0.0001 to 0.0000)	-0.0006 (-0.0011 to -0.0001)	0.0001 (0.0000 to 0.0001)	-0.0003 (-0.001 to 0.0000)
Lower respiratory infections, via $PM_{2.5}$	-0.0001 (-0.0002 to 0.0000)	-0.0008 (-0.0014 to -0.0002)	0.0001 (0.0000 to 0.0001)	-0.0003 (-0.0006 to -0.0001)
PA-related all-cause mortality	4.65 (4.25 to 5.00)	2.69 (2.47 to 2.89)	2.69 (2.47 to 2.89)	4.03 (3.54 to 4.46)

Notes: The weighted figure of 12.45% physical activity displacement is included for all outcomes except the single risk factor scenarios. Health discounted 5%. Costs discounted 5%. The reference case assumes 10,000 travellers switch 5 trips per week from car to active transport for one year. Exposures included are physical activity, air quality ($PM_{2.5}$, ambient and traffic participants), road trauma. The conversion of VSL to VSLY is discounted at 5% and VSLY is $235,000 (OIA).

1. For the off-road cycling scenario, road traffic injury and air pollution for traffic participants are not included, leaving physical activity and ambient air pollution effects.
2. Walking to and from public transport transit stops.
3. Values are the average with a 95% confidence interval.
4. In this scenario, 10,000 travellers switch 3 trips per week from car to active transport for one year.
5. In this scenario, the 'mode share' setting of the model is used, rather than 'change in number of trips for a number of persons'.

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