Active Travel England

Active Travel Portfolio Research and Evaluation Programme

Evidence assessment: The Impacts of Interventions to Enable Walking and Wheeling

October 2024

Sheffield Hallam University, NatCen and Mosodi Ltd

ACTIVE TRAVEL PORTFOLIO RESEARCH AND EVALUATION PROGRAMME

Title: Evidence assessment: The impacts of Interventions to Enable Walking and Wheeling

Date: October 2024

Authors: Yesha Bhagat, Caterina Branzanti, Nevena Ilic, George Leeder, Conor O'Shea

Contents

Executive Summary

About this evidence assessment

Sheffield Hallam University, NatCen, and Mosodi Ltd were commissioned by the Department for Transport (DfT) and Active Travel England (ATE) to carry out an evidence assessment on walking and wheeling interventions and their role in active travel. Whilst active travel evidence and policy often refers to cycling and walking, a broader and more inclusive definition refers to any travel that is powered, partially or fully, by the sustained physical exertion of the traveller (Cook et al., 2022). As such the definition also includes wheeling, which refers to the use of wheelchairs and other wheeled mobility aids such as mobility scooters and rollators.

In England, the government has an ambition to make walking, wheeling and cycling the natural choice for shorter journeys or as part of a longer journey. The second cycling and walking investment strategy[1] (CWIS2) aims, by 2025, to increase the percentage of short journeys in towns and cities that are walked or cycled to 46%; increase walking activity to an average of one walking stage per person per day; double cycling activity to 1.6 billion journey stages; and increase the percentage of children aged five to ten who usually walk to school to 55%. Over the longer term, the ambition is that half of all short journeys in towns and cities will be walked or cycled by 2030, and that England will have a 'world-class' cycling and walking network by 2040.

The need for evidence on walking and wheeling interventions

CWIS2 reaffirms the government's commitment to making walking and wheeling (and cycling) the natural first choice for many journeys in the UK. Providing accessible conditions for walking and wheeling (in this context 'wheeling' refers to the use of wheelchairs and other wheeled mobility aids such as mobility scooters and rollators) requires improvements to the public realm, including redesigning towns, cities and neighbourhoods to enable more active short journeys. Where it is not possible to remove the barriers to active travel by improving the built environment, safe and appealing conditions for walking and wheeling must be provided in other ways, e.g. through group-based activities like walking buses. Communication-based strategies can increase individuals' motivation and confidence to travel as pedestrians, encouraging them to incorporate active travel into their daily routines.

This evidence assessment was commissioned to examine the approaches taken to encouraging active travel in previous interventions, and the extent to which they were successful. The findings can be used to inform the design and implementation of future intervention and policies aimed at encouraging and incentivising walking and wheeling. Cycling is not covered by this assessment but is the focus of a separate report within this suite of evidence assessments, The Impacts of Interventions to Enable Adult Cycling (Gregory et al., 2024).

1 ATE & Department for Transport (2023). The second cycling and walking investment strategy (CWIS2), 10 March 2023.

Structure of this report

The findings of this evidence assessment have been organised into three chapters: built environment interventions; influencing behaviour interventions; and factors affecting intervention success. The first chapter discusses the design features and effectiveness of interventions that aimed to facilitate active travel through the provision of infrastructure and/or equipment in the public realm. The second chapter discusses the design features and effectiveness of interventions that aimed to facilitate active travel through interpersonal approaches (i.e. any relationship-based or communication-based approaches to influencing people's active travel behaviour). The third chapter discusses the factors that affected the effectiveness of both intervention types in encouraging active travel, as well as the barriers and enablers to effectiveness.

Methodology

The report presents findings from 25 studies that were selected following a process of systematic searching, screening, prioritising, and evidence extraction. The evidence reviewed predominantly comprises review studies or evaluation papers that either assessed a specific intervention in depth or synthesised evidence on a range of interventions. Supplementing this are a small number of relevant reports from government and other non-academic sources.

It is important to note that the evidence assessment had a tightly defined scope. Therefore, more extensive and systematic research into the evidence base would be required to produce exhaustive findings.

Key findings

This evidence assessment seeks to synthesise available evidence to address the following four research questions:

- **RQ1.** To what extent do the active travel interventions (Infrastructure and equipment, Influencing and incentivisation, Road safety training, Social and behavioural interventions) achieve their intended outcome of encouraging walking and wheeling?
- **RQ2.** What have been the enablers, barriers and contextual factors associated with achieving impact?
- **RQ3.** How have different groups of walkers and wheelers been targeted?
- **RQ4.** What approaches have been taken to measuring and understanding impact, including modal shifts to walking and wheeling?

This section summarises the key findings of this evidence assessment. Key findings were also synthetised in the Key Findings Tables shown at the end of this section.

The evidence search identified no interventions that aimed to facilitate an uptake in active travel by means of wheeling specifically. As such, the findings of this evidence assessment almost entirely concerned interventions to facilitate an uptake in active travel by means of walking.

Built environment interventions

This evidence assessment identified three approaches to facilitating increases in active travel through changes to the built environment:

- **The creation of new walking routes.** This either involved the installation of new pathways or closing off roads to traffic. Both approaches were shown to be effective for increasing walking. One exception where the evidence was less conclusive was the installation of new pathways next to guided busways, but the evidence was not clear on why.
- **The upgrading of existing walking routes.** Upgrades to existing walking routes included improvements to increase their greenness, safety, accessibility or navigability. Such upgrades were consistently shown to be effective for increasing walking.
- **The dissemination of guidance and resources.** This included handbooks, toolkits or frameworks containing guidance on how to assess the inclusivity of built environment and how to make improvements where necessary. The search did not identify any evidence to suggest whether or not such strategies were effective.

Influencing behaviour interventions

This evidence assessment identified three approaches to facilitating increases in active travel using influencing behaviour strategies:

- **Information sharing.** This included the dissemination of information about active travel via different media, including information about its benefits and how it can be incorporated into daily routines. More specifically, this took five different formats: general promotion (information without a specific strategy or designated format); workplace travel planning (information about how to incorporate walking into the commute and business trips); personal travel planning (information about how to incorporate walking into personal routines, tailored to individuals or groups); media campaigns; and social media. All information sharing strategies were shown to be effective for increasing walking, albeit to varying degrees.
- **Incentivisation.** This involved encouraging people to engage in walking by stimulating competition within their social groups. Two forms of incentivisation were used to encourage participation in walking: reward-based incentivisation (the offer of prizes) and challenge-based incentivisation (the setting of individual or group level goals and challenges). No conclusions could be drawn on either form of incentivisation, as the available evidence on both was limited.
- **Social strategies.** Two social strategies were used to encourage walking: social walking (group-based walking activities within a social group) and motivational strategies (individually tailored guidance and coaching on incorporating walking into daily routines). Social walking was effective for increasing walking in the interventions where it featured, but motivational strategies were not. One evaluation study suggested that the use of individually tailored motivational strategies is not effective unless part of a whole systems approach that also focuses on interactions between the intervention itself and wider factors that contribute towards travel behaviour.

Factors affecting intervention success

At a high level, the factors affecting intervention success can be summarised as relating to:

The extent to which interventions maximised the appeal of the built environment

Interventions should seek to maximise the appeal of the built environment for pedestrians. Perceptions of the built environment and whether it offered appealing conditions for active travel were driven by both: a) key characteristics of the built environment such as its safety (real and perceived); 'greenness'; accessibility and inclusivity and b) more variable factors such as the time of year and distance which individuals had to travel. Furthermore, there is some evidence that multi-pronged interventions that target improvements to the wider public are more effective in increasing the appeal of active travel than singular/standalone improvements to specific active travel routes.

In addition to built environment changes, softer interventions may be required. For example, improvements to pavement infrastructure may be coupled with walking buses to increase perceptions of safety). Ongoing promotion is also important for creating and maintaining positive perceptions of the public realm. Such promotion may be more effective where strategies are tailored to the preferences of specific groups, or to individuals, rather than being one-size-fits-all.

The effectiveness of collaborative working

Designing and delivering interventions requires effective collaboration between all programme stakeholders. Programmes may benefit from having one designated stakeholder/organisation to lead programme coordination. It's crucial that programme coordinators undertake early engagement with local communities and engage with local authorities to understand any capacity limitations that might limit their involvement in delivery.

Lastly, monitoring and evaluation processes need to be fit for purpose and capable of establishing and measuring the contribution of the intervention to behaviour change. It was found that resources and timeframes available were often insufficient and/ or inappropriate, which made it difficult to draw conclusions on the effectiveness of interventions. These requirements need to be carefully considered at the early stages of design, to ensure that research aims can be appropriately addressed.

Limitations and suggestions for further research

The evidence identified was drawn from a variety of sources, including other evidence reviews, quantitative or mixed-methods studies (including cross-sectional and longitudinal studies). Publication types included academic literature and grey literature (including a number of evaluation reports).

The evidence assessment was productive in identifying, comparing, and contrasting different types of interventions based on their design features. However, scope for producing generalisable conclusions about these types of interventions was limited. This was due to the small volume of evidence identified on each intervention type. Furthermore, the approaches taken to measuring intervention success were highly inconsistent and where this evidence was available, it was often not discussed in detail.

Furthermore, several gaps emerged, where the search returned limited to no evidence, meaning it was not possible to answer the research questions fully. Key gaps included wheeling interventions; equipment-based interventions and road safety training interventions; and approaches to targeting different groups.

To grow and strengthen the evidence base, future research should seek to:

- Account for a wider range of intervention types and a more exhaustive volume of evidence about the effectiveness of each – ideally through the use of systematic reviews.
- Examine the gaps identified by this evidence assessment with focused research on each. Research is warranted to establish whether these are persistent gaps in the literature and/or intervention base. For wheeling interventions specifically, it may be that the evidence gap reflects a paucity of interventions that aim to facilitate active travel by means of wheeling, but further investigating is required to confirm this. Further discussion of future areas of research are included in section 6.

Key Findings Tables

This section provides summary tables on the key findings from the evidence assessment.

Table 1: Built Environment interventions by feature (NB: all interventions shared the same aim – to facilitate an uptake in walking)

Interventions identified from the sources	Creation of new walking routes: Closing streets to vehicles and creating pedestrian only zones	Creation of new walking routes: Creating new pathways and routes for walking/ active travel	Upgrades to existing walking routes: Making routes safer	Upgrades to existing walking routes: Making routes more pleasant	Active travel infrastructure guidance and resources: Handbooks, tools and frameworks
10 km walkway and dual carriageway in Kenilworth (NatCen, 2020)		✓			
Beelines (Burns et al., 2022)			✓	✓	
Cambridgeshire Guided Busway (NatCen, 2020; Heinen, et al., 2017; Heinen, et al., 2015)		✓			
Fitter for Walking project (Adams et al., 2012)			✓	✓	
Healthy Streets (Burns et al., 2022)					✓
Mini Hollands in London (Aldred et al., 2024; Aldred at el., 2019)	✓	✓			
Pedestrian Oriented Districts in NYC (Burns et al., 2022)	✓				
People's bridge in Cardiff (NatCen, 2020)		✓			
Raised walkway in Southampton (NatCen, 2020)		✓			
Transport for London's Planning for Walking toolkit (Burns et al., 2022)					✓
Transport for London's Temporary Traffic Management Handbook (Burns et al., 2022)					✓
Local Sustainable Transport Fund initiatives (DfT, 2017)			✓	✓	

Table 2: Influencing behaviour interventions by feature

Interventions identified from the sources	Information sharing (General promotion, travel plans, media campaigns, social)	Incentivisation (rewards/ challenges)	Social Strategies (social walking/ personalised motivations)
Active Lions (Bopp, et al., 2018)	✓	✓	
Beat the streets (Cavill et al., 2019)		✓	
DfT Smarter Choices and Sustainable Travel Towns programmes (CIHT, 2015)	✓		
Living Streets' Fitter for Walking project (Adams et al., 2012)			✓
MCPs (Keall et al., 2015)	✓		
Men on the Move (Mackey et al., 2019)		✓	✓
Paths for All Step Count Challenge (Paths for All, 2019)		✓	
Smarter Choices, Smarter Places (Paths for All, 2019)	✓		
The Liverpool Hospital Travel Plan (Petrunoff et al., 2016)	✓		
Travel Smart (Cavill et al., 2019)	✓		✓
Walk in to work out (Cavill et al., 2019)	✓		
Walk to work (Audrey et al., 2019)	✓		✓
Walking buses (Burns et al., 2022)			✓
Local Sustainable Transport Fund initiatives (DfT, 2017)	✓		

Table 3: Intervention effectiveness: built environment

Key evidence	Source/method/sample/country
Intervention effect on walking levels: walking increased	
This evidence review found increases in walking. For example, it was found that in Manchester, at sites where routes had been improved for walking or cycling, 70% of people said the upgraded route had increased their level of physical activity (although rates of walking was not specified) (surveys of 1,750). Additionally, in Merseyside, a survey of over 700 people using traffic-free routes found that almost half of the respondents said the route had encouraged them to walk or cycle more.	Cavill et al. (2019) Evidence review with 84 studies. Global.
This study found that exposure to the intervention (i.e. Proximity to a guided busway which has a walking and cycling path adjacent to the bus lane) was significantly associated with the likelihood of making large changes in commute mode choice. It found that commuters living 4 km from the busway were almost twice as likely to report a substantial increase in their active travel mode than those living 9 km away.	Heinen et al. (2015) Quasi-experimental analysis using travel diaries and GIS with a sample of 470 adults. Cambridge (UK).
The Mini Holland project in London, which involved creating new walking paths found that during the first three years of the intervention those close to it increased the number of minutes walked. There was also an increase in participants recording 140+ minutes a week of active travel in general. Those living further away also increased their level of active travel, but this was not a statistically significant increase.	Aldred et al. (2024) Longitudinal survey with a sample of 1,519 participants. UK.

Key evidence	Source/method/sample/country
Intervention effect on walking levels: walking increased	
NatCen (2020) found that different infrastructural changes to the built environment improved active travel. The review considered interventions at three sites: Cardiff – where a traffic-free People's Bridge was built among other smaller developments; Kenilworth – where a 10 km dedicated cycle and walking path was built; and Southampton – where a raised walkway on top of a wall was put in place to provide better connection between the north and the south of the town. In Cardiff 52% of respondents to a residents' survey reported using the infrastructure compared with 37% in Kenilworth and 22% percent in Southampton. The Southampton and Kenilworth sites reported an 8% and 5% increase in active travel time, respectively.	NatCen (2020) REA with 30 articles. UK, Europe, North America, Australia, NZ.
This study found that following a street renovation (new light rail line, improved sidewalks, bike lane, street lighting, and landscaping) in California, there was a 37% increase in the number of pedestrians using it.	Jensen et al. (2017) Counting of adult men and women/no sample size provided. USA.
This paper focused on Finland found that after infrastructural improvements were made to the main walking and cycling paths near to workplaces, the number of pedestrians and cyclists on the improved main path increased. There was an overall increase of 36% points in cyclists and 11% points in pedestrians.	Aittasalo et al. (2019) Randomised controlled trial in 16 workplaces. Phase 1 n=1,823, Phase 2 n= 826. Finland.
Route user data in the Fitter for Walking project indicated there were increases in the number of people walking on the routes following environmental improvements (e.g., new dropped kerbs, improved street lighting, resurfacing of paths, removal of encroaching vegetation, litter pick-up or bulb planting) and promotional activities (e.g., led walks, themed walks (for example a bat walk or nature walk), and development of walking maps and street parties). However, this increase was only evident after more than 12 months in most case studies, suggesting it may take some time for environmental and social changes to have an impact on walking levels. In examining route usage, at baseline, 129 pedestrians used the route over the two-day survey period. Route use by pedestrians increased by 14% at follow-up 1 and 59% at follow-up 2 compared to baseline.	Adams et al. (2012) Mixed methods approach including interviews, focus groups and longitudinal surveys. 150 communities sampled. UK.
The paper reports on studies which found that higher GVI (a measure of greenness e.g., tree canopy or global vegetation index) was positively associated with an increase in walking and in people's satisfaction with active travel. It also presents studies which found a positive association between the presence of large parks or street trees along the road and increased walking. It should be noted, however, that this was dependent on road type (small/ low traffic having a higher association).	Lemieux et al. (2023) (paywall) Comprehensive exploratory review consisting of 70 scientific articles. North America, East Asia, Europe.

Key evidence	Source/method/sample/country
Intervention effect on walking levels: walking increased	
This paper presented a retrofitting case study in Lisbon involving widening pavements, creating new crosswalks, installing benches, lighting, greenery and planting trees. Significant increases (figures were not reported in the source) in pedestrian volumes were observed on the streets that received the intervention, particularly on streets where larger-scale built-environment changes occurred. There was no change on the comparison street.	Xiao et al. (2022) Systematic review and meta-analysis of 102 reports. Global.
Evaluation of two Local Sustainable Transport Fund (LSTF) initiatives in Redhill and Telford to determine the impact of sustainable transport measures on town centres, and whether LSTF type initiatives help town centres develop economically. Survey evidence revealed net increases in use of bus, train, and especially walking, amongst users of these modes. The results for both locations suggest that the biggest change was in the frequency of walking trips. However, the study also found that car use increased across both locations. Consequently, the study found no evidence of significant modal shift, or that a higher proportion were using sustainable travel modes.	Department for Transport (2017) Two case study sites – Telford and Redhill, UK.The key evidence sources in each location comprised: Town centre user questionnaires (before and after); 1434 responses were achieved in the main Telford Shopping Centre (734 before, 704 after) and 1384 responses in Redhill (659 before, 725 after). Residents panel questionnaires (before and after); The number of retained responses achieved was 241 in Telford and 335 in Redhill. Focus groups (before and after); Two groups undertaken in each location in both the before and after phases. Retailer interviews (after only); Twenty interviews were undertaken in each location. Stakeholder interviews (before, interim, after) with the LSTF Delivery Team, Local Authority Economic Development Officers, Shopping Centre Managers, local interest representatives, and key developers / trip attractors.

Key evidence	Source/method/sample/country
Intervention effect on walking levels: no change in walking levels	
The study found that the implementation of a bus lane with a parallel path for walking did not result in universally more walking behaviour.	Heinen et al. (2017) Longitudinal survey with sample of 347 adult commuters. Cambridge (UK).

Table 4: Intervention effectiveness: influencing behaviour

Key evidence	Source/method/sample/country
Intervention effect on walking levels: walking increased	
At the end of the Living Streets' Fitter for Walking project (community led walks and themed nature walks), increases in the number of pedestrians using the project routes were observed in six of the seven community projects evaluated, and 25% of route users perceived they had used the route more often in the last 12-18 months. Route users reported undertaking more active travel via walking. They also started walking for a wider variety of journey purposes. Community members and residents reported walking more, discovering new places to walk and new walking routes.	Adams et al. (2012) Mixed methods approach including interviews, focus groups and longitudinal surveys. 150 communities sampled. UK.
This paper reported on local authority interventions aimed at increasing active travel via walking. It found that in an intervention in North Lanarkshire, the number of participants reporting that they were regularly physically active (unspecified) rose by 15 percentage points (66% to 81%), and that a media campaign led to surveyed respondents reporting they were 30% more likely to walk because of the campaign.	Paths for All (2019) Evaluation of Smarter Choices, Smarter Places 2018/19, a multi-intervention programme. Analysis of monitoring data and case studies (31 schemes). UK.
The authors of this evidence review mention one "walk in to work out" study which involved an intervention led by a workplace. The intervention was found to increase walking to work by 64 minutes per person, on average.	Cavill et al. (2019) An evidence review of academic and grey literature papers (n=68) investigating the effectiveness of interventions to promote walking and cycling. Global.
Students had a higher percentage of active trips post-intervention (64.2%) compared with pre-intervention (49.2%) Greater awareness of Active Lions was also associated with greater levels of active travel.	Bopp et al. (2018) Longitudinal and cross-sectional surveys in 2014 (n= 852) and 2015 (n= 610). USA.
The review found that registered users of a travel-planning app had much greater increases in public transport, walking and cycling time than those not receiving reward. The source did not specify figures.	NatCen (2020) REA of 30 papers. UK, Europe, North America, Australia, NZ.
Evaluation of the DfT's Smarter Choices and Sustainable Travel Towns intervention found that active travel by walking increased from 10% to 13% in the towns of Worcester, Darlington, and Peterborough.	CIHT (2015) Grey literature report. Great Britain.
Burns et al. (2022) found that walking buses not only increased walking to school but also improved pupil attendance. They cite a Walking School Bus study in Springfield, Massachusetts which showed that students participating in the program had a slightly better attendance rate (approximately two percent) than their peers.	Burns et al. (2022) Grey literature report. International.
The proportion of staff travelling actively to work increased by 4%-6% across intervention years compared to the baseline. Compared to baseline, after adjusting for distances staff lived from work staff had 33% (95% CI 1%-74%) greater odds of travelling to work via active modes in 2012, and 50% (95% CI 15%- 96%) greater odds in 2013.	Petrunoff et al. (2016) Cross sectional survey (n=687-904). Australia.

Key evidence	Source/method/sample/country
Intervention effect on walking levels: no change in walking levels	
A 'Walk-to-work' intervention (which used peer promoters) did not result in a significant level of mode shift or increases in active travel via walking.	Audrey et al. (2019) Randomised control trial. England and Wales.
The 'Men on the move' programme, which implemented a personalised coaching and group based motivational meetings did not find sustained increases in walking (reported as active travel). They did however find some general physical activity benefits. At 12 weeks, the intervention group achieved more steps, moderate–vigorous physical activity and energy expenditure than the control group. The intervention group was also more likely to take public transport and meet national guideline levels of physical activity.	Mackey et al. (2019) Randomised control trial. Canada.
The Active Lions campaign found that, though there was a significant increase in active travel for students answering the post-survey compared to pre-survey (reported in WW increased section), there was a negligible level of change for employees (7.9% pre-survey and 8.91% post-survey).	Bopp et al. (2018) Longitudinal and cross-sectional surveys in 2014 (n= 852) and 2015 (n= 610). USA.

1. Introduction

1.1 Active travel policy context

Active travel can be defined as travel that is powered – either partially or fully – by the sustained physical exertion of the traveller. Whilst active travel evidence and policy often refers to cycling and walking, a broader and more inclusive definition refers to any travel that is powered, partially or fully, by the sustained physical exertion of the traveller (Cook et al., 2022). As such the definition also includes wheeling (the use of wheelchairs and other wheeled mobility aids such as mobility scooters and rollators). In recent years, active travel has received increasing recognition for its potential to help facilitate a range of environmental, public health and economic policy outcomes (Hirst, 2020).

In England, the government has an ambition to make walking, wheeling and cycling the natural choice for shorter journeys or as part of a longer journey. The government's original Cycling and Walking Investment Strategy (CWIS) published in 2017 set out specific, measurable aims and provided the financial resource to help achieve them.

The second cycling and walking investment strategy[2] (CWIS2), published in 2022 and updated in March 2023, aims, by 2025, to increase the percentage of short journeys in towns and cities that are walked or cycled to 46%; increase walking activity to an average of one walking stage per person per day; double cycling activity to 1.6 billion journey stages; and increase the percentage of children aged 5 to 10 who usually walk to school to 55%. The latter is set out as a specific target. Over the longer term, the strategy is that half of all short journeys in towns and cities will be walked or cycled by 2030, and that England will have a 'world-class' cycling and walking network by 2040. CWIS2 also introduced a more inclusive definition of active travel to include wheeling.

To support the implementation of projects that deliver its active travel aims, the Government has made an investment projected to be £3.6 billion from 2021 to 2025, and established ATE. ATE's role is to administer the funding whilst working with local authorities to ensure the delivery of high-quality active travel infrastructure for walking, wheeling and cycling, provide tools to deliver ambitious active travel programmes, and support children and other people to cycle.

1.2 Background to the evidence assessment

In 2022, the Department for Transport (DfT) commissioned Sheffield Hallam University in partnership with the National Centre for Social Research (NatCen) and Mosodi Ltd to undertake a portfolio evaluation of active travel. Overall management of this evaluation programme was transferred to ATE in September 2023. The overall aims of the evaluation are to understand how active travel interventions are being delivered; what impact they are having on uptake of active travel; whether they represent value for money; and how they are contributing to the government's walking and cycling objectives.

To support the development of evaluation activities, ATE commissioned a suite of evidence assessments across a range of research and policy priority areas to help assemble evidence of 'key facts' and identify research gaps. The complete list of these evidence assessments is:

2 ATE and Department for Transport (2023) The second cycling and walking investment strategy (CWIS2), 10 March 2023.

1. Enabling adult cycling.
2. Walking and wheeling.
3. Early consideration of active travel via planning and design.
4. Economy.
5. Health and wellbeing.
6. Journey times, congestion, and resilience.
7. Active school travel.

1.3 Walking and wheeling

This report presents the results of the walking and wheeling evidence assessment. It set out to identify previous interventions that aimed to facilitate an uptake in active travel by means of walking and/or wheeling and to assess how effective these interventions were in achieving this aim. Throughout this report the terms walking and wheeling are used exclusively of one another, for example, when the term walking is used it is in relation to walking explicitly, not as a collective term for walking and wheeling. Cycling is not covered by this assessment but is the focus of a separate theme (enabling adult cycling) within this suite of evidence assessments.

Originally, the evidence assessment was intended to also provide an assessment of previous interventions that aimed to facilitate an uptake in the use of micromobility for active travel, as well as interventions with intended outcomes relating to accessibility and inclusion. However, to ensure that the evidence assessment could yield the most value, the scope was narrowed to focus more specifically on walking and wheeling. When the evidence search was conducted, the scope included any intervention that aimed to facilitate an uptake in active travel via walking or wheeling through the use of infrastructure and equipment; influencing and incentivisation; road safety training; or social and behavioural approaches). For each intervention, evidence was gathered on: intervention effectiveness; factors contributing to intervention effectiveness; approaches to targeting different groups; and approaches to measuring and understanding intervention effectiveness.

1.4 Research questions

This evidence assessment seeks to synthesise available evidence to address the following four research questions.

RQ1. To what extent do the active travel interventions (Infrastructure and equipment, Influencing and incentivisation, Road safety training, Social and behavioural interventions) achieve their intended outcome of encouraging walking and wheeling?

RQ2. What have been the enablers, barriers and contextual factors associated with achieving impact?

RQ3. How have different groups of walkers and wheelers been targeted?

RQ4. What approaches have been taken to measuring and understanding impact, including modal shifts to walking and wheeling?

At the reporting stage, new terminology was applied to describe and differentiate key intervention types more clearly. Hereon:

- The term 'built environment intervention' is used to describe any intervention that aimed to facilitate active travel through the provision of infrastructure and/or equipment in the public realm.
- The term 'influencing behaviour intervention' is used to describe any intervention that aimed to facilitate active travel by using interpersonal approaches (i.e. through any use of relationships and/or communication to influence people's behaviour).

1.5 The structure of this report

The report is structured as follows:

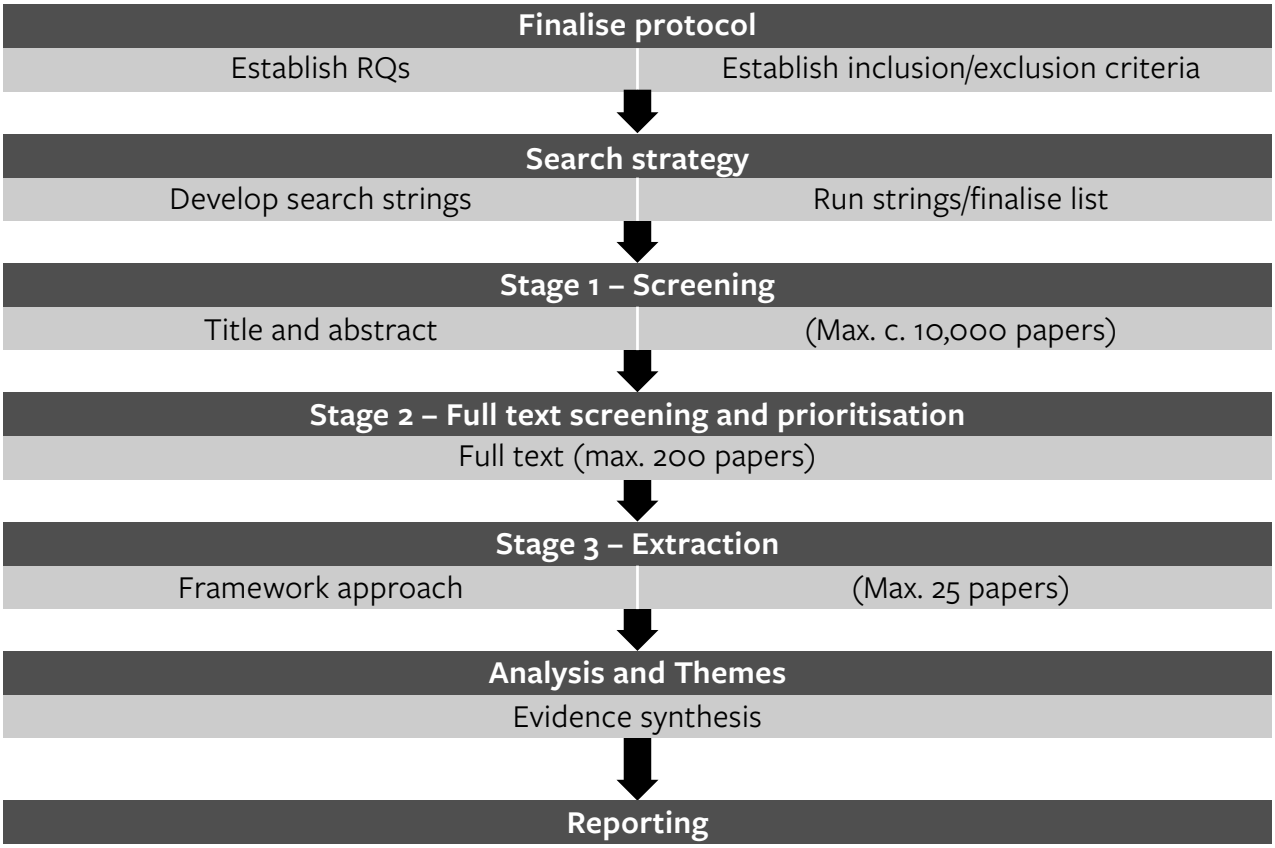
- **Executive summary.** The executive summary provides a high-level summary of the report, as well as a summary of key findings.
- **Introduction.** The first chapter provides background to this evidence assessment.
- **Methodology.** The second chapter provides a summary of the methodology used for identifying and synthesising relevant evidence.
- **Built environment interventions.** The third chapter describes the key features of interventions that aimed to encourage active travel through changes to the built environment and explores their effectiveness in doing so.
- **Influencing behaviour interventions.** The fourth chapter describes the key features of interventions that aimed to encourage active travel through interpersonal strategies and explores their effectiveness in doing so.
- **Factors affecting intervention success.** The fifth chapter examines the factors which affected the effectiveness of built environment and influencing behaviour interventions in encouraging active travel, as well as the barriers and enablers to intervention success.
- **Conclusion and next steps.** The final chapter provides a summary conclusion of the evidence against the research questions and sets out implications and recommendations in terms of addressing gaps in the evidence base.

2. Methodology

This section outlines the overall methodology and approach to the evidence assessment. It provides further detail about the development of the assessment protocol, each of the specific stages in the identification, screening and extraction of evidence, as well as identifying the limitations of the research design.

The overall design was organised into three key stages and a set of supporting activities, as summarised in Figure 1.

Figure 1: Evidence assessment stages



2.1 Evidence assessment protocol

A protocol was developed which outlined the process and method to be followed. This helped to ensure consistency across the suite of assessments and to support the identification of relevant, high-quality papers within each assessment within a finite resource.

We determined initial thematic priorities for the evidence assessment with ATE. A stakeholder engagement process was held with key staff within ATE, DfT and other organisations to discuss and agree the thematic scope, agree a set of sub-themes to structure the identification and assessment of evidence, research questions and the concepts and terms that would be used to specify the inclusion criteria. Suggestions were also made by stakeholders for specific non-academic studies and reports for consideration in the evidence assessment. Initial scoping was supported by running a series of test searches using generic search strings on bibliographic databases to provide an initial indication of the likely size of the evidence base. This was used to help further refine the thematic scope of the assessment and its sub-themes and provide initial information on the broad composition of the evidence base (e.g. likely availability of UK-based evidence, types of methods and studies, availability of systematic or meta review studies).

2.2 Search strategy

Academic literature was identified as being potentially relevant to the assessment theme and sub-themes using two database searches: an academic search using the Scopus database and a manual grey literature search across a range of relevant sites (full details of this, including the specific search strings used, can be found in Annex A). In addition to this, evidence identified by experts from ATE and DfT at the stakeholder engagement stage was incorporated into the screening.

2.2.1 Inclusion and exclusion criteria

The inclusion criteria were developed to narrow the search to the papers most relevant to the overall theme. These criteria were applied to both search pathways but not to the third pathway, which was the suggested evidence from ATE and DfT staff.

- **Language:** Only English language papers.
- **Country:** UK, Europe, North America, New Zealand and Australia (those deemed most relevant to the English context).
- **Year:** Papers published from 2013 onwards (to ensure the most recent evidence was prioritised).
- **Publication status:** Published peer-reviewed academic literature in addition to published grey literature (to prioritise peer-reviewed evidence).
- **Type of studies:** Systematic/evidence reviews, meta-analysis, theoretical paper, or studies using primary data collection or secondary data analysis.

2.2.2 Academic database search and search strings

Joint search strings were developed for the walking and wheeling evidence assessment and the health and wellbeing evidence assessment. This was because both evidence assessments were conducted by NatCen, and due to the thematic overlaps between the two evidence assessments.

These strings were then used to search the Scopus bibliographic database, which is a large and comprehensive database of peer reviewed academic publications. Annex A provides an outline of the search strategies deployed and breaks down the number of results returned for each search string and in each database. The total number of studies identified as being potentially relevant to the two evidence assessments included in the joint search was 2,240.

2.2.3 Grey literature search

To supplement the academic database search, a search of 'grey' literature was conducted across a range of relevant websites using the Google search engine. This applied a standardised set of search strings for all six evidence assessments to identify further sources. The results were then manually screened by each theme to identify relevant evidence for inclusion in the full text screening stage. Theme leads coordinated to avoid including the same piece of evidence in multiple themes. For this theme, 21 additional papers and reports were identified for inclusion in the full text screening. A full list of the websites searched for grey literature is included in Annex A.

2.2.4 Suggested evidence

A final pathway through which evidence was identified was suggested evidence provided by experts at ATE and DfT. The stakeholder engagement stage included inviting suggestions of evidence that might be included in the assessment. Twenty-seven additional sources were identified for inclusion in the full text screening on the basis that they were potentially relevant to at least one of the evidence assessments in the joint search.

2.3 Screening and extraction

2.3.1 Title and abstract screening

After removing duplicate sources (identified more than once across the different search strings), 1,677 titles were initially screened for relevance to the evidence assessments included in the joint search. This process involved assessment of titles and the publication title against the inclusion criteria. Several rounds of refinement were required to exclude irrelevant articles or publications. All papers were considered against a prioritisation tool and checklist to ensure the final list of papers would address the research questions specifically. The criteria used at this stage were:

- Relevance to the themes and sub-themes of the evidence assessment.
- Geographic focus (aiming to identify UK based studies where possible).
- Paper type[3] (e.g. systematic review paper, primary research paper, literature review, discussion paper).
- Study/data type (aiming to prioritise inclusion of studies which used real-world data as opposed to modelled or synthetic data).
- Coverage across sub-themes (aiming for a pragmatic distribution of studies across the agreed sub-themes).
- Whether the study was specifically recommended at the stakeholder engagement stage for inclusion; and
- Age of the study (aiming to include most recent studies where possible).

Following this screening process, 295 studies were accepted for full text review.

2.3.2 Full text screening and prioritisation

Of the 295 sources that underwent full text review, 253 were identified from the academic search, 15 from the grey literature search and 27 were recommended by ATE or the DfT. Following changes to the evidence assessment process, it was no longer possible to carry out full text screening on all 295 sources. Instead, a priority selection was made, which primarily included sources identified as being review papers at title and abstract screening and/or sources recommended by ATE or the DfT.

A Weight of Evidence (WoE) approach was used to score evidence according to the quality of its research design and presentation of findings. This was assessed using the questions and scoring scheme set out in Table 5 to arrive at a final WoE score out of 14 for each candidate source.

3 Systematic review papers were prioritised (where available) as these papers synthesise the available evidence on a topic or the effectiveness of an intervention by drawing on multiple primary research papers. This means that evidence from systematic reviews is more comprehensive and reliable than from individual studies.

Table 5: Weight of Evidence scoring scheme

Question	Score
Is there a clear statement of the aims/objectives or clear research questions?	1-4
Is the sampling strategy (or data selection strategy if not collecting primary data) clearly described and appropriate for the research questions/aims?	1-4
Is the method of data collection and analysis clearly described, and appropriate to answer the aims/research questions?	1-3
Are there any concerns regarding accuracy (e.g. discrepancies within the report)? (high score means no concerns)	1-3
Total Weight of Evidence (WoE) score	**4-7 (low)** **8-11 (medium)** **12-14 (high)**

2.3.3 Data extraction

Using the WoE scoring to prioritise the most robust studies, 25 papers were identified to extract data and evidence from. The full list of papers is shown in Annex B along with their WoE scores. An extraction framework was developed to organise the evidence extracted. The framework was structured thematically, to ensure a spread of papers across the sub-themes. Once extraction was complete, the evidence was summarised and synthesised for inclusion in this report.

2.4 Limitations of the research design

This was a focused evidence assessment. It drew on a limited number of sources in line with the available resource, to answer the research questions, using a systematic screening and prioritisation process. To draw more exhaustive conclusions a systematic review would be required.

3. Built environment interventions

3.1 Introduction

This chapter summarises evidence on interventions that aimed to facilitate an uptake in active travel (via walking) by making changes to the built environment. Three types of interventions were identified in the literature: a) creation of new walking routes (section 3.2); b) upgrades to existing walking routes (section 3.3); and c) dissemination of guidance and resources (section 3.4). An overview of key features is presented for each of the interventions. Evidence on the effectiveness of the first two interventions is also included, but not about the dissemination of guidance and resources. This is because the available evidence on this approach did not include an assessment of whether the approach had been effective.

Overall, the available evidence indicated that infrastructural interventions were effective in facilitating an uptake in walking. However, the results of interventions that took the form of busways with adjacent walking paths were relatively more inconclusive than other infrastructural interventions. It should also be noted that that the generalisability of findings for many of these studies is limited by their small sample sizes, use of convenience sampling and high rates of survey attrition.

The intervention design features discussed in this chapter are summarised in Table 1, evidence on their effectiveness is summarised in Table 3, and a full overview of the interventions they featured in is provided in Annex C.

3.2 Creation of new walking routes

Two broad approaches were used to achieve the creation of new walking routes. The first involved the installation of new pathways, specifically to facilitate active travel. This approach was used for the Cambridgeshire Guided Busway (Heinen et al., 2015; Heinen et al., 2017; NatCen, 2020). The second involved closing off roads to traffic. This approach was used for Pedestrian Oriented Districts (Burns et al., 2022); Mini-Hollands (Aldred et al., 2019; Aldred et al., 2024); People's Bridge (NatCen, 2020); 10 km Dedicated Cycle and Walking Path (NatCen, 2020); and Raised Walkway (NatCen, 2020). Overall, the evidence indicated that the creation of new walking routes was an effective way of encouraging walking, although there is variation in the extent of change seen.

Regarding the installation of new pathways, in their longitudinal study, Aldred et al. (2024) found that living close to an area with a mini-Holland intervention was consistently associated with increased walking and participants reported doing over 140 additional minutes a week of active travel. Similar conclusions were drawn from a rapid evidence assessment conducted by NatCen (2020), examining the impact of implementing dedicated walking and cycling routes at three sites in Cardiff, Kenilworth, and Southampton.[4] The research found an increase in active travel, which was attributed to the new routes integrating well with other pathways used for key journeys, such as to respondents' workplaces.

4 Cardiff – a traffic-free People's Bridge among other smaller developments; Kenilworth – a 10 km dedicated cycle and walking path; and Southampton – a raised walkway on top of a wall providing better connection between the north and the south of the town.

However, mixed results were found on new guided busways with adjacent walking paths. Quasi-experimental studies by Heinen et al. (2015; 2017) highlighted an inconsistency in whether the busways were effective in increasing walking. Heinen et al. (2015) found that new busway promoted an increase in active travel and a decrease in car trips. They further explained that individual commuters living 4 km from the busway were almost twice as likely to report a substantial increase in their active travel mode as those living 9km away. However, Heinen et al's 2017 study, presented more variation in the travel patterns and found no significant association between the new busway and a shift in active travel. They attributed the lack of change in travel patterns to factors including individuals' daily routines changing with varying work locations which do not allow for a consistent mode of travel. They also found that individuals may have 'habitual behaviour' that is unlikely to change, even when exposed to an intervention.

Regarding closing off roads to traffic, evaluation of the implementation of traffic free areas also found increases in walking. Adams et al's (2012) mixed method study concluded that the implementation of traffic free areas in the 'Fitter for Walking' project generated an increase in the number of pedestrians in the study areas. For example, two out of seven case studies observed increases in route use from the baseline at the 12-month stage, and all five case studies that collected follow up data between 14-20 months observed increases from the baseline. Similarly, Cavill et al's (2019) evidence review highlighted that traffic-free routes in Merseyside encouraged active travel via both walking and cycling.

3.3 Upgrades to existing walking routes

Approaches to upgrading existing walking routes included green improvements and efforts to improve the safety, accessibility or navigability of routes (e.g. by planting trees, improving lighting and removing obstacles along the route). These approaches were used for Fitter for Walking (Adams et al., 2012) and Beelines (Burns et al., 2022).

The available evidence consistently showed that approaches involving the use of greenery and the installation or upgrading of walking infrastructure consistently were successful in facilitating an uptake in walking. This was illustrated in the following studies:

- Lemieux et al. (2023) concluded that a higher Green View Index (GVI)[5] was associated with higher walking and satisfaction with active travel and found a positive association between the presence of large parks or street trees along the road and increases in walking.
- Xiao et al. (2022) observed significant increases in pedestrian volumes on the streets retrofitted with various changes (including the widening of pavements; installation of new crosswalks, benches, lighting, and greenery) and no changes for comparison streets.
- Similarly, Jensen et al's (2017) comparison study found that more people were observed walking on routes that received renovations (including the installation of light rail lines, bike lanes, street lighting, landscaping and the improvement of sidewalks)
- Adams et al's (2012) evaluation of the 'Fitter for Walking' project observed a general increase in walking, whereby route users felt that they had used the route more often in the 12-18 months since the improvements had occurred.

5 A measure of greenery along the street

- Evaluation of two Local Sustainable Transport Fund initiatives reported a net increase in walking, although this was accompanied with smaller increases in bus, train and car travel (DfT, 2017).
- Finally, Aittasalo, et al's (2019) RCT found that improvements[6] to the main walking and cycling paths near Finnish workplaces increased the number of pedestrians.

3.4 Dissemination of guidance and resources

Where guidance and resources were disseminated on how to improve the built environment, this was with a focus on improving its inclusivity. This took the form of handbooks, toolkits or frameworks containing guidance on how to assess the built environment and how to make improvements where necessary. Examples were discussed by Burns et al. (2022), including the Transport for London Temporary Traffic Management Handbook, Transport for London Planning for Walking Toolkit and the Healthy Streets indicator framework. A further example is the City of London Street Accessibility Tool (CoLSAT), which enables designers and planners to quickly and easily identify how street features impact on the different needs of disabled people. By recognising that accessibility requirements of disabled people can sometimes be conflicting, the tool supports decision-makers to consider differing needs across groups and identify optimal trade-offs to ensure no one is excluded from using our streets.

6 Source does not detail these improvements.

4. Influencing behaviour interventions

4.1 Introduction

This chapter summarises evidence on interventions that aimed to facilitate an uptake in active travel (via walking) by 'influencing behaviour' (i.e. through interpersonal strategies). Three types of influencing behaviour interventions were identified in the literature: a) information sharing (4.2) b) incentivisation (4.3) and social strategies (4.4).

Overall, the evidence indicated that the influencing behaviour interventions identified had mixed effectiveness. Of the three overall types, information sharing was most consistently proven to be effective, as all the studies that discussed it found that walking levels increased (albeit to varying degrees). Incentivisation resulted in some increases to walking behaviour. However, these were not sustained over time and the findings were inconclusive because of low sample sizes. Lastly, while social strategies resulted in some increases in walking behaviour, this was only observed for one of the two types of strategies identified.

The intervention design features discussed in this chapter are summarised in Table 1, evidence on their effectiveness is summarised in Table 4, and a full overview of the interventions in which they featured in is provided in Annex C.

4.2 Information sharing

Information sharing interventions aimed to influence walking behaviour via different forms of media, by disseminating information about active travel, its benefits and how it can be incorporated into daily routines. Five approaches were taken to information sharing: general promotion; workplace travel planning; personal travel planning; media campaigns; and social media. The evidence indicates that information sharing contributed to increases in active travel by walking in all the interventions where it featured, though the size of this increase varied considerably by intervention.

4.2.1 General promotion

General promotion strategies involved the dissemination of information about walking without a specific format or strategy. This approach was used in the DfT Smarter Choices and Sustainable Travel Towns (CIHT, 2015); Walk in to Work Out (Cavill et al., 2019); the Model Communities Programme (MCP) (Keall et al., 2015). For example, the Walk In to Work Out programme provided participants with a booklet of educational and practical information, such as recommended routes, tips for personal safety, details of facilities such as bike storage (Cavill et al., 2019).

Three studies examined the effectiveness of interventions that involved general promotion for increasing active travel by walking. Firstly, in their grey literature report, CIHT (2015) examined the DfT Smarter Choices and Sustainable Travel Towns programme. They found that general promotion of walking in the three sustainable towns resulted in an increase in walking of 10-13%. Similarly, an evidence review by Cavill et al. (2019)(2019) found that general promotion via the sharing of educational and practical information increased walking to work by an average of 64 minutes per person per week. Finally, a mixed-method study by Paths for All (2019) examined 'Get Walking North Lanarkshire' and found that general promotion of the health benefits of walking led to an increase in physical activity levels from 66% to 81% after six months.

4.2.2 Workplace travel planning

Workplace travel planning strategies involved the dissemination of information about how to incorporate walking into commuting and business trips. This approach was used in the Liverpool (Australia) Hospital Travel Plan (a three-year travel plan on increasing active travel to work). Petrunoff et al. (2016) found this was effective in increasing levels of active travel by walking, albeit by a small amount. This was evidenced by a two-percentage point increase in the proportion of staff who walked to work across intervention years, from 4% to 6%. A wide range of strategies were deployed as part of the travel plan, which included improvements to bike storage and facilities, reduced public transport passes, led rides and walks, and a reduction in car parking spaces.

4.2.3 Personal travel planning

Personal travel planning strategies involved the dissemination of information about how to incorporate walking into personal routines, with this information being tailored to the individual.

Three studies examined the effectiveness of personal travel planning in increasing active travel by walking. Firstly, CIHT's (2015) grey literature report found that providing personal travel planning to households resulted in a two-percentage point increase in the proportion of households walking to work, from 3% to 5%. Similarly, in their evidence review, Cavill et al. (2019) found evidence that a personal travel planning intervention resulted in a 6% increase in rates of walking. Finally, in their systematic review, Ogilvie et al. (2004) examined the effectiveness of various interventions that involved information sharing to motivated subgroups of the population and/or by tailoring this information and advice to individual's personal requirements. Motivation in this respect was based on the fact they were voluntarily participating in a behaviour change programme. They found that such approaches were effective for promoting modal shifts towards walking in all the interventions they examined.

4.2.4 Media campaigns

Media campaign strategies involved the dissemination of information about walking via websites, TV, posters or leaflets. This approach was used in Smarter Choices, Smarter Places (Paths for All, 2019); Active Lions (Bopp et al., 2018).

One mixed-method study (Paths for All, 2019) examined the use of media campaigns to deliver information about active travel and thereby encourage an uptake in walking. This was the 'Smart Choices, Smart Places' intervention, in which information sharing took place via the television channel STV, STV online and cinemas. The campaign reached an estimated audience of 490,000 and follow-up surveys indicated that 30% of viewers would be more likely to walk as a result.

4.2.5 Social media

Social media strategies involved the dissemination of information specifically via social networking sites such as Facebook and Twitter. This approach was used in the Model Communities Programme (Keall et al., 2015) and Active Lions (Bopp et al., 2018).

Of the interventions identified which used social media to promote active travel by walking, evidence on the effectiveness of these approaches was only explored in relation the Active Lions campaign. In their pilot evaluation study, Bopp et al. (2018) found that the Active Lions campaign saw a higher percentage of active trips post-intervention (64.2%) than pre-intervention (49.2%) for students. However, no differences were found for employees.

4.3 Incentivisation

Incentivisation interventions involved encouraging people to incorporate walking into their daily routines by stimulating healthy competition within their social groups. Two approaches were taken to incentivisation: a) reward-based incentivisation and b) challenge-based incentivisation. Although there was some evidence to indicate that incentivisation was effective in facilitating mode shift towards walking, this evidence was considerably limited, meaning that no conclusions could be drawn.

Reward-based incentivisation involved awarding prizes as a way of encouraging participation in walking. This approach was used in Fitter for Walking (Adams et al., 2012) and Active Lions (Bopp et al., 2018). In their evidence review, NatCen (2020) identified examples where such approaches were more effective if the rewards were tailored towards individual preferences. However, the authors also noted that the changes in walking behaviour were not sustained after the reward-based incentive was removed.

Challenge-based incentivisation involved setting personal or group level goals and challenges as a way of encouraging participation in walking. This approach was used in Paths for All Step Count Challenge (Niven and Khalife, 2016); Beat the Streets (Cavill et al., 2019). In their evidence review, Cavill et al. (2019) identified that four-fifths of Beat the Streets participants reported themselves as walking (or cycling) more after participating in the intervention[7]. Additionally, Niven and Khalife, (2016) identified that levels of walking increased for three out of the four individuals who participated in the Paths for All Step Count Challenge. For one participant, this change was sustained throughout the observation period, while for the other two it was only sustained until the next winter period. Given this study only had four participants, due caution should be taken when interpreting these findings.

4.4 Social strategies

Social strategies involved encouraging people to incorporate walking into their daily routines by facilitating walking-based activities within their social groups or coaching them to increase and maintain walking. Two approaches were taken to social strategies: social walking and motivational strategies.

Overall, the effectiveness of social strategies for facilitating walking depended on the specific approach. Social walking-based strategies were consistently shown to be effective, whereas motivational strategies did not result in any change in walking behaviour.

4.4.1 Social walking

Social walking strategies involved use of group-based walking activities to facilitate an uptake in walking behaviour that individuals would associate with supportive relationships and a sense of community cohesion. The group-based walking activities took place both for active travel and leisure, and in the form of school buses, community walks and nature walks. This approach was used in Fitter for Walking (Adams et al., 2012); Walking Buses (Burns et al., 2022).

7 As this finding was part of a review, the authors did not present any further information regarding the number of participants, and therefore, the definition of 'four-fifths' is unclear.

Adams et al. (2012) examined the use of social walking strategies in Fitter for Walking and found that the number of pedestrians using the routes featured in the intervention increased. Of those surveyed, 25% reported themselves to have used the route more often in the 12 to 18 months following the intervention. Furthermore, they reported themselves to be undertaking more walking as a mode of active travel overall, and for a greater range of purposes than pre-intervention.

4.4.2 Motivational strategies

Motivational strategies involved encouraging individuals to engage in walking behaviour by providing them with tailored guidance and support about how to incorporate and maintain waking within their daily routes. This approach was used in Walk to Work (Audrey et al., 2019); Men on the Move (Mackey et al., 2019); and Travel Smart (CIHT, 2015; Cavill et al., 2019).

In their randomised control trial, Audrey et al. (2019) examined the effectiveness of personal coaching strategies in the Walk to Work intervention. This took the form of designated 'walking promotors' in the workplace. The trial did not result in mode shift, and the authors concluded that targeting individual level behaviour change was not sufficient in the context of the Walk to Work intervention, as change required a whole systems approach that also focuses on interactions between the intervention itself and wider factors that contribute towards travel behaviour.

Similarly, in their randomised control trial, Mackey et al. (2019) examined the effectiveness of personal coaching and group based motivational meetings in the Men on the Move intervention. Although participation led to some physical health benefits[8], the trial did not result in sustained mode shift.

8 At 12 weeks, the intervention group achieved more steps, moderate–vigorous physical activity and energy expenditure than the control group. The intervention group was also more likely to take transit and meet national guideline levels of physical activity (Mackey et al., 2019).

5. Factors affecting intervention success

In this section, we explore the factors that affected the success of different interventions. Firstly, we discuss general barriers and enablers to success that cut across more than one type of intervention. Secondly, we discuss factors that were specific to built environment interventions or influencing behaviour interventions.

5.1 General barriers and enablers to intervention success

5.1.1 Safety concerns

Safety concerns (in relation to road traffic, crime and/or anti-social behaviour) were identified as a key barrier to the success of previous interventions that aimed to achieve increases in the use of active travel modes (Adams et al., 2012; NatCen, 2020; Xiao et al., 2022). Evidence from Adams et al. (2012) indicated this to be a particular issue in neighbourhoods with high volumes or perceptions of crime and anti-social behaviour. Regarding road traffic safety, Adams et al. (2012) identified pavement parking as a key barrier to the effectiveness of interventions that aimed to facilitate an uptake in wheeling, as the parked cars could force buggy and mobility scooter users into the road.

However, Xiao et al. (2022) and NatCen (2020) also identified examples of previous interventions that had sought to address these barriers, to some success. One example cited by (NatCen, 2020) was to mitigate safety concerns about active school travel by facilitating walking school buses.

5.1.2 Environmental factors

Winter weather conditions were identified as a key barrier to the success of key Paths for All (2019) interventions. In terms of delivery, it meant that planned outdoor activities to promote active travel could not take place as planned. In terms of participation, it meant that people were less engaged. Attempts to mitigate these challenges included delivering shorter, more flexible interventions – for example, by offering participants vouchers that could be redeemed in the future (when weather conditions were more appealing for active travel).

Presence of greenery could also contribute to the appeal of active travel. In their evidence review, Lemieux et al. (2023) found evidence that rates of walking were higher on streets with more trees and “eye level greenness”. Satisfaction with walking was also higher for those travelling on such streets. For example, one study of schoolchildren in Turkey found that children were more likely to walk to school on streets where trees cast a higher level of shade onto the roads. In another example, one study found that mobility aid users found streets with trees on them to be appealing – despite potential obstacles such as bulging tree roots or fallen branches – as they provided a source of comfort, safety and wellbeing.

Greater travel distances and lower proximity to active travel infrastructure were also found to deter active travel. For example, Heinen et al. (2015) found that residents living close to a busway (a dedicated road for buses, with a parallel pedestrian/cycle path) were more likely to change to an active mode of travel. By contrast, evidence reviewed in an assessment of school travel studies (NatCen (2023) identified evidence that secondary school children are less easily encouraged to engage in active travel than primary school children, because of larger catchment areas and thus greater distances of travel to school. Finally, Paths for All (2019) found that where the availability of buses was poorer and/or the price of bus travel higher, this could negatively impact the effectiveness of initiatives aimed at supporting mixed mode travel which included walking.

5.1.3 Partnership working

Delivery lessons emerged in the literature around the importance of successful stakeholder engagement and partnership working between for example council departments and local groups to support active travel. This was seen in the evaluation of Paths for All (2019) where the success factors for programmes involving the community included: allowing for sufficient planning and lead-in time, particularly where events involving multiple organisations were planned; the importance of holding regular meetings and of promoting a shared understanding of milestones and inputs (Paths for All, 2019).

NatCen (2020) found evidence that successful interventions for walking to school were those which were able to effectively mobilise communities (for example, through working with them to identify priority routes), and which implemented holistic, multi-pronged approaches which integrated the work of local councils, the school, families, and the wider community in encouraging walking to school.

5.1.4 Capacity to support interventions

Drawing on Adams et al's (2012) study, local authority involvement was found to be an important factor in the delivery of the Fitter for Walking project. This included the ability of the local authority to act on recommendations and provide funding and resource. It was found that local authority partners sometimes found it difficult to fund and support the project owing to time pressures from their existing work, budget cuts, existing development plans for neighbourhoods. This was reported to have led to some long implementation delays (Adams et al., 2012).

5.2 Infrastructure and equipment intervention enablers and barriers

5.2.1 Working at scale

There is evidence that interventions which aimed to take a whole systems approach, or which implemented changes at different levels were more effective than those which were more narrowly focused.

For example, Cavill et al. (2019) found that city or town wide interventions focused on creating networks of active travel routes were more successful than interventions focused on one specific subgroup or one commuting route. The authors highlighted that creating a network of available routes provided a foundation for introducing other interventions aimed at promoting active travel.

Further examples included Winters et al. (2017) who presented evidence that successful active travel interventions include those which worked at different levels of a system. An example given was a policy limiting car use or promoting public travel, in addition to making infrastructure and facility improvements alongside focusing on education. Additionally, Burns et al. (2022) found that a multi-pronged approach combining multiple small changes (e.g. changes to crossing points, reducing traffic in neighbourhoods and better wayfinding) had more potential for transformative change, than a singular improvement to a specific active travel route.

5.2.2 Community involvement

NatCen's evidence review (2020) found that early involvement with local communities, including those considered deprived, was a success factor when seeking to make infrastructural changes. Early involvement allowed intervention staff to capture and apply insights into the proposed changes and design plans. It also helped to improve awareness and subsequent use of new or improved pathways.

5.2.3 Project management and leadership

A leadership role in the project governance structure was found to be an important driver for the success of interventions in the community. Adams et al. (2012) described how in the Fitter for Walking projects the effectiveness of the project co-ordinator was critical for success. Project co-ordinators were required to lead and co-ordinate. They played a key role in engaging community groups, facilitating relationships between the community and local authority partners, and ensuring the focus of the project on walking. For the project to be successful, the co-ordinators needed to have or develop knowledge of the local area and understand existing relationships between the local authorities and communities.

5.3 Influencing behaviour

5.3.1 Accounting for individual preferences

Tsimpiria et al. (2019), drawing a data modelling approach found that the most effective interventions in terms of bringing about multi-modal shifts towards active travel were those which considered users' preferences and those which tailored rewards for active travel to different population segments (DfT, 2020).

5.3.2 Motivational approaches

Participants in the Step Count Challenge intervention received a 'well-done' email if they beat their steps record. Participants reported that this was an effective incentive that motivated them to increase active travel. A further reported enabler was the increased awareness and knowledge of the health benefits of active travel that the intervention provided (Niven and Khalife, 2016).

5.3.3 Peer influence

Research conducted by DfT (2020) found that motivational factors supported active travel. The research highlighted that encouraging people to monitor their transport behaviour against social norms, as well as highlighting stories of successful switches appeared most effective in sustaining active and public transport choices. Similarly, research conducted by NatCen (2020) found that increases in cycling and walking were prompted by interventions that encouraged people to self-monitor their travel behaviour against others.

5.3.4 Sustaining behaviour change

There was some evidence that interventions may struggle to achieve sustained behaviour. For example, NatCen (2020) found that financial incentives, other rewards, or even penalties delivered through transport planning apps, can impact active travel behaviour. However, there is evidence that these may not often lead to sustained behaviour change once the incentive is removed.

NatCen (2020) also found that an intervention working across multiple local authorities to create better maintained and more attractive walkways with community input experienced challenges in achieving sustained rates of walking including one year on from the intervention. One of the reported factors for this was the fact that maintenance of the paths was not sufficiently maintained.

5.3.5 Promotional activities

Adams et al. (2012) reported that promotional activities had an important role in: supporting community engagement; helping the community to identify the barriers to walking in their area; maintaining momentum during the project; engaging additional community groups and members; and in promoting new routes and the environmental changes which had been made. These activities would maximise the chances of sustained behaviour change. The street audit was an example of a promotional activity used as a tool to engage the community; help to focus the project on a specific route or area; help to identify the barriers to walking and potential solutions on the identified route; and provide feedback to Local Authorities on the improvements that were needed (Adams et al., 2012).

5.4 Targeting different groups of walkers

There is evidence of variation in how receptive different demographic groups were in terms of increasing their rates of active travel including walking. It was recommended that further consideration be given to how different groups can be effectively targeted within interventions.

For example, (DfT, 2020) reported that women and people from ethnic minority backgrounds were less likely to switch to modes of active travel, while Song et al. (2017) reported that men were significantly more likely to switch towards walking and cycling than women. However, Mackey et al. (2019) highlighted evidence that older men were particularly difficult to engage when it came to making changes to their lifestyle and behaviours. Variations were also found in terms of the extent to which different groups sustained new travel mode patterns. For example, after increasing their rates of active travel, non-homeowners were less likely to sustain this shift compared with those who owned their own homes.

Few of the identified infrastructure interventions examined how different groups are targeted or need further consideration.[9] However, DfT (2020) reported that interventions are more effective where they are age appropriate. For example, they suggested that younger people were more engaged with smartphone apps, and this indicated that interventions that featured apps would be more effective for younger people. DfT (2020) also found that older age groups were however more responsive to monetary or awards-based incentives when it came to supporting active travel.

9 Transport for London's (TfL) Planning for Walking toolkit contains good practice guidance for planners and designers. Guidance is provided to improve the pedestrian environment for all protected characteristic groups covered by the Equality Act of 2010. Options were provided to improve visual and tactile legibility, design consistency, clear and comfortable spaces, suitably placed street furniture, and the provision of regular resting points (Burns, et al., 2022). Additionally, the City of London Street Accessibility Tool enables designers and planners to quickly and easily identify how street features impact on the different needs of disabled people.

5.5 Understanding and measuring impact

Annex B presents an overview of the approaches taken to understanding and measuring the impact of the interventions identified in this evidence assessment. A wide range of methods were used to monitor and measure the impact of the interventions. However, there were also a range of limitations identified with these methods.

5.5.1 Samples and population

Three challenges were identified with sampling the populations targeted by interventions, which made it difficult to draw robust and comprehensive about the entire target population, or to extrapolate study results to a wider population:

- **Difficulty drawing a representative sample.** As explained by Lemieux et al. (2023), it is often challenging or not possible to extrapolate the results of an intervention to a wider population or to different urban contexts. This is because the scope of survey data collection is often limited by the small scale of the intervention itself, which makes for small study areas and small samples.
- **Difficulty reaching all the target population.** Even at a small scale, survey data collection is time-consuming and can be limited by the available resource (Lemieux et al., 2023). Bopp et al. (2018) found that the large target population of Active Lions (44,000 students and 26,000 employees at a university) was a barrier to both implementation and evaluation. This was further exacerbated by the diffuse nature of the intervention, which had many points of outreach. This made it difficult to document how many students and employees were exposed to Active Lions marketing, social media, or events. Although Active Lions achieved a degree of success, outreach to students and employees was not as broad as was initially planned).
- **Low response rates.** Low response rates and/or high survey attrition can limit the interpretation of results (Adams et al., 2012; Heinen et al., 2015). For example, in Heinen et al.'s follow-up survey (2015), only 43% of respondents had also taken part in the pre-survey. However, it was also noted that use of alternative approaches that do not rely on specific response levels – such as convenience sampling – introduce selection biases that also limit the interpretation of results (Adams et al., 2012; Aldred et al., 2019). Adams et al. (2012) identified shorter surveys and providing route users with a copy of the survey to complete at home, as potential mitigations against low response rates.

5.5.2 Tool design and data collection timeframes

Two data collection challenges were identified that could limit the interpretation of results:

- **Short intervention/observation timeframes.** A key requirement for drawing robust conclusions about intervention effectiveness is to ensure the intervention and data collection timeframes are long enough for behaviour change to occur and fully develop, which often requires longitudinal research design (Adams et al., 2012; Brown et al., 2016; Winters et al., 2017). Both Adams et al. (2012) and Brown et al. (2016) reported that the length of intervention and/or data collection timeframes may have been insufficient. In addition to longer overall timeframes, other mitigations suggested in the literature included more frequent counts/surveys or continuous automated monitoring to monitor route usage (Adams et al., 2012).

- **Imprecise measurement tools.** An additional limitation can be inappropriate measurement tools. Brown et al. (2016), for example, commented that use of accelerometers and GPS data may have led to the misidentification of observation of physically activity as active travel, potentially leading to inaccurate conclusions about mode shift.

5.5.3 Understanding attribution

Ability to draw robust conclusions about the effectiveness of active travel interventions can often be limited by the challenges of accurately attributing any changes in behaviour observed. This challenge can play out in different ways. Firstly, where a programme uses multiple different types of intervention approach – for example, infrastructural changes and interpersonal strategies – it can be difficult to separately account for the effects of each (Keall et al., 2015). Secondly, ascertaining whether and to what extent the intervention itself contributed to an individual's change in behaviour can be difficult, because individuals will decide what to do based on a combination of factors, possibly include those directly related to the intervention, but also factors such as their personal needs, preferences, attitudes, physical and social environment (Adams et al., 2012; Winters et al., 2017). To mitigate issues such as these and more conclusively assess the effect of interventions, Petrunoff et al. (2016) highlighted the importance of using a control group.

6. Key determinants of and barriers to participation in active travel

Previous chapters have explored the key determinants of and barriers to participation in active travel resulting from built environment interventions and behaviour-based interventions. The presence or absence of the following, plus factors linked to quality and accessibility, have the potential to either encourage or deter participation:

6.1 Key determinants

- **Walking routes,** both the creation of new routes and upgrades to existing walking infrastructure.
- **Provision of guidance** such as handbooks and toolkits.
- **Workplace and personal travel planning,** providing information about how to incorporate walking into the commute and business trips and personal routines, tailored to individuals or groups).
- **Partnership working** in design and implementation of interventions (i.e., allowing for sufficient planning and lead-in time; holding regular meetings and of promoting a shared understanding of milestones and inputs).
- **System-wide interventions** which aim to take a whole systems approach, or which implement changes at different levels.
- **Community involvement,** including identification of barriers, and input to guide planning, design and development of infrastructure and programmes
- **Leadership** in project governance structures.
- **Consideration of users' preferences,** tailoring rewards for active travel to different population segments.
- **Motivational correspondence** (e.g., 'well done' emails for active travel).
- **Peer influence** and **social strategies,** such as group walking.
- **Financial incentives and rewards,** such as incentivisation through apps.
- **Promotional campaigns** e.g., via social media.

6.2 Key barriers

- **Safety concerns,** especially in relation to road traffic, crime and/or anti-social behaviour.
- **Weather conditions,** especially inclement and/or winter weather.
- **Greater travel distances** and lower proximity to active travel infrastructure.
- **Insufficient local authority capacity** to support interventions.

The evidence review provides some insight into determinants in relation to different demographic groups including age, gender, ethnicity, people on low incomes and disability. Some studies found that people with protected characteristics experienced different barriers to participation, such as safety needs being more prevalent amongst children and young people, people with disabilities and older people. One study included a recommendation that programmes and interventions need to be 'age-appropriate' to consider different needs and preferences associated with various stages of the life course.

The evidence highlighted that older men were particularly difficult to engage when it came to making changes to their lifestyle and behaviours. However, a DfT study reported that older people were more responsive to incentivisation such as monetary rewards. Younger people tend to engage more with smartphone apps, making app-based interventions particularly effective for this demographic. This study also reported that women and people from ethnic minority backgrounds were less likely to switch to modes of active travel.

Examples of good practice for widening participation included the production of good practice guides and toolkits, such as TfL's Planning for Walking toolkit and the City of London Street Accessibility Tool. Guidance is provided to improve the pedestrian environment for all protected characteristic groups covered by the Equality Act of 2010, including improving visual and tactile features, maintaining design consistency, creating clear and comfortable spaces, strategically placing street furniture, and providing regular resting points. The accessibility requirements of disabled people vary significantly and can sometimes be conflicting, therefore these tools support decision-makers to consider differing needs across groups and identify optimal trade-offs to ensure no one is excluded from using our streets.

7. Limitations

The evidence assessment was productive in identifying, comparing, and contrasting different types of interventions based on their design features. However, scope for producing generalisable conclusions about these types of interventions was limited. This was due to the small volume of evidence identified on each intervention type. This meant it was not possible for this evidence assessment to answer the research questions fully. Key gaps included:

- **Wheeling interventions.** Evidence about interventions which target wheeling as a distinct active travel activity appears to be a gap within the evidence base. As a result, the findings of this reported were almost entirely limited to walking.
- **Equipment-based interventions and road safety training interventions.** The search also returned insufficient evidence on these two intervention types for them to be discussed in the report.
- **Approaches to targeting different groups.** Intervention types and design features were identified and differentiated to a relatively high level of granularity. However, the evidence search identified a limited volume of evidence on approaches to targeting different groups, which made for a less in-depth discussion in the report.

Furthermore, the approaches taken to measuring intervention success were highly inconsistent and where this evidence was available, it was often not discussed in detail.

8. Conclusions

This report provides valuable insights into the topic of walking and wheeling through various interventions and infrastructure improvements, along with highlighting gaps and limitations in terms of the evidence base.

This report has attempted to answer the following research questions:

- **RQ1.** To what extent do the active travel interventions (Infrastructure and equipment, Influencing and incentivisation, Road safety training, Social and behavioural interventions) achieve their intended outcome of encouraging walking and wheeling?

This evidence assessment sought to synthesise the available evidence on previous interventions aimed to facilitate increases in active travel via walking and wheeling. More specifically, it sought to identify how effective such interventions were in achieving their intended outcomes; the enablers, barriers and contextual factors associated to doing so; the approaches used to target different groups of walkers and wheelers; and the approaches to measuring and understanding intervention impact.

Two broad types of active travel intervention were identified in the evidence search – built environment interventions and influencing behaviour interventions. The evidence assessment was productive in identifying, comparing, and contrasting different types of interventions based on their design features. The Weight of Evidence score for each piece of evidence in the review is given in Annex B. However, insufficient evidence was collected to draw any generalisable conclusions about how effective each type of intervention was. Furthermore, the intervention types and approaches to understanding their effectiveness were substantially disparate, making it difficult to directly compare their effectiveness. Despite this, some cross-cutting themes emerged surrounding the factors affecting intervention success.

1. Encouraging individuals to engage in higher volumes of active travel requires improvements to, and maintenance of, the built environment to maximise the appeal of active travel as an alternative to motorised transport. This may require improvements to the safety, 'greenness', and accessibility/inclusivity of the built environment. Rather than targeting singular improvements to specific active travel routes, multi-pronged interventions that also target improvements to the wider public realm may be more effective. Where improvements cannot be achieved through infrastructure then softer interventions may be required (e.g. walking buses to increase safety). Ongoing promotion is also important for creating and maintaining positive perceptions of the public realm. Such promotion may be more effective where strategies are tailored to the preferences of specific groups, or to individuals, rather than being one-size-fits-all.

2. Designing and delivering interventions requires effective collaborative working between all programme stakeholders. Programmes may benefit from having one designated stakeholder/organisation to lead programme coordination. Early engagement with local communities is crucial, and intervention coordinators should be alert to the capacity limitations of local authorities involved in delivery.

3. Difficulty drawing robust conclusions about intervention effectiveness is widespread. The necessary requirements for first affecting behaviour change, robustly measuring it and establishing the contribution of the intervention are often not supported by the available resources and timeframes. These requirements need to be carefully considered at the early stages of design, to ensure that research aims can be sufficiently addressed.

Determinants/barriers of participation

- **RQ2.** What have been the enablers, barriers and contextual factors associated with achieving impact?

Key determinants for achieving impactful outcomes in active travel initiatives include the creation of new walking routes and the upgrade of existing walking infrastructure, which are fundamental to encouraging participation. The provision of practical guidance, such as handbooks and toolkits, along with information on workplace and personal travel planning, further supports individuals in making informed decisions about active travel.

Successful interventions often involve partnership working in the design and implementation stages, ensuring adequate planning, lead-in time, and regular meetings to promote a shared understanding of milestones and necessary inputs. Approaches that take a whole-systems perspective, implementing changes across different levels, are particularly effective. Community involvement and strong leadership within project governance structures also play crucial roles in driving success.

Consideration of users′ preferences is important, with rewards for active travel tailored to different population segments. Motivational correspondence, such as sending ′well done′ emails, along with peer influence and social strategies like group walking, can further enhance engagement. Financial incentives and promotional campaigns, especially those conducted via social media, are also useful tools in encouraging participation.

Nevertheless, several key barriers can hinder participation in active travel. Safety concerns, particularly related to road traffic, crime, and anti-social behaviour, are significant deterrents. Adverse winter weather conditions also pose challenges, making active travel less appealing and practical during colder months.

Additionally, greater travel distances and limited proximity to active travel infrastructure can discourage individuals from choosing active modes of transport. Furthermore, insufficient capacity within local authorities to support and implement interventions effectively can impede the success of active travel initiatives.

The barriers and facilitators highlighted above do not affect all demographic groups equally, as explored through RQ3.

- **RQ3.** How have different groups of walkers and wheelers been targeted?

Transport for London's Planning for Walking toolkit offers valuable guidance for planners and designers. It provides best practices for enhancing the pedestrian environment, ensuring it meets the needs of all groups protected under the Equality Act of 2010. This includes improving visual and tactile features, maintaining design consistency, creating clear and comfortable spaces, strategically placing street furniture, and providing regular resting points. Additionally, the City of London Street Accessibility Tool helps designers and planners quickly assess how street features impact the needs of disabled individuals.

The Department for Transport (DfT) has noted that interventions are more effective when they are age-appropriate. For instance, younger people tend to engage more with smartphone apps, making app-based interventions particularly effective for this demographic. On the other hand, older age groups respond better to monetary incentives or awards when encouraging active travel. However, the evidence search identified a limited volume of evidence on approaches to targeting different groups, which made for a less in-depth discussion in the report.

- **RQ4.** What approaches have been taken to measuring and understanding impact, including modal shifts to walking and wheeling?

The sources listed in Annex B provide an overview of the various approaches used to understand and measure the impact of the interventions identified in this evidence assessment. A wide range of methods were employed to monitor and evaluate the effectiveness of these interventions. However, several limitations were also noted with these methods.

One of the primary challenges was sampling the populations targeted by the interventions. Difficulties in drawing a representative sample, reaching the target population, and achieving satisfactory response rates made it challenging to gather robust and comprehensive data. Additionally, short intervention and observation timeframes, along with the use of imprecise measurement tools, further limited the ability to accurately assess the impact of the interventions or generalise the findings to a broader population.

8.1 Future research

Across this topic, further research (ideally systematic reviews) could account for a wider range of intervention types and a more exhaustive volume of evidence on each. This would build on the findings of this evidence assessment by enabling more generalisable conclusions about the effectiveness of each intervention type.

In addition to the key intervention types discussed, deep dive research is also warranted on the key gaps identified in Section 7 to establish whether these are persistent gaps in the literature and/or intervention base. For wheeling interventions in particular, it may be that the gap identified by this evidence assessment reflects a paucity of interventions that aim to facilitate active travel by means of wheeling, but further investigation is required to confirm this.

References

Adams, E., Goad, M., & Cavill, N. (2012). Evaluation of Living Streets' Fitter for Walking project, s.l.: BHF National Centre for physical activity and health.

Aittasalo, M., Tiilikainen, J., Tokola, K., Suni, J., Sievänen, H., Vähä-Ypyä, H., Vasankari, T., Seimelä, T., Metsäpuro, P., Foster, C., & Titze, S. (2019). Socio-Ecological Natural Experiment with Randomized Controlled Trial to Promote Active Commuting to Work: Process Evaluation, Behavioral Impacts, and Changes in the Use and Quality of Walking and Cycling Paths. *International Journal of Environmental Research and Public Health,* 16(9), 1661.

Aldred, R., Croft, J., & Goodman, A. (2019). Impacts of an active travel intervention with a cycling focus in a suburban context: One-year findings from an evaluation of London's in-progress mini-Hollands programme. *Transportation Research Part A: Policy and Practice,* 123, 147-169.

Aldred, R., Goodman, A., & Woodcock, J. (2024). Impacts of active travel interventions on travel behaviour and health: Results from a five-year longitudinal travel survey in Outer London. *Journal of Transport & Health,* 35, 101771.

Niven, A & Khalife, N (2016), Paths for All Workplace Step Count Challenge 2015: A qualitative study of participants' perceived physical and mental health benefits of participation in the Step Count Challenge. s.l.: Paths for All.

s.l.: Paths for All.

Audrey, S., Fisher, H., Cooper, A., Gaunt, D., Garfield, K., Metcalfe, C., Hollingworth, W., Gillison, F., Gabe-Walters, M., Rodgers, S., Davis, A.L., Insall, P., & Proctor, S. (2019). Evaluation of an intervention to promote walking during the commute to work: a cluster randomised controlled trial. *BMC Public Health,* 19(427), 1-13.

Bhagat, Y., Vey, J., Link, S., Robertson, K. & Vanson, T. (2024) *Evidence Assessment: Active School Travel.* Sheffield Hallam University, NatCen and Mosodi Ltd.

Bopp, M., Sims, D., Matthews, S.A., Rovniak, L.S., Poole, E., & Colgan, J. (2018). Development, Implementation, and Evaluation of Active Lions: A Campaign to Promote Active Travel to a University Campus. *American journal of health promotion,* 32(3), 536-545.

Brown, B. B., Smith, K.R., Tharp, D., Werner, C.M., Tribby, C.P., Miller, H.J., Jensen, W. (2016). A complete street intervention for walking to transit, nontransit walking, and bicycling: A quasi-experimental demonstration of increased use. *Journal of Physical Activity and Health,* 13(11), 1210-1219.

Burns, T., Clermont, A., Holding, R., Man Oram, M-Y., Claris, S., Meeran, G., Kalatha, G., Mazur, P., Lee, R., Arrowsmith, H., & Fusco, R. (2022). Walking for everyone: Making walking and wheeling more inclusive, s.l.: Sustrans; Arup; Living Streets.

Cavill, N., Davis, A., Cope, A., & Corner, D. (2019). Active Travel & Physical Activity Evidence Review, s.l.: Sport England.

CIHT (2015). Planning for Walking, s.l.: Chartered Institution of Highways and Transportation.

Cook, S., Stevenson, L., Aldred, R., Kendall, M., & Cohen, T. (2022). More than walking and cycling: What is 'active travel'? *Transport Policy,* 126, 151-161.

Department for Transport (2020). Gear Change A bold vision for cycling and walking, s.l.: GOV.UK.

Department for Transport (2017) Local Sustainable Transport Fund Case Study Evaluation – Impact of Sustainable Transport Measures on Town Centres.

Douglas, M. J. et al. (2023). Road space reallocation in Scotland: A health impact assessment. *Journal of Transport & Health,* 30, 101625.

Heinen, E., Harshfield, A., Panter, J., Mackett, R., & Ogilvie, D. (2017). Does exposure to new transport infrastructure result in modal shifts? Patterns of change in commute mode choices in a four-year quasi-experimental cohort study. *Journal of Transport & Health,* 6, 396-410.

Heinen, E., Panter, J., Mackett, R. L., & Ogilvie, D. (2015). Changes in mode of travel to work: a natural experimental study of new transport infrastructure. *International Journal of Behavioral Nutrition and Physical Activity,* 12(1), 81.

Jensen, W. A., Stump, T.K., Brown, B.B., Werner, C.M., & Smith, K.R. (2017). Walkability, Complete Streets, and Gender: Who Benefits Most? *Health Place,* 1, 80-89.

Keall, M., Chapman, R., Howden-Chapman, P., Witten, K., Abrahamse, W., & Woodward, A. (2015). Increasing active travel: results of a quasi-experimental study of an intervention to encourage walking and cycling. *Journal of Epidemiology and Community Health,* 69(12), 1184-1190.

Lemieux, C., Bichai, F., & Boisjoly, G. (2023). Synergy between green stormwater infrastructure and active mobility: A comprehensive literature review. *Sustainable Cities and Society,* 99, 1049000.

Mackey, D. C., Perkins, A.D., Hong Tai, K., Sims-Gould, J., & McKay, H.A. (2019). Men on the move: A randomized controlled feasibility trial of a scalable, choice-based, physical activity and active transportation intervention for older men. *Journal of Aging and Physical Activity,* 27(4), 489-502

NatCen (2020). Impact of interventions encouraging a switch from cars to more sustainable modes of transport: A rapid evidence assessment (REA), s.l.: Department for Transport

Ogilvie, D., Egan, M., Hamilton, V., & Patticrew, M. (2004). Promoting walking and cycling as an alternative to using cars: systematic review. *BMJ,* 329(7469), 763.

Paths for All (2019). Evaluation of Smarter Choices, Smarter Places 2018/19, s.l.: s.n.

Petrunoff, N., Wen, L. & Rissel, C. (2016). Effects of a workplace travel plan intervention encouraging active travel to work: outcomes from a three-year time-series study. ***Public Health,*** 135, 38-47.

Song, Y., Preston, J., Ogilvie, D., & iConnect Consortium. (2017). New walking and cycling infrastructure and modal shift in the UK: a quasi-experimental panel study. *Transportation research part A: policy and practice,* 95, 320-333.

Winters, M., Buehler, R., & Götschi, T. (2017). Policies to Promote Active Travel: Evidence from Reviews of the Literature. *Current Environmental Health Reports,* 4, 278-285.

Xiao, C., van Sluijs, E., Ogilvie, D., Patterson, R., & Panter, J. (2022). Shifting towards healthier transport: carrots or sticks? Systematic review and meta-analysis of population-level interventions. *Lancet Planet Health,* 6(11), E858-E869.

Annex A – Database searches

Scopus

Platform: Scopus.

Date searched: February 6, 2024.

Number of EA2 results (2013-present): 775.

Table 6: Search strings used for EA2 Walking and Wheeling

1	TITLE-ABS((active) W/1 (travel* OR commut* OR journey*)) OR AUTHKEY((active) W/1 (travel* OR commut* OR journey*))	2760
2	TITLE-ABS(walking OR wheeling OR wheelchair* OR ″wheel chair*″) OR AUTHKEY(walking OR wheeling OR wheelchair* OR ″wheel chair*″)	196,545
3	TITLE-ABS(determinant* OR factor* OR characteristic* OR socioeconomic* OR social* OR economic* OR income* OR demograph* OR barrier* OR facilitator* OR enabl* OR gender OR ethnic* OR race OR racial OR cultur* OR urban OR rural OR choice* OR choose OR perception* OR perceive* OR predictor* OR measur* OR impact* OR context* OR factor* OR social* OR behavio* OR infrastructur* OR equip*) OR AUTHKEY(determinant* OR factor* OR characteristic* OR socioeconomic* OR social* OR economic* OR income* OR demograph* OR barrier* OR facilitator* OR enabl* OR gender OR ethnic* OR race OR racial OR cultur* OR urban OR rural OR choice* OR choose OR perception* OR perceive* OR predictor* OR measur* OR impact* OR context* OR factor* OR social* OR behavio* OR infrastructur* OR equip*)	38,471,286
4	#1 AND #2 AND #3	1074
5	Limit Subject Area to Social Science, Medicine, Environmental Science, Engineering, Business/Management/Accounting, Decision Sciences, Psychology, Economics/ Econometrics/Finance, Arts and Humanities	1038
6	Limit Language to English	1026
7	Limit Document Type: Article, Review	946
8	Limit Publication Year to 2013-2024	775
9	TITLE-ABS(″systematic review″ OR ″systematic literature review″ OR ″meta-analysis″ OR metanalysis OR ″scoping review″ OR ″systematic map″ OR ″evidence gap map″ OR ″evidence and gap map″ OR ″systematic mapping review″ OR ″umbrella review″ OR ″realist review″ OR ″integrative review″ OR ″metaregression″ OR ″meta-regression″ OR ″rapid review″ OR ″systematized literature review″)	599,307
10	#9 AND #4	56
11	Limit Publication Year to 2003-2012	6

Google (grey literature)

Platform: Google

Date searched: February 29th, 2024

Number of results: 131

Table 8: Search strings used in Google

Organisation	Search string	Valid results
Active Oxfordshire	(INTITLE:research OR study OR analysis) AND (active AROUND(2) (travel OR commute OR journey OR transport)) AND AFTER:2012 AND site: activeoxfordshire.org/	6
Active Travel Academy (University of Westminster)	(INTITLE:research OR study OR analysis) AND (active AROUND(2) (travel OR commute OR journey OR transport)) AND AFTER:2012 AND site: westminster.ac.uk/ata/	5
Age UK	(INTITLE:research OR study OR analysis) AND (active AROUND(2) (travel OR commute OR journey OR transport)) AND AFTER:2012 AND site: ageuk.org.uk/	6
Association of Cycle Traders (ACT)	(INTITLE:research OR study OR analysis) AND (active AROUND(2) (travel OR commute OR journey OR transport)) AND AFTER:2012 AND site: cycleassociation.uk/	1
British Heart Foundation (BHF)	(INTITLE:research OR study OR analysis) AND (active AROUND(2) (travel OR commute OR journey OR transport)) AND AFTER:2012 AND site: bhf.org.uk/	2
Campaign for Better Transport	(INTITLE:research OR study OR analysis) AND (active AROUND(2) (travel OR commute OR journey OR transport)) AND AFTER:2012 AND site: bettertransport.org.uk	10
Campaign for National Parks	(INTITLE:research OR study OR analysis) AND (active AROUND(2) (travel OR commute OR journey OR transport)) AND AFTER:2012 AND site: cnp.org.uk/	4
Centre for Transport & Society (University of the West of England)	(INTITLE:research OR study OR analysis) AND (active AROUND(2) (travel OR commute OR journey OR transport)) AND AFTER:2012 AND site: uwe.ac.uk/research/centres-and-groups/cts	0
Cycle BOOM	(INTITLE:research OR study OR analysis) AND (active AROUND(2) (travel OR commute OR journey OR transport)) AND AFTER:2012 AND site: cycleboom.org/	1
Cycling UK	(INTITLE:research OR study OR analysis) AND (active AROUND(2) (travel OR commute OR journey OR transport)) AND AFTER:2012 AND site: cyclinguk.org/	18
Disability Rights UK	(INTITLE:research OR study OR analysis) AND (active AROUND(2) (travel OR commute OR journey OR transport)) AND AFTER:2012 AND site: disabilityrightsuk.org/	2
Living Streets	(INTITLE:research OR study OR analysis) AND (active AROUND(2) (travel OR commute OR journey OR transport)) AND AFTER:2012 AND site: livingstreets.org.uk/	6
ModeShift	(INTITLE:research OR study OR analysis) AND (active AROUND(2) (travel OR commute OR journey OR transport)) AND AFTER:2012 AND site: modeshift.org.uk	0
National Institute for Health and Care Excellence (NICE)	(INTITLE:research OR study OR analysis) AND (active AROUND(2) (travel OR commute OR journey OR transport)) AND AFTER:2012 AND site: nice.org.uk/	0
Partnership for Active Travel and Health	(INTITLE:research OR study OR analysis) AND (active AROUND(2) (travel OR commute OR journey OR transport)) AND AFTER:2012 AND site: pathforwalkingcycling.com/	0

Organisation	Search string	Valid results
Paths for All	(INTITLE:research OR study OR analysis) AND (active AROUND(2) (travel OR commute OR journey OR transport)) AND AFTER:2012 AND site: pathsforall.org.uk/	10
Royal National Institute of Blind People (RNIB)	(INTITLE:research OR study OR analysis) AND (active AROUND(2) (travel OR commute OR journey OR transport)) AND AFTER:2012 AND site: rnib.org.uk/	1
Sustrans	(INTITLE:research OR study OR analysis) AND (active AROUND(2) (travel OR commute OR journey OR transport)) AND AFTER:2012 AND site: sustrans.org.uk/	15
The Ramblers	(INTITLE:research OR study OR analysis) AND (active AROUND(2) (travel OR commute OR journey OR transport)) AND AFTER:2012 AND site: ramblers.org.uk/	1
Transport & Health Study Group (THSG)	(INTITLE:research OR study OR analysis) AND (active AROUND(2) (travel OR commute OR journey OR transport)) AND AFTER:2012 AND site: transportandhealth.org.uk/	4
Transport for London (TfL)	(INTITLE:research OR study OR analysis) AND (active AROUND(2) (travel OR commute OR journey OR transport)) AND AFTER:2012 AND site: tfl.gov.uk/	0
Transport Research Laboratory (TRL)	(INTITLE:research OR study OR analysis) AND (active AROUND(2) (travel OR commute OR journey OR transport)) AND AFTER:2012 AND site: trl.co.uk/	8
Transportation Research Group (University of Southampton)	(INTITLE:research OR study OR analysis) AND (active AROUND(2) (travel OR commute OR journey OR transport)) AND AFTER:2012 AND site: southampton.ac.uk/research/groups/transportation-group	0
Sport England	(INTITLE:research OR study OR analysis) AND (active AROUND(2) (travel OR commute OR journey OR transport)) AND AFTER:2012 AND site: sportengland.org/	9
Systra	(INTITLE:research OR study OR analysis) AND (active AROUND(2) (travel OR commute OR journey OR transport)) AND AFTER:2012 AND site: systra.com/uk/	1
Transport Scotland	(INTITLE:research OR study OR analysis) AND (active AROUND(2) (travel OR commute OR journey OR transport)) AND AFTER:2012 AND site: transport.gov.scot/	0
Bikeability	(INTITLE:research OR study OR analysis) AND (active AROUND(2) (travel OR commute OR journey OR transport)) AND AFTER:2012 AND site: bikeability.org.uk/	0
Transport for New Homes	(INTITLE:research OR study OR analysis) AND (active AROUND(2) (travel OR commute OR journey OR transport)) AND AFTER:2012 AND site: transportfornewhomes.org.uk/	4
ITS Leeds	(INTITLE:research OR study OR analysis) AND (active AROUND(2) (travel OR commute OR journey OR transport)) AND AFTER:2012 AND site: leeds.ac.uk/transport	0
Centre for Cities	(INTITLE:research OR study OR analysis) AND (active AROUND(2) (travel OR commute OR journey OR transport)) AND AFTER:2012 AND site: centreforcities.org/	7
Chartered Institute of Highways and Transport	(INTITLE:research OR study OR analysis) AND (active AROUND(2) (travel OR commute OR journey OR transport)) AND AFTER:2012 AND site: ciht.org.uk/	14
Chartered Institute of Logistics and Transport	(INTITLE:research OR study OR analysis) AND (active AROUND(2) (travel OR commute OR journey OR transport)) AND AFTER:2012 AND site: ciltuk.org.uk/	1
Total		**136**

Annex B – Details of sources included in the full assessment

Table 7: Source information

Reference and DOI	Method / data	Sample	Geography	Weight of Evidence score	Reason for inclusion where WoE is not high	Built environment	Influencing behaviour	Targeting different groups of walkers	Measuring impact
Adams, E., Goad, M., & Cavill, N. (2012). Evaluation of Living Streets' Fitter for Walking project, s.l.: BHF National Centre for physical activity and health.	Interviews, focus groups and surveys - longitudinal	4944	UK	8 (medium)	Relevance to the theme	✓	✓		✓
Aittasalo, M. et al. (2019). Socio-Ecological Natural Experiment with Randomized Controlled Trial to Promote Active Commuting to Work: Process Evaluation, Behavioral Impacts, and Changes in the Use and Quality of Walking and Cycling Paths. *International Journal of Environmental Research and Public Health*, 16(9), 1661.	Randomised controlled trial in 16 workplaces	Phase 1 n=1823, Phase 2 n= 826	Finland	12 (high)	N/A	✓			
Aldred, R., Croft, J., & Goodman, A. (2019). Impacts of an active travel intervention with a cycling focus in a suburban context: One-year findings from an evaluation of London's in-progress mini-Hollands programme. *Transportation Research Part A: Policy and Practice*, 123, 147-169.	Longitudinal Survey	1712	UK	11 (medium)	Relevance to the theme	✓			✓

Reference and DOI	Method / data	Sample	Geography	Weight of Evidence score	Reason for inclusion where WoE is not high	Built environment	Influencing behaviour	Targeting different groups of walkers	Measuring impact
Aldred, R., Goodman, A., & Woodcock, J. (2024). Impacts of active travel interventions on travel behaviour and health: Results from a five-year longitudinal travel survey in Outer London. *Journal of Transport & Health*, 35, 101771.	Longitudinal Survey	1079	UK	14 (high)	N/A	✓			
Audrey, S. et al. (2019). Evaluation of an intervention to promote walking during the commute to work: a cluster randomised controlled trial. *BMC Public Health*, 19(427), 1-13.	Randomised Control Trial	654	England and Wales	12 (high)	N/A		✓		
Bopp, M. et al. (2018). Development, Implementation, and Evaluation of Active Lions: A Campaign to Promote Active Travel to a University Campus. *American journal of health promotion*, 32(3), 536-545.	Cross sectional survey; longitudinal survey	Students n=563; Staff n=999	USA	13 (high)	N/A		✓		✓
Brown, B. B. et al. (2016). A complete street intervention for walking to transit, nontransit walking, and bicycling: A quasi-experimental demonstration of increased use. *Journal of Physical Activity and Health*, 13(11), 1210-1219.	Accelerometers; GPS units; surveys	2012: n=910; 2013: n=536	USA	13 (high)	N/A				✓

Reference and DOI	Method / data	Sample	Geography	Weight of Evidence score	Reason for inclusion where WoE is not high	Built environment	Influencing behaviour	Targeting different groups of walkers	Measuring impact
Burns, T. et al. (2022). Walking for everyone: Making walking and wheeling more inclusive, s.l.: Sustrans; Arup; Living Streets.	Literature review, interviews, case studies	60	Europe, US	7 (low)	Relevance to the theme; stakeholder suggestion.	✓	✓	✓	
Cavill, N., Davis, A., Cope, A., & Corner, D. (2019). Active Travel & Physical Activity Evidence Review, s.l.: Sport England.	Evidence review	68 academic sources	Global	14 (high)			✓		
CIHT (2015). Planning for Walking, s.l.: Chartered Institution of Highways and Transportation.	Evidence review		UK	4 (low)	Relevance to the theme; stakeholder suggestion.		✓		
Department for Transport (2017) Local Sustainable Transport Fund Case Study Evaluation – Impact of Sustainable Transport Measures on Town Centres.	Questionnaires, focus groups, interviews	Questionnaires: n=2818 (town centre users) n=576 (resident panel questionnaires). Focus groups n=4. Interviews n=40 (retailer interviews, stakeholder interviews unspecified)	UK	9 (medium)	Relevance to the theme; stakeholder suggestion.	✓	✓		
Douglas, M. J. et al. (2023). Road space reallocation in Scotland: A health impact assessment. *Journal of Transport & Health*, 30, 101625.	Evidence review, stakeholder interviews, workshops	13	UK	9 (medium)	Relevance to the theme	✓			

Reference and DOI	Method / data	Sample	Geography	Weight of Evidence score	Reason for inclusion where WoE is not high	Built environment	Influencing behaviour	Targeting different groups of walkers	Measuring impact
Heinen, E., Harshfield, A., Panter, J., Mackett, R., & Ogilvie, D. (2017). Does exposure to new transport infrastructure result in modal shifts? Patterns of change in commute mode choices in a four-year quasi-experimental cohort study. *Journal of Transport & Health*, 6, 396-410.	Longitudinal survey	1206	UK	13 (high)	N/A	✓			
Heinen, E., Panter, J., Mackett, R. L., & Ogilvie, D. (2015). Changes in mode of travel to work: a natural experimental study of new transport infrastructure. *International Journal of Behavioral Nutrition and Physical Activity*, 12(1), 81.	Commute travel diaries; GIS	470	UK	9 (medium)	Relevance to the theme	✓			✓
Hosking, J. et al. (2010). Organisational travel plans for improving health. *Cochrane Database of Systematic Reviews*, 3.	Systematic review	17 studies	Global	10 (medium)	Relevance to the theme		✓		
Jensen, W. A. et al. (2017). Walkability, Complete Streets, and Gender: Who Benefits Most?. *Health Place*, 1, 80-89.	Observation	n/a	US	11 (medium)	Relevance to the theme	✓			

Reference and DOI	Method / data	Sample	Geography	Weight of Evidence score	Reason for inclusion where WoE is not high	Built environment	Influencing behaviour	Targeting different groups of walkers	Measuring impact
Keall, M. et al. (2015). Increasing active travel: results of a quasi-experimental study of an intervention to encourage walking and cycling. *Journal of Epidemiology and Community Health*, 69(12), 1184-1190.	Longitudinal surveys; interviews; travel diaries	1209	New Zealand	9 (medium)	Relevance to the theme		✓		
Lemieux, C., Bichai, F., & Boisjoly, G. (2023). Synergy between green stormwater infrastructure and active mobility: A comprehensive literature review. *Sustainable Cities and Society*, 99, 1049000.	Literature review	14,655 in phase 1; 5,303 in phase 2; 513 in phase 3	North America, East Asia, Europe	14 (high)	N/A	✓			✓
Mackey, D. C. et al. (2019). Men on the move: A randomized controlled feasibility trial of a scalable, choice-based, physical activity and active transportation intervention for older men. *Journal of Aging and Physical Activity*, 27(4), 489-502.	Randomised control trial	2686	USA	12 (high)	N/A		✓	✓	
NatCen (2020). Impact of interventions encouraging a switch from cars to more sustainable modes of transport: A rapid evidence assessment (REA), s.l.: Department for Transport.	Evidence review		UK, Europe, North America, Australia, New Zealand	11 (medium)	Relevance to the theme	✓			

Reference and DOI	Method / data	Sample	Geography	Weight of Evidence score	Reason for inclusion where WoE is not high	Built environment	Influencing behaviour	Targeting different groups of walkers	Measuring impact
Ogilvie, D., Egan, M., Hamilton, V., & Patticrew, M. (2004). Promoting walking and cycling as an alternative to using cars: systematic review. *BMJ*, 329(7469), 763.	Systematic review		UK, Australia, US, Netherlands, Denmark, Finland	5 (low)	Relevance to the theme		✓		
https://www.pathsforall.org.uk/mediaLibrary/other/english/svl_scsp-evaluation-18-19.pdf Paths for All (2019). *Evaluation of Smarter Choices, Smarter Places* 2018/19.	Evaluation study	31 schemes	UK	12 (high)	N/A		✓		
Petrunoff, N., Wen, L., & Rissel, C. (2016). Effects of a workplace travel plan intervention encouraging active travel to work: outcomes from a three-year time-series study. *Public Health*, 135, 38-47.	Cross sectional surveys	2011 (n = 804), 2012 (n = 904), 2013 (n = 872) and 2014 (n = 687).	Australia	11 (medium)	Relevance to the theme		✓		✓
Winters, M., Buehler, R., & Götschi, T. (2017). Policies to Promote Active Travel: Evidence from Reviews of the Literature. *Current Environmental Health Reports*, 4, 278-285.	Evidence review		Not specified	10 (medium)	Relevance to the theme				✓
Xiao, C. et al. (2022). Shifting towards healthier transport: carrots or sticks? Systematic review and meta-analysis of population-level interventions. *Lancet Planet Health*, 6(11), E858-E869.	Systematic review		North America Oceania Europe Asia South America	14 (high)	N/A	✓			

Annex C – Intervention context

The sources identified interventions with specific project names, aims and features. These are described below:[10]

- **Active Lions campaign** (**IB**) aimed to increase active transportation to campus for all students and employees in a large university in the Northeastern United States. The campaign used a smartphone application and social media components (further discussed in the Social Interventions section). The social media components involved Facebook and Twitter pages, social media profiles and daily online posts and the app included competitive features such as goal setting, user statistics and rewards (Bopp et al., 2018).
- **Beat the Street** (**IB**)**,** a technology-based promotion to encourage people to walk more. As part of a game, people were encouraged to log their walks to school by swiping a post near the school and collecting points to enter a competition (Cavill et al., 2019).
- **Beelines** (**IE**)**,** a programme undertaken in Greater Manchester to develop a region-wide walking and cycling network by improving built infrastructure. This included improving crossing points, reducing traffic in neighbourhoods and better wayfinding to enable people to walk and wheel more (Burns et al., 2022).
- **Cambridgeshire Guided Busway** (**IE**)**,** the busway comprised of a 25 km off-road guideway for buses, with the development of a parallel path that can be used for walking and cycling. This aimed to reduce traffic and enable more active travel (including walking) by provided additional pathways (NatCen, 2020; Heinen et al., 2017; Heinen et al., 2015).
- **DfT Smarter Choices and Sustainable Travel Towns programmes** (**IB**)**,** a walking promotion programme in the towns of Worcester, Darlington and Peterborough, where residents were provided information about cycling and walking (CIHT, 2015).
- **Fitter for Walking project** (**IE/IB**)**,** an initiative targeting deprived communities in 12 local authority areas across five regions of England. The programme promoted walking as a mode of transport and built community cohesion via social community walks and working together to make improvements to their local environment (including new dropped kerbs, improved street lighting, resurfacing of paths, removal of encroaching vegetation, litter pick-up or bulb planting) (Adams et al., 2012).
- **Healthy Streets** (**IE and/or IB**)**:** This was a framework which assessed how street design could be improved to encourage more active travel, be more inclusive, and become environmentally sustainable. The framework was based on ten different 'Healthy Street indicators' which balanced social, economic, and environmental sustainability. Using this framework and designer could consider areas of improvement or requirements for infrastructural change. (Burns et al., 2022).
- **10 km dedicated cycle and walking path and bridge crossing a dual carriageway** (**IE**)**,** in Kenilworth (NatCen, 2020).
- **Raised walkway on top of a wall** (**IE**)**,** in Southampton (NatCen, 2020).
- **Traffic-free 'People's Bridge'** (**IE**)**,** in Cardiff (NatCen, 2020).

10 Intervention types: IE= Infrastructure and Equipment/ IB=Influencing Behaviour

- **Men on the Move** (**IB**)**.** This was a programme for men aged 60 years and older and was delivered by trained activity coaches who delivered: (a) one-on-one participant consultations to develop personal action plans for PA and active transportation, (b) monthly group-based motivational meetings, (c) weekly telephone support.
- **Mini-Holland** (**IE**)**:** This project aimed to shift travel mode from private car use to active travel, which was developed in three London boroughs and involved the implementation of routes for low traffic, cycling, and pedestrians. The infrastructural changes included redesigned town centres with cycle hubs at tube and rail stations; measures to reduce motor traffic in residential areas; physically protected cycle lanes along main roads; and improving walking environment. Pedestrian only routes and areas were enforced which closed off roads to traffic. Over 50 side road junctions were transformed into 'continuous footways' (where the footway is continued over the road, indicating pedestrian priority) (*Aldred et al., 2019; Aldred et al., 2024*).
- **Model Communities Programme** (**IB**)**.** Let's Go in New Plymouth and iWay in Hastings, together comprise the Model Communities Programme (MCP). The MCP involved behavioural and social marketing programmes to promote cycling and walking in cities with low active travel. The source did not describe what this entailed further (*Keall et al., 2015*).
- **Paths for All Step Count Challenge** (**IB**)**,** a four-week workplace walking challenge where participants received an information pack, pedometer and a user account to record daily steps and track progress with other team members (*Paths for All, 2019*).
- **Pedestrian orientated districts** (**IE**)**.** This was an initiative developed in New York that aimed to create low traffic neighbourhoods to prioritise pedestrians. Flexible streets were created using 'Enhanced Planter Barricades' to block street entrances during the day and allow vehicle traffic overnight. The introduction of these barriers was accompanied by increased greenery, seating, public art and a wider footpath (*Burns et al., 2022*).
- **Smarter Choices, Smarter Places** (**IB**)**.** Smarter Choices, Smarter Places (SCSP) is a Scotland-wide grant programme designed to encourage people to reduce car use in favour of more sustainable modes of travel such as walking, cycling and using public transport. Media promotion and campaigns were a core part of many SCSP initiatives (*Paths for All, 2019*).
- **The Liverpool Hospital Travel Plan** (**IB**)**,** intended to help participants plan their journey and aimed to promote active forms of transport and decrease the proportion of staff driving to work. The intervention consisted of two stages of change: actions aimed at individuals, and capacity building and the organisation (*Petrunoff et al., 2016*).
- **Transport for London's** (**TfL**) **Planning for Walking toolkit** (**IE**)**.** This was a handbook providing advice for street planners and designers involved in the redesign or development of streets, footpaths, and public spaces in London. It contained good practice guidance and analytical tools to identify methods to create high-quality walking environments (*Burns et al., 2022*).
- **Transport for London's Temporary Traffic Management Handbook** (**IE**)**.** This handbook addressed the planning and designing of roadworks that can often create barriers for walkers. It aimed to make streets easier to use, more attractive, inclusive, intuitive, consistent, and safer to encourage more active travel. The handbook provided guidance for traffic management designers and work promoters on how to make streets safer for people who walk, cycle and ride motorbikes, especially children, disabled people and older people (*Burns et al., 2022*).

- **Travel Smart** (**IB**)**.** The Travel Smart intervention involves three key phases each based on personal contact with the households in a target area. The process involves dialogue which motivates people to consider and review their travel behaviour in the context of their lifestyles. It also made use of personal travel plans to encourage participants to take up more active travel. Personalised Travel Smart packages were hand-delivered containing maps, area information and journey plans (*Cavill et al., 2019; CIHT, 2015*).
- **Walk in to Work Out** (**IB**)**,** a workplace-led intervention meant to provide workers with an information pack about how to choose routes, how to keep safe whilst traveling and the location of showering facilities after their commute. The intervention involved a booklet with interactive materials covering educational, and practical information on how to embed active travel into daily routines (*Cavill et al., 2019*).
- **Walk to work** (**IB**)**.** This was a ten-week intervention encouraging people to walk to work through social support techniques. This involved three steps: identification and training of walk to work promotors; maintained contact between promoters and participants; and then ongoing encouragement from promoters to keep up walking (*Audrey et al., 2019*).
- **Walking buses** (**IB**)**.** Walking school buses are frequently used in the UK and US to promote active travel to and from school in a safe and organised way. They consist of a group of pupils with adults at the front and back, often wearing high-vis jackets to make them more visible (*Burns et al., 2022*).