Interventions to increase active travel and improve health outcomes in different population groups: protocol for a multi-stage evidence synthesis

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Background

Active travel is defined as walking, cycling, wheeling (the use of mobility aids), or scootering activity, for the functional purpose of transport to a particular destination (i.e. getting from place to place), such as work, school or the shops (Public Health England 2016; Saunders et al, 2013). Physical activity generally (Warburton and Bredin, 2017), as well as active travel activity specifically (Dinu et al, 2019), have been directly linked to health benefits. Beyond potential benefits for population health, active travel also confers important co-benefits for planetary health (Rutter et al, under review). For example, it provides opportunities for replacing journeys that would otherwise have used more environmentally damaging modes. Reducing emissions from vehicles and road materials improves air quality with associated health as well as environmental benefits. Moreover, substantial reductions in land transport emissions are needed to meet Net Zero commitments (Marteau et al, 2022). The vital importance for population and planetary health of rapid modal shifts towards active transport is highlighted in numerous policy documents and reports including being central to two of the Lancet-Chatham House Commission's recommendations for policy actions with the potential to improve population health post COVID-19 (Rutter et al, under review). However, levels of active travel in the UK do not reflect this emphasis, and are currently low.

The most recent available data for Great Britain[1] reports that in 2022, 323.8 billion vehicle miles were driven on roads of which cycle traffic only made up 3.9 billion. Furthermore, in England, 278 miles and 282 trips were travelled per person via walking or cycling modes versus 4192 miles and 502 trips as a car or van driver or passenger. In terms of recent trends, the most recent available Department for Transport data[2] (suggests cycling traffic levels have decreased by 5.2% over the period of June 2022 to June 2023. while motor traffic levels have increased by 2.3% over the same period. Importantly, there is also substantial evidence that levels of active travel differ by population groups, including those subject to disadvantage and to health and environmental inequities (Sustrans et al, 2022). For example, in England in 2022, distance walked and cycled was negatively associated with

[1] https://www.gov.uk/government/statistics/road-traffic-estimates-in-great-britain-2022/road-traffic-estimates-in-great-britain-2022-headline-statistics
[2] https://www.gov.uk/government/statistics/cycling-index-england/cycling-index-england

income quintile (241 miles vs 319 miles for lowest and highest income groups respectively, although slightly more trips were taken by the former). Furthermore, a lower distance (and involving fewer trips) was walked and cycled by those who have never worked and the long-term unemployed, versus managerial and professional occupations (237 vs 354 miles respectively), as well as by those with a mobility difficulty versus no such difficulty (112 vs 302 miles respectively).

A wide range of interventions have been developed and implemented at varying scales to attempt to increase the uptake and prevalence of active travel behaviours, applying both individual- and population-level approaches (Xiao et al, 2022; Love et al, 2019). Common types of active travel interventions encompass changes to the physical or built environment (including specific active travel infrastructure such as cycle or pedestrian paths or pavement improvements, and streetscape or public realm improvements (e.g. lighting, signage, greening, street furniture); marketing or information campaigns (e.g. education sessions); provision of skills training, equipment or structured opportunities (e.g. cycle training, cycle share or subsidy schemes, walking buses); and, incentives (e.g. financial or other rewards) (Cavill et al, 2019; Hansmann et al, 2022; Medeiros et al, 2021; Smith et al, 2017; Xiao et al, 2022).

While active travel interventions, especially their impacts on physical activity outcomes, have been widely evaluated via primary outcome evaluation studies and at the level of evidence syntheses, this has been principally in relation to overall effects across populations. Differential impacts of interventions by population subgroups including those subject to disadvantage, have been relatively under-studied, including in a UK-specific context, despite such differences having the potential to reduce or exacerbate disparities in both levels of active travel and in health outcomes more generally. At present, there is weak evidence for positive health equity impacts of active travel interventions (Hansmann et al, 2022) and the potential for negative health equity impacts cannot be excluded (Luan et al, 2019). The scope of previous reviews has been relatively limited in terms comprehensively searching for and identifying relevant evidence, and the focus of investigations relatively narrow in terms of the range of population subgroups considered. It has been recognised in the Department of Health and Social Care (England) – the commissioners of this review and key stakeholders in its development – that the current evidence base is unable to optimally inform decision-makers in developing and implementing active travel interventions and policies that are both effective and equitable, including those aimed at specific communities and population subgroups. Without a comprehensive evidence-based assessment, there is a risk that interventions target whole populations inappropriately and/or target population subgroups ineffectively, and so risk widening existing health inequalities.

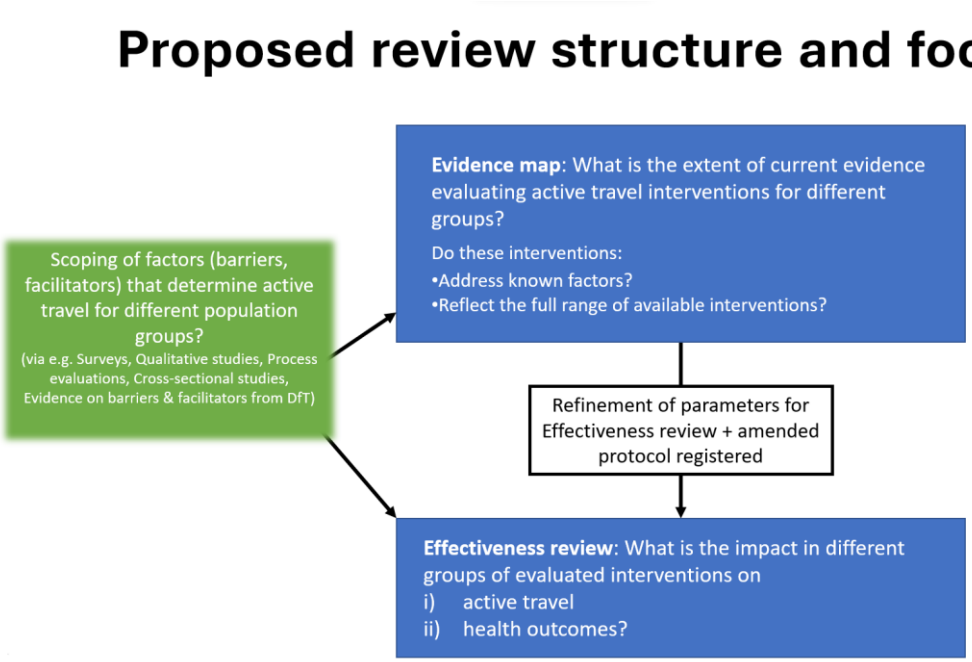
Aims

The overall aim of this research is to develop understanding of the potential public health impact of active travel interventions across different population groups, particularly those subject to disparities in health outcomes. This will be addressed via a multi-stage programme of work (see Figure overleaf). We will first produce a descriptive and high-level overview of the research evidence on differential impacts of active travel interventions (Evidence Map), followed by an in-depth assessment of their effectiveness (Effectiveness Review). The Evidence Map will help to refine the scope of the Effectiveness Review to make it optimally informative and efficient given available evidence, and contextualise the findings of the of the Effectiveness Review – e.g. by illustrating types of interventions for which data are not available.

This programme of work aims to answer the following questions:

Research question 1 (Evidence Map): What is the extent of current evidence evaluating active travel interventions targeting, or reporting outcomes for, different groups?

Research question 2 (Effectiveness Review): What is the impact in different groups of evaluated interventions on i) active travel ii) health outcomes?



Methods

NB This protocol focuses predominantly on the Evidence Map component of this work. Because we consider completing the Evidence Map component to be essential to determining the parameters of the Effectiveness Review (see below for explanation), we intend to register an updated protocol at a later date that specifically concerns the Effectiveness Review.

We will produce a descriptive and high-level overview of the research evidence on differential impacts of active travel interventions. For simplicity, we here use the term 'Evidence Map' but these are often technically termed Evidence and Gap Maps (EGMs). Maps of this kind are systematic and visual representations of the availability of evidence given a particular focus or domain relevant to a research question (Campbell et al, 2022; Shemilt et al, 2022). They typically consist of a framework of primary dimensions (rows and columns) and secondary dimensions as a set of filters, enabling exploration of the map's contents.

Our intention for mapping the evidence is to efficiently establish an understanding and an overview of the landscape of relevant research representing its key features and characteristics, to usefully inform the design of the subsequent Effectiveness Review. In principle it should reduce the risk of spending undue time reviewing in detail parts of the map (or aspects of our research questions) that have already been well addressed by previous research, or of conducting an uninformative or

inefficiently-focused review of studies that are only few in number and/or are methodologically weak. Furthermore, it should increase efficiency of the subsequent Effectiveness Review as most or all of the relevant evidence will likely be contained in the Evidence Map and so will have already been screened and annotated with its key characteristics. *See 'Data extraction' for further details*.

Eligibility criteria

Evidence Map

Studies will be assessed for inclusion based on meeting the following criteria:

Population: Adults and children. Populations can comprise specific disadvantaged (and other different) groups, or general populations should outcomes be assessed in at least one population subgroup (see also 'Outcome').

Intervention: Any intervention with a purpose of increasing active travel. Active travel is defined as walking, cycling, wheeling (the use of mobility aids), or scootering activity, for the functional purpose of transport to a particular destination (i.e. getting from place to place), such as work, school or the shops (Public Health England 2016; Saunders et al, 2013). To be eligible studies must either a) be explicit that the intervention aims to increase active travel and/or b) measure active travel behaviours accompanied by a plausible intervention mechanism. Eligible interventions may also include aims or components related to travel or physical activity for non-transport purposes (e.g. recreation or leisure, sport, fitness, exercise, performance, or rehabilitation) providing they do not constitute a major or predominant focus of the intervention, and/or are not implemented or delivered in contexts or settings explicitly related to these kinds of activity (e.g. organised or prescribed sport or exercise programmes in leisure facilities). Eligible interventions may also include aims or components unrelated to active travel or physical activity, again providing they do not constitute a major or predominant focus of the intervention. Interventions can be targeted or delivered to individuals or groups, or applied at population-level without targeting.

Comparison: Absence of the active travel intervention.

Outcome: Any quantitative measure of active travel behaviour and/or health outcome, that is reported for at least one population subgroup. This could therefore concern a total population outcome where this population is of a specified group, or a disaggregated subgroup(s) outcome derived from a broader (e.g. general) population. Active travel can be assessed via self-report, observation, or use an objective measure for individual participants (e.g. accelerometer, geographic sensor). Health outcomes can be assessed via self-report or an objective measure of health or disease status (e.g. morbidity, mortality), or physiological or psychological functioning, including quality of life and mental health. We will include generic physical activity outcome data where the degree to which they pertain to active travel is not clear (e.g. where active travel is not disaggregated) providing we can determine, or judge it likely (e.g. given the context and/or the study report authors' interpretation), that most or all relates to active travel.

Study design: Any randomised or non-randomised intervention outcome evaluation, or systematic review of intervention outcomes (including overviews of reviews).

Publication type: Intervention outcome evaluation studies within empirical primary research reports, and reports of systematic reviews.

Effectiveness Review

Currently we anticipate that the Effectiveness Review will employ identical criteria to the Evidence Map for Population, Intervention and Comparison, but that the criteria for Outcome, Study design, and Publication type may change as a result of generating the Evidence Map. Therefore, we intend to register an updated protocol at a later date that specifically concerns the Effectiveness Review.

Identification of evidence

Evidence Map

We will conduct comprehensive systematic searches for primary and secondary research reports of intervention outcome evaluation studies in published articles and other sources including technical, scientific, organisational or other policy focused reports (from local, national, or supra-national levels), as well as other forms of grey literature (e.g. conference proceedings). We will not search for or include preprints of primary and secondary research reports. While we will search information sources focused on international and UK contexts in English, no publication date, language or geographical limits will be applied. Information sources will cover literature spanning transport and the built environment, health, psychological and behavioural sciences, social policy, social science and economics, and will include relevant systematic review repositories. The following electronic databases and other online resources will be searched:

Built environment and transport

- Transport Research International Documentation (TRID)
- ICE Virtual Library (Civil Engineering Resource)
- Geobase (OVID)
- Urbadoc
- ICONDA (OVID)

Health, and psychological and behavioural sciences

- CINAHL (EBSCO)
- Embase (OVID)
- MEDLINE (OVID)
- Public Health Database (Proquest)
- Health Management Information Consortium (OVID)
- PsycInfo (OVID)
- Cochrane Library - Databases of Systematic Reviews and controlled trials
- Database of promoting health effectiveness reviews (DoPHER)
- The Trials Register of Promoting Health Interventions (TRoPHI)

Social policy, social science and economics

- Applied Social Sciences Index and Abstracts (ASSIA) (ProQuest)
- Econlit (EBSCO)
- ABI/Inform Global (Proquest)
- Socialogical Abstracts (Proquest)Social Policy and Practice (OVID)

- PAIS Index (Proquest)
- ERIC (EBSCO)
- IBSS (ProQuest)

Interdisciplinary, Web of Science

- Science Citation Index (Web of Science)
- Social Science Citation Index (Web of Science)
- Conference Proceedings Citation Index - Science (Web of Science)
- Conference Proceedings Citation Index - Social Science & Humanities (Web of Science)
- Emerging Sources Citation Index (Web of Science)

Other specialist resources

- SafetyLit
- Social Systems Evidence
- Epistemonikos
- Health Evidence Canada

The search strategies for the databases will be further developed in collaboration with an Information Specialist. We expect to search on concepts of types of active travel (e.g. walking, cycling, wheeling, scootering) and purpose (e.g. transport, commuting, utilitarian travel, active travel) and a broad concept for evaluation and study design. We will use a range of topic relevant terms and synonyms and search the title and abstract fields of records as well as controlled vocabulary within individual databases, such as Medical Subject Headings (MeSH).

We will also search websites of key organisations in the area of health and transport to search for reports and evaluation documents, including the following: Department of Health and Social Care (DHSC), Department for Transport (DfT), Sustrans, Active Travel England, Transport Research Laboratory, Eltis (The Urban Mobility Observatory), Association for European Transport, and the WHO Transport webpages and included weblinks.

Effectiveness Review

We anticipate employing the same search strategy to identify records for both the Evidence Map and Effectiveness Review, given the Effectiveness Review will likely use eligibility criteria that are either identical or narrower than those criteria used for the Evidence Map. We may conduct additional searches and/or update the map searches for the in-depth review if deemed necessary once the parameters of the Effectiveness Review have been set. This would likely include forward and backwards citation searching on relevant studies identified from the Evidence Map, using OpenAlex Graph and Scopus.

Selection procedure

Evidence Map

Bibliographic records will be imported into EPPI Reviewer 6 and duplicates will be semi-automatically identified using its 'manage duplicates' tools and discarded.

Records will be prioritised for title-abstract screening using 'active learning', where the list of unscreened records will be continually reprioritised by a machine learning classifier that is being trained to distinguish between eligible and ineligible records based on the growing corpus of eligibility decisions made by the researchers. Use of 'active learning' expedites study selection in systematic reviews by ensuring that records of eligible studies are more likely to be identified and selected early in the screening process, compared with screening records in a quasi-random order (e.g. alphabetical). Title-abstract screening will be truncated at a point where we judge it is unable to be justified in terms of significantly increased effort being required to identify each new relevant study. This will be informed by monitoring the rate of study inclusion into the full-text screening stage via screening progress data (captured by EPPI Reviewer) to observe when the rate of identifying potentially eligible studies slows significantly. Where feasible, manual screening will be undertaken for all records without an abstract and those identified from manual searching. We may also apply other processes to support ceasing manual screening, such as comparing the inclusion rate with that from an initial randomly screened sample, and observing the trend in relevance ranking of the remaining unscreened references after applying a machine classifier that is trained on the manually screened records.

Eligibility screening will proceed from examination of the prioritised title-abstract records to assessment of corresponding full-text articles for those title-abstract records assessed as potentially eligible.

Title-abstract screening: A sample of 100 title-abstract records will initially be pilot screened by three reviewers independently and their decisions compared. Additional samples will be screened by all three reviewers until a high degree of agreement on inclusion/exclusion decisions (90% or more) is achieved. The remaining title-abstract records will be screened by one reviewer only, but if there is uncertainty regarding the eligibility of a record, it will be discussed with a second reviewer to reach a joint consensus decision.

In operationalising our inclusion criteria into concrete screening rules, we anticipate that, in particular, the inclusion of eligible outcomes in an article (i.e. including outcome data that relate to population subgroups) may not be consistently mentioned explicitly in abstracts. Therefore we will likely be relatively inclusive at title-abstract screening stage, retaining abstracts that include more implicit indications that such data could be present e.g. mention of a focus on equity or differential impacts (irrespective of this being linked to population groups), or suggest related analytic approaches e.g. moderators, modifiers, or subgroups.

Full-text screening: If feasible by respect to the number of records that require full-text screening, full-texts of all potentially relevant records will be screened independently by two reviewers. Any disagreements that arise will be resolved by consensus or if necessary by consulting a third reviewer as arbiter. If we judge there are too many records to make independent screening by two reviewers feasible, full-texts will instead be screened by one researcher with a second researcher verifying all exclusion decisions.

Any papers not written in English will be translated using Google Translate and then screened.

Effectiveness Review

To be determined.

Data extraction

Evidence Map

Our intention for mapping the evidence will be to efficiently establish an understanding and an overview of the landscape of relevant research representing its key features and characteristics, to usefully inform the design of the subsequent Effectiveness Review. As such, we do not intend the Evidence Map to be exhaustive (i.e. by including all primary and secondary research that meets our inclusion criteria).

We will first extract information from systematic reviews to determine areas of the map that may not merit additional synthesis. This will be followed by extraction of information from primary research reports in areas of the map not comprehensively covered by existing systematic reviews. We will cease extracting new information either as a whole, or to specific parts of the Map, when by consensus we judge that it will not add further useful information. Our overall strategy is analogous to the process of 'cartographic generalisation' (Touya et al, 2023) - which is integral to the design of maps of physical space - as the level of detail of coded information presented in the Evidence Map will be iteratively fine-tuned to make it appropriate to its scale and purpose, through procedures of selection, simplification, and classification.

Data will initially be extracted in increments of 10 articles independently by two reviewers. As far as possible this will be represented as codes for categories and options within those categories. Alongside data extraction refinements to these categories, their options and other aspects of the organisational structure of the map and related definitions will be suggested and agreed by consensus, involving a third reviewer as necessary. Further increments of articles will be extracted by both reviewers until both of the following conditions are met: i) achieving a high degree of agreement (90% or more), and ii) no substantive changes to the map's organisational structure being required.

Data extracted for the Evidence Map will be sufficiently detailed to be enable it to inform the criteria for inclusion for the Effectiveness Review, as well as help to contextualise the nature of the narrower evidence base included in, and findings of, the Effectiveness Review. We therefore plan to include the following, but this may be expanded or otherwise revised as we encounter new evidence. Furthermore, while we anticipate that the characteristics listed will each be extracted in some way, for some their precise formulation and categorisation will necessarily develop iteratively as the Evidence Map develops, via both bottom-up (useful categorical distinctions emerging as new evidence is encountered) and top-down processes (applying existing knowledge from the active travel and other literatures and new conceptual knowledge as it is encountered via the literature and discussion).

Study and publication characteristics: Study design (e.g. randomised controlled trial; interrupted time series; controlled before and after; prospective cohort; repeated cross-sectional; other longitudinal design); Year; Type of publication.

Setting characteristics: Country; Study and geographic setting (e.g. delivered in community; delivered via an institution such as a school, or workplace).

Participant characteristics: Focus on general or specific population(s); Population subgroup(s) that are specified and represented with related data: at minimum, we will include codes for: sex/gender; race/ethnicity; age (e.g. children and adolescents/elderly); socioeconomic status (e.g. categorisation via education, income, occupational status, geography); disability; sexuality (by LGBT+ group(s)).

Intervention characteristics: A broad categorisation of intervention types applying the Behaviour Change Wheel (Michie et al, 2011), assigning its seven policy categories (Communication/marketing; Guidelines; Fiscal; Regulation; Legislation; Environmental/social planning; Service provision[3]) and/or its nine intervention functions (Education; Persuasion; Incentivisation; Coercion; Training; Enablement; Modelling; Environmental Restructuring; Restrictions). Categories are not mutually exclusive (i.e. some interventions may require multiple codes). Precise category boundaries and associated definitions will be refined as the mapping proceeds. We intend to link this categorisation using the Behaviour Change Wheel to the Behaviour Change Technique Taxonomy (v1) (Michie et al, 2013) in the subsequent Effectiveness Review.

Outcome characteristics: Active travel activity outcomes assessed (e.g. walking; cycling, wheeling, scootering); Measure(s) of active travel used (e.g. duration, distance, frequency; via observation, via self-report); How differential impact data for active travel reported (e.g. absolute outcome value(s) for subgroup(s); correlational/associational data; not examined or interpreted as an independent variable (e.g. used as control variable only)); Health outcome(s) assessed; Measure(s) of health outcome(s) used; How differential impact data for health outcome(s) reported.

Study quality: We will not appraise the quality of studies in the process of generating the Evidence Map because we are not synthesising their findings. We may subsequently appraise the quality of some studies e.g. existing systematic reviews, to inform development of the scope of the Effectiveness Review.

Effectiveness Review

To be determined.

Mapping and synthesis

The planned work will involve multiple related stages in order to address the stated Aims.

Evidence Map

This stage will involve generating a map of evaluations of available active travel interventions targeting, or reporting outcomes for, disadvantaged (and other different) groups, and drawn from a global context. This will tabulate the specified key characteristics, in particular, the extent of evidence regarding different population groups, and its distribution across possible intervention types. An interactive map of the evidence will be generated using EPPI Reviewer's Visualisation software (EPPI-Vis) (Thomas et al, 2022) to enable users to examine our findings visually and view the

[3] This also aligns well with categorisations used in previous reviews focused specifically on active travel interventions (e.g. Cavill et al, 2019; Hansmann et al, 2022; Medeiros et al, 2021; Smith et al, 2017; Xiao et al, 2022) which commonly include but with varying terminology: changes to the physical/built environment (including e.g. specific active travel infrastructure such as cycle or pedestrian paths or pavement improvements, and streetscape or public realm improvements (e.g. lighting, signage, greening, street furniture); marketing/promotion/information campaigns to encourage or increase awareness/knowledge of the benefits of and opportunities/resources for, active travel (e.g. education sessions); provision of skills training, equipment or structured opportunities (e.g. cycle training, cycle share or subsidy schemes, walking buses); and, incentives (e.g. financial or other rewards for behaviour).

bibliographic details of included studies. The map will be accompanied by a descriptive summary of the Evidence Map which will detail the extent and nature of the current evidence base (including important gaps). The summary will address our first research question - *What is the extent of current evidence evaluating active travel interventions targeting, or reporting outcomes for, different groups?* - as well as supplementary questions of whether identified interventions address known factors linked to active travel (see 'Additional scoping to inform the descriptive summary of the Evidence Map'), and address the full range of available intervention types (as per the distribution of evidence in relation to categories of intervention characteristics).

Additional scoping to inform the descriptive summary of the Evidence Map

In parallel to, and following, the Evidence Map being populated, we will conduct additional non-systematic scoping of the wider literature to help contextualise its findings beyond what is possible from solely the evidence included in the map. We will prioritise effort towards the nature of evidence that is observed in the Evidence Map, and which we can be certain will be able to be represented in an Effectiveness Review (e.g. population subgroups and intervention types for which evidence is identified).

This interrogation of the wider literature will primarily focus on identifying the factors (barriers and facilitations) associated with active travel for population subgroups for which evidence of intervention effectiveness exists. These factors will then be linked to the review team's judgements of whether the identified interventions plausibly address them. We anticipate that some factors will clearly map on to the explicit purpose of interventions e.g. judging that concerns about lack of safe infrastructure for walking and cycling are plausibly addressed by provision of safe infrastructure. Others may require more judgement in terms of their purpose or content, and where it is not explicitly reported or unclear how the evidence may or may not map on to factors, we will agree such mapping by consensus of at least two reviewers with a third as arbiter where necessary. Scoping will be truncated if we identify substantive evidence of these factors for a particular population subgroup e.g. via identifying a focused quantitative or qualitative systematic review complemented by relevant primary data e.g. Sustrans Walking and Cycling Index Data Tool panel data from 2019 and 2021 which captures key barriers and facilitators for different sociodemographic groups (https://www.sustrans.org.uk/the-walking-and-cycling-index/walking-and-cycling-index-data-tool/what-people-think/.

There may be other contextual aspects which require similar non-systematic literature scoping, whether at this stage or a subsequent stage. This may include additional corroboration of whether apparent gaps in the Evidence Map reflect a true absence of any evidence or may be linked to limiting criteria we applied; identification of complementary qualitative data on experiences of included interventions including concerning specified active travel and health outcomes; and, additional scoping of key relationships or concepts that we may also need to consider for the conceptualisation, design, or interpretation of the Effectiveness Review (and as such will be addressed when we finalise that review's protocol).

Use of the Evidence Map to inform the Effectiveness Review

The process of generating the Evidence Map will aid us in refining the scope and the protocol for conducting the Effectiveness Review, particularly around the range of possible outcomes and study designs. For example, we will seek to specify and define the likely wide range of eligible outcomes (and measures thereof) that could assess frequency, duration, or distance, in relation to a range of

behaviours, which outcomes it may be most justifiable to combine or treat as distinct, and which are likely to be most informative to address the review's Aims and the most feasible (e.g. where data are most plentiful).

Effectiveness Review

To be determined.

Equity issues

Health inequities are unfair, socially produced, and systematic disparities in health outcomes between population groups, associated with their social, economic or personal characteristics (Dahlgren and Whitehead, 2006; Hollands et al, under review). Reducing health disparities forms a core component of the UK Government's 'Levelling Up' agenda (Department for Levelling Up, Housing and Communities, 2022), and considerations of equity impacts are entwined with active travel. Where dimensions of equity are associated with lower prevalence of active travel, this has the potential to directly exacerbate inequalities in health outcomes, given adverse effects of physical inactivity. Wider prevalence of active travel may also exacerbate inequalities via various indirect pathways. For example, lower socio-economic status people are more affected by the externalities of predominant non-active modes of travel, such as being subject to disproportionate exposure to the pollution, safety and social connectivity impacts of motor vehicle infrastructure (Rutter et al, under review).

Our consideration of equity for this evidence synthesis is informed by ongoing development of a checklist that we (within the NIHR PRP Reviews Facility) are developing as part of a new suite of tools for use to help guide consideration issues of health equity in systematic reviews and related forms of evidence synthesis. In developing this protocol we have applied the current (November 2023) version of the checklist to the Evidence Map. *See Appendix 1 for details*.

The implications of completing this checklist for the Evidence Map as described above are that we will both systematically seek to identify and code evidence (or a lack thereof) in relation to each of our specified population subgroups, as well as use this information to inform further explicit consideration of dimensions of equity when reporting the findings of the Map (e.g. ensuring that we explicitly describe where evidence is and is not located in relation to dimensions of equity impacts). Furthermore, while for pragmatic reasons, we have not completed the checklist for several additional population subgroups from a wider set specified within the checklist, should evidence pertaining to these or other additional population subgroups be identified in the course of completing the Map, we will add corresponding codes to our data extraction process and treat these subgroups in a comparable manner.

Stakeholder engagement

Ongoing policy stakeholder involvement of DHSC colleagues in developing and finalising research questions and methods. No public involvement is planned.

Provisional Timetable (TBC)

	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8
Searches for the Evidence Map								
Screening of records (title/abstract & full text screening)								
Data extraction								
Additional scoping of wider context								
Draft Evidence Map summary; Circulate to DHSC for comment; Finalise Evidence Map and summary								
Develop protocol for Effectiveness Review in conjunction with discussions with DHSC								
Additional searches and screening for the Effectiveness Review and non-systematic scoping of wider context	TBD							
Data extraction	TBD							
Analysis	TBD							
Draft Effectiveness Review; Circulate to DHSC for comment; Finalise Effectiveness Review	TBD							

Registration

The protocol for the Evidence Map will be registered on the Open Science Framework. The protocol for the Effectiveness Review will be registered on both PROSPERO and the Open Science Framework.

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Appendix 1 – Provisional assessment of equity considerations

Our consideration of equity for this evidence synthesis is informed by ongoing development of a checklist that we (within the NIHR PRP Reviews Facility) are developing as part of a new suite of tools for use to help guide consideration issues of health equity in systematic reviews and related forms of evidence synthesis. In developing this protocol we have applied the current (November 2023) version of the checklist to the Evidence Map.

This checklist comprises a set of six signalling questions, and we considered in turn whether these potentially apply to studies eligible for inclusion in the Evidence Map, across the minimum set of population subgroup(s) or dimensions for which we have specified (see 'Data extraction') that we will include data extraction codes for (i.e. sex/gender; race/ethnicity; age (e.g. children and adolescents/elderly); socioeconomic status (e.g. categorisation via education, income, occupational status, geography); disability; sexuality (by LGBT+ group(s).

We judged the following four (of six) signalling questions – 1a, 1b, 2, 3a - to be relevant to the Evidence Map (i.e. justifying a 'Yes' response):

1a. Is the intervention under investigation targeted at specific marginalised, at-risk, socially excluded and/or inclusion health group(s) of people?;
1b. Is the intervention under investigation aimed at reducing social gradients across populations or among subgroups of the population?;
2. Are the impacts of, or responses to, the intervention(s), or the experiences of the phenomenon, under investigation, expected to differ among specific marginalised, at-risk, socially excluded and/or inclusion health group(s) of people in important or meaningful ways? *(This signalling question necessitated a judgement on how confident we are that effects differ, which we considered to be unsure for all groups. While there appears to be some evidence for each population subgroup (other than concerning sexuality where there is an apparent absence of evidence), that membership may be associated with reduced active travel (Sustrans et al, 2022), initial scoping of evidence from multiple reviews of the patterning of intervention impacts for different population subgroups (Hansmann et al, 2022; Medeiros et al, 2021; Tcymbal et al, 2020, Smith et al, 2017) suggests no clearly consistent and reliable differences in impacts)*
3a. Is the health condition, public health issue, or phenomenon, being addressed by the review (and/or map) more likely to be experienced by one or more specific marginalised, socially excluded and/or inclusion health group(s) of people? (*Given there appears to be some evidence for each population subgroup (other than concerning sexuality where there is an apparent absence of evidence), that membership may be associated with reduced active travel (Sustrans et al, 2022), we considered this to be relevant for all groups other than concerning sexuality)*

We judged an 'Unsure' response most appropriate for the remaining two signalling questions (3b, 3c):

3b. Are aspects of the intervention(s) and/or comparator(s), including how they are provided, expected to make it harder for some specific marginalised, at-risk, socially excluded and/or inclusion health group(s) of people to take part in eligible studies?;
3c. Are elements of study design, such as eligibility criteria or recruitment and consent processes, expected to make it harder for some specific marginalised, at-risk, socially excluded and/or inclusion health group(s) of people to take part in eligible studies?