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Encouraging sustainable travel behaviour in children, young people and their families

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Executive summary

Purpose

In 2022, the Scottish Government consulted on a draft route map that sets out interventions to reduce the distance travelled by car by 20%, by 2030. Some of those relate specifically to children and young people (CYP).

This project aims to provide evidence to support the development of integrated policy interventions to increase sustainable travel among Scotland's CYP and their families. We reviewed Scottish, Welsh and Danish policy, and literature evaluating interventions related to sustainable travel among CYP and families, focusing beyond the journey to/from school.

Key findings

Literature review

The limited evidence on interventions influencing non-school related sustainable travel by CYP and their families, along with insights from methods like the Scottish Government's ISM (Individual, Social and Material) behaviour change framework¹ and wider literature on travel behaviour suggest that there is potential in:

- supporting infrastructural improvements with interventions that capitalise on the social environment of educational settings;
- addressing travel behaviours beyond the school commute;
- designing integrated interventions to maximise both sustainable travel and related policy objectives such as physical activity and road safety;
- including interventions that target families with younger children (0-4 years old) and whole family units; and
- intervening with specific age groups and during key moments of change such as the transition from primary to secondary school, leaving school and starting a family.

¹ <https://www.gov.scot/publications/influencing-behaviours-moving-beyond-individual-user-guide-ism-tool/pages/2/>

Policy review

The policy review found that coverage of issues around CYP's travel was limited across Scottish local authorities. Our analysis of local and national policy highlights that:

- There is consistent support for walking, wheeling and cycling across the policy landscape. The Scottish Government's Place Principle emphasises the role of the local environment in shaping opportunities to play, be physically active and safe when walking, wheeling and cycling.
- Many policy actions that might affect CYP do not mention them explicitly, or only mention travel to school even in cases where policies would be expected to impact CYP travel behaviours more widely. There is no consistent policy goal except in relation to school travel.
- There is considerable potential to broaden the narrative on CYP travel to encompass all types of journeys, as well as to improve cross-sectoral integration by including recognition of the multiple benefits of increasing active travel by CYP in local authority level policies on planning, tourism and air quality.
- There is potential to improve cross-sectoral integration by recognising the multiple benefits of increasing active travel by CYP in local authority level policies on planning, tourism and air quality.
- National policy aligns with the goal of promoting sustainable travel by CYP, however, this could be strengthened by e.g. setting out a high-level policy goal to support independent travel from around the age of 12 and expanding tools for assessing play opportunities.

Recommendations

The following recommendations for policymakers in national and local government set out priority actions to promote sustainable travel amongst CYP and their families.

1. Prioritise inclusive infrastructure to deliver a transport network that promotes independent movement from around age 12 (around the transition to high school or earlier), to support sustainable travel norms before children reach driving age.
2. Consider the potential for development of a policy indicator of children's independent travel to benchmark progress and complement indicators around school travel.
3. Harness the potential to deliver interventions in educational settings. Learning for Sustainability is embedded in the Curriculum for Excellence and affords opportunities for interventions targeting multiple objectives – sustainable travel, physical activity, safety and wellbeing – aligning with the 'Getting It Right for Every Child' (GIRFEC) approach.
4. Shift the default language in policy and focus of interventions beyond travel to school to encompass wider travel behaviour for leisure and other purposes, normalising the idea of children as needing to travel for all sorts of reasons.
5. Consider play as a cross-cutting goal. There is potential for play policy to maximise benefits to CYP by including all of the neighbourhood as potential play space, rather than focussing on a defined list of play spaces. This would be comparable to the Welsh Government's Matter F: Access to space/provision in their play sufficiency toolkit. There are also opportunities to develop street/design guidance to accommodate different age groups and their capabilities (in line with the age-groups used in the play sufficiency regulations).

6. Enhance the links between transport and child poverty action by ensuring strategies to tackle child poverty include measures on active travel accessibility alongside policy goals on public transport accessibility.
7. Enable, incentivise and raise awareness of whole-family travel opportunities. These might include providing smaller bikes, bike seats and cargo bikes through cycle share schemes; family-friendly rail fares and facilities in public transport and at interchanges; and in the design of walking and cycle routes to accommodate groups.
8. Consider key life course transitions in designing interventions e.g. moving from pre-school to primary school, primary school to secondary school, leaving school, becoming a parent. This might include opportunities to piggyback on existing interventions e.g. baby boxes.
9. Prioritise place-based intervention approaches. Place-based approaches allow priorities to be set locally, taking into consideration the social, economic and environmental context. There is potential to use the ISM Tool in such approaches, to map the factors that support or constrain sustainable travel by children and young people locally and identify priorities for future interventions.
10. Engage children of different ages, backgrounds and abilities in developing ideas and designing future interventions. Capitalise on existing tools (e.g. Place Standard tools for Children and Young People or the ISM Tool) and integrate with existing work engaging with CYP in different policy areas (e.g. local development plans, youth engagement, children's rights). The choice of appropriate tool may depend on the specific objectives of the engagement e.g. whether focused specifically on designing transport-related interventions or wider objectives around place-making.
11. Build in robust evaluation to future interventions and pilot initiatives funded by the Scottish Government. There is also a need for research to evaluate informal interventions, such as bike buses and family bike workshops being delivered by the third sector and by community organisations. Adopting ISM-thinking in evaluation design could help to diagnose reasons for intervention success or failure.

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1 Introduction

1.1 Context

Scotland's Climate Change Plan 2018-2032 update set out the commitment to achieve a 20% reduction in car kilometres travelled by 2030, as part of the Scottish Government's policies and proposals to achieve Net Zero by 2045. In January 2022, Transport Scotland published a [route map to car use reduction](#) setting out interventions through which this target would be achieved, several of which focus on children and young people (CYP). CYP are a critical demographic group for a number of reasons. The Scottish Government recognizes the rights of young people as set out in the UN Convention on the Rights of the Child (UNCRC), and there is increasing emphasis on involving young people in policy making (e.g. in the planning system). CYP are also the demographic who will experience the greatest effects of climate change in their lifetime, and as such hold a considerable stake in Net Zero policy and have the potential to act as agents of change in the sustainability transition. Behaviour change amongst this generation has the potential to create long-lasting effects throughout their adult lives and in creating enduring positive social norms for future generations. In this way, behaviour change among CYP may play an important role in creating the conditions for a social tipping point in travel norms. At the same time, CYP are a diverse demographic group – the design of interventions targeting behaviour change in CYP must therefore remain sensitive to the different factors shaping travel behaviour amongst CYP of different ages and abilities (including the level of agency children themselves have in their travel choices), and of families as they move through different stages in the family life cycle. Furthermore, CYP living in deprived areas and in rural and island communities, and disabled CYP, may experience particular barriers to sustainable travel, and travel options can impact on wider opportunities for these groups.

Transport Scotland's car use reduction route map outlines four priority behaviours. These are: reducing the need to travel (e.g. using online alternatives), living well locally (accessing local good, services and amenities), switching modes (walking, wheeling, cycling or using public transport rather than car travel), and combining or sharing car trips with others. Achieving the objective to reduce car travel amongst CYP and shift to more sustainable alternatives is a matter of cross-sectoral policy relevance due to: a) the wide range of Individual, Social and Material factors shaping travel behaviour, and b) the potential for the realisation of multiple benefits across a range of policy domains. As well as transport and climate change policy, CYP travel behaviours are of relevance to: health and wellbeing as outcomes of active travel and in relation road safety and air and noise pollution from car traffic; communities, planning and the built environment e.g. in relation to the delivery of the 20 Minute Neighbourhoods model (O'Gorman & Dillon-Robinson, 2021) and National Planning Framework 4 (NPF4), and in urban design, masterplanning and architecture to support sustainable travel; the natural environment sector's role in creating safe and attractive environments for active travel and promoting sustainable travel in visits to the outdoors; in relation to the environmental sustainability of the leisure and tourism industries; in the support for children's rights set out in the UNCRC; and in relation to education and employment opportunities. Creating cultural change in travel behaviours, where sustainable travel is the norm, requires action across multiple policy portfolios and at range of scales, necessitating intervention at both national and local government levels.

There has, thus far, been considerable attention to school-related travel, including in previous Scottish Government research (Systra, Wellside Research & Sustrans, 2016; Transport Scotland, 2021). However, to accelerate progress towards the 2030 target it is necessary to consider further potential interventions focusing on the wider travel

behaviours of CYP and their families. There is therefore a need for a synthesis of the existing evidence base on such behaviours to underpin future policy approaches.

1.2 Aim and research questions

This project aims to provide evidence to support the prioritisation of actions to increase levels of sustainable travel amongst Scotland's CYP and their families, within an integrated cross-sectoral policy approach. The project focuses primarily on switching to more sustainable travel modes, although this might also entail choosing more local destinations that can be accessed by sustainable travel modes. Sustainable travel modes considered within the project include active travel in the form of walking, wheeling (e.g. using a wheelchair or other wheeled mobility aid), using a pushchair or (non-motorised) scooter or cycling, and public transport such as trains, buses and trams.

The research focuses on journeys other than the school commute. This can include after-school or out-of-school clubs and activities, leisure and shopping trips, and holidays. The core population of interest here are CYP up to age 18 and their families (in line with the UNCRC).

The project will address the following research questions:

1. What policy actions are currently being taken in Scotland to promote sustainable travel by CYP and their families? Are there opportunities for greater cross-sectoral integration in achieving this objective?
2. What policy interventions are most likely to change the travel behaviours of CYP and their families, based on Scottish and international evidence?
3. Which policy interventions have the potential to contribute most to wider policy objectives in Scotland, including supporting an inclusive and Just Transition to Net Zero?
4. What actions should be prioritised by policymakers to promote sustainable travel by CYP and their families and contribute to normalising sustainable and active travel across the life course?

In the following section we outline the methods and evidence used to address these questions. We then go on to present evidence on interventions (research questions 2 and 3) and current policy (research question 1), and bring together a set of conclusions and recommendations (section 6, addressing research question 4).

2 Methodology

2.1 Research methods

The research consists of two components: 1) a review of literature synthesising evidence on interventions from Scottish and international academic and grey literature, and 2) a policy review identifying and analysing relevant local and national policy in Scotland, supported by an analysis of policy approaches in two international comparator countries (Wales and Denmark). The research team brought together insights from these two components in an intensive integration workshop, in which an initial set of recommendations was developed.

The specific methods used in literature review and policy review are outlined in sections 3 and 4 and Appendix A.

2.2 Conceptual framework

The Scottish Government's *ISM (Individual, Social, Material) Tool* (Darnton & Horne, 2013) is a useful interdisciplinary conceptual framework through which to consider behaviour change in relation to sustainable travel. We used the ISM as an analytical tool to characterise interventions in terms of the Individual, Social and Material factors targeted and as a lens through which to consider CYP travel behaviour from a holistic, systems perspective.

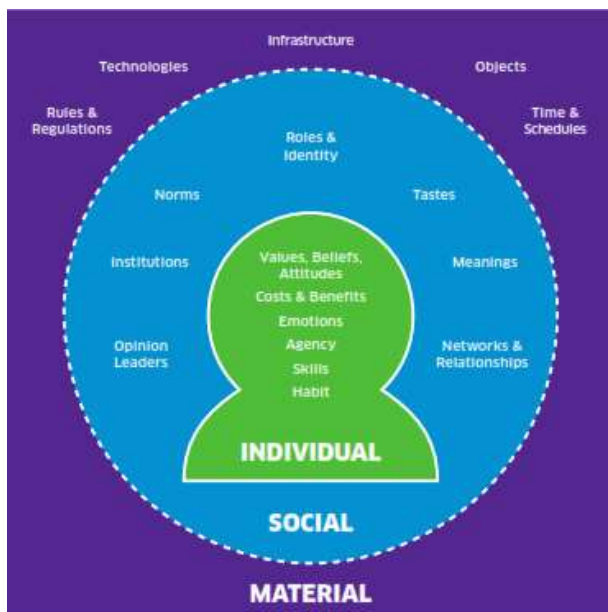


Figure 1.1 : The ISM Framework

Alongside the ISM, we adopted a *life course perspective* (Elder et al., 2003), which considers the ways in which behaviour change occurs (or not) over time throughout the different stages of a person's life. This involved paying particular attention to ages and stages of childhood and of family life in our analysis. Considerations include: how children's competencies, agency and influence change as they grow; how habits can be disrupted by intervention at key transition points (Verplanken & Wood, 2006); the influence of social norms associated with changing social identities (e.g. as a teenager, as a parent); and impacts of family norms in childhood on behaviour as an adult.

3 Literature review

3.1 Review approach and overview of intervention studies

The literature review method involved a systematic search and screening process of academic and grey literature studies (see Appendix A for details). The search process identified sources which mentioned keywords related to sustainable travel, interventions, and children, young people or families in titles, keywords list or abstracts. Sources were included in the review if they presented an evaluation of an intervention in relation to children and young people. This included: studies reporting on interventions specifically targeting children, young people or family travel; studies reporting evidence on the impact of wider interventions on CYP/families; and studies reporting intervention impacts on adults' attitudes to CYP travel (e.g. willingness to allow children to travel, or perceptions of children's safety). The full set of inclusion/exclusion criteria applied is set out in Appendix A.

Fourteen studies met the criteria for inclusion in the review. Overall, these studies evaluated 10 separate interventions. Two interventions were evaluated in more than one study. No studies investigated more than one intervention. Appendix B sets out an overview of the studies included in the review (geographic coverage, types of interventions studied, methods used etc.) and details of the interventions themselves.

3.2 Intervention impacts on travel behaviours of CYP/families

3.2.1 Measuring travel behaviour impacts

Travel behaviours of CYP or their families were measured in only eight of the 14 studies (covering six of the 10 interventions). Studies without behavioural measures focused on generating qualitative insights about experiences rather than measuring change (three studies), on perceptions rather than behaviour (two studies), or on modelling the potential impact of behaviour change on physical activity levels (one study). In studies assessing travel behaviour impacts, self-reported measures were most common. These varied widely (see Box 3.1). Three studies (covering two interventions) also collected objective measures of travel behaviour (using e.g., GPS systems on cycles, or embedded in mobile apps), but lacked necessary baseline or control group data to be able to assess change using these measures. The variety of different travel behaviour measures used made it difficult to directly compare interventions.

Box 3.1: Self-reported travel behaviour measures used in reviewed studies

- Frequency of travel (e.g., trips per day, days travelled per week) by different modes
- Duration of time spent travelling by different modes
- Distance travelled by specific travel modes
- Distance travelled for different purposes
- Proportion of journeys made by different modes
- Primary travel mode for different purposes/destinations
- Whether or not a particular travel mode was ever used for a particular purpose/destination

3.2.2 Which interventions successfully changed travel behaviour?

A summary of the impact of each intervention is provided in Table 3.1. We discuss those interventions which appear to have had the greatest impact below.

High impact interventions

Looking at the impact scores assigned to the studies (Table 3.1), the most successful intervention was not a travel intervention, but a health focused one – the “lauft” school physical activity program (Isensee et al., 2018). The 12-week awareness-raising

programme (involving pedometer step count competitions and class-based physical activity challenges) resulted in a significant and sustained increase in daily active travel (minutes walking or cycling) at the 1 year follow-up. This physical activity-focused study did not measure travel outcomes other than active travel minutes so it is not possible to assess the extent to which active travel replaced car use.

Medium impact interventions

The most successful transport-focused intervention was the CARTOBIKE kindergarten trial (Bjørnarå et al., 2019; Bjørnarå et al., 2021), in which providing parents with bicycles resulted in positive effects on cycling and reduced car use. Providing e-bikes had a small positive effect on cycling as compared to traditional bikes (Bjørnarå et al., 2021). As well as increases in cycling, the evaluation reported greater motivation to cycle and higher ratings of enjoyment amongst participants (Bjørnarå et al., 2019).

Two interventions promoting public transport reported positive changes in travel behaviour - the free London bus travel for young people (Edwards et al., 2013, Green et al., 2014), and the Nordhorn intervention for children with intellectual disabilities (Haveman et al., 2013). However, due to the lower methodological quality of these studies it is not possible to confidently attribute behavioural changes to the interventions themselves. The evaluation of the free bus travel for young people intervention showed that more short trips were made by bus after the introduction of free travel than before, with some evidence of a shift from walking to bus use. Despite this, there was no evidence that the intervention impacted on overall distance travelled by bus or walking (distance by bus increased for both young people and the control group of adults). At the same time, however, overall distance by car declined (both in young people and the control group, but with a greater decline seen in young people). It is not clear whether this means a statistically significant reduction in distance travelled by young people overall as this was not assessed in the study. Nor is it clear the extent to which car use was directly replaced by different travel modes – the observational method used and the variety of different measures of travel behaviour used means it is difficult to speculate on the cause of observed changes.

Qualitative research (Goodman et al, 2014, Green et al., 2014) highlighted that young people valued free bus travel for providing opportunities for leisure trips and as a social activity. In the Nordhorn public transport intervention (Haveman et al., 2013), a much greater proportion of children reported ever having used public transport for leisure purposes after the intervention than before the intervention. However, as only one question related to leisure behaviour (the rest of the evaluation focusing on travel to school), it is not clear whether the frequency of bus trips for leisure changed.

Table 3.1: Summary of travel-related impacts of interventions. Details of the interventions are provided in Appendix B. Impact score indicates the magnitude of impact on sustainable travel behaviours (high impact = shift towards more sustainable travel behaviour). Quality score provides indication of the methodological quality of the study (see Appendix A). Blank fields (-) indicate where impact was not assessed. Impact scores have only been assigned where a study has assessed travel behaviour impact

Intervention	Studies	Travel behaviour impact	Impact score	Quality score	Impact on travel-related attitudes, perceptions and experience
1) CARTOBIKE kindergarten trial	Bjørnara et al., 2019	Intervention group more likely than control to cycle to work (39% vs. 5.9%) but no difference in primary modes for kindergarten commute or shopping. Overall increase in frequency of cycling (for all destination types) and decrease in car use frequency (for work and kindergarten) in intervention group.	Med	Med	Motivation to cycle higher in intervention group than control at follow up and increased in intervention group from baseline. Ratings of enjoyment also increased.
	Bjørnara et al., 2021	E-bike (vs traditional bike) had small positive effect on cycling.	Low	Med	-
2) "läuft" school physical activity program	Isensee et al., 2018	Average daily active travel time increased significantly in intervention group (from 49 min to 66 min) between baseline and 1 year follow up. No change in control.	High	High	-
3) School based active travel campaign	Stark et al., 2018	Mixed results – intervention group increased cycling and decreased car use, but control group also decreased car use, with increased walking and public transport.	Low	Med	Attitudes to walking improved in intervention group, relative to control group but no difference in changes to cycling attitudes. Attitudes towards car use became more negative in the intervention group.
4) Free bus travel for young people	Edwards et al., 2013	Share of short trips travelled by bus doubled in young people (significant increase compared control group of adults), however share of short trips walked declined, indicating shift from walking to bus. However, there was no overall impact on overall distance walked, nor of overall number of bus trips or distance travelled by bus. No overall change in share of short trips by bike or car, but distance travelled by car and by bike declined overall in CYP, relative to the comparator adult group.	Med	Low	-
	Goodman et al., 2014	-	-	Low	Participants noted that free bus travel offered greater opportunity for non-essential social and recreational trips, including exploring new places. Also emphasized importance of buses for socialising.

	Green et al., 2015	-	-	Low	Highlights contribution of qualitative findings (see Goodman et al, 2014) to quantitative findings in Edwards et al., 2013.
	Green et al., 2014	Reiterates impacts described in Edwards et al., 2013	Med	Low	Reiterates impacts described in Goodman et al, 2014, Green et al., 2015.
5) Nordhorn Public Transport Intervention Study	Haveman et al., 2013	Before intervention 49% of participants had ever travelled alone by bus for leisure, increasing to 88% after intervention.	Med	Low	-
6) Smartphone app game	Roider et al., 2019	When questioned about which modes were used more often the most commonly reported were walking, followed by cycling (magnitude of effect unclear).	Low	Low	51% stated that they did not think more about mode choice as a result of the app. 71% felt game was effective in improving knowledge through feedback on the impact of their personal travel.
7) Edinburgh 20mph streets	Williams et al., 2022	-	-	Low	Perceptions on child safety at different speed limits did not change between baseline and follow ups at 6 months or 1 year.
8) Self-explaining roads	Ryan et al., 2018	-	-	Low	Children reported self-explaining roads made cycling in neighbourhood more enjoyable and provided greater opportunities for play. Views on safety impacts were mixed.
9) Protected cycle lanes	Knight et al., 2022	-	-	Med	Mixed evidence on adults willingness to let children cycle according to cycle lane type/presence. In both online and field experiments, participants were more willing to let children cycle on protected than unprotected cycle lanes. However, in the field study there was no difference between willingness scores for protected and control (no cycle lane) conditions.
10) Simulated interventions for physical activity	Almagor et al., 2021	-	-	Low	-

3.2.3 Considering interventions through the lens of the ISM

The ISM was developed as a framework for categorising the mechanisms by which interventions seek to create change (Southerton et al., 2011). For effective behaviour change, supporting conditions must be in place across the Individual, Social and Material domains, and therefore interventions targeting multiple domains (or suites of interventions which together cover multiple domains) are more likely to be effective (Southerton et al., 2011). As an analytical framework, the ISM can therefore be used to:

- a) identify the different mechanisms by which an intervention seeks to create change (i.e. which factors within the Individual, Social, and Material domains are interventions trying to address), and
- b) consider whether the wider Individual, Social and Material context in which an intervention is implemented supports or constrains the success of an intervention.

No studies appeared to target change across all three ISM domains. Several of the interventions used what might be described as ‘soft’ measures (Semenescu et al. 2020) which aim to change behaviour through “strategies aimed at influencing people’s perceptions, beliefs, attitudes, values, and norms” (Steg, 2003:190) to elicit voluntary change. These types of interventions typically seek to address Individual and Social factors within the ISM. Several of the interventions focusing on Individual and Social factors were delivered in the school setting. The advantages of targeting such interventions in this way include greater opportunity to activate social levers including shifting social norms at the peer-group level e.g. through competition and feedback, developing shared meanings around travel, and opportunities to raise awareness and change attitudes through learning about others’ experiences. Prior research has highlighted the potential of school-based initiatives to shift school-related travel behaviour (Jones et al., 2019, Larouche et al., 2018). However, our review found only a very limited number of wide-ranging school-based interventions that targeted out-of-school travel behaviour in addition to the school commute. Similarly, our review found little consideration of the potential for ‘contextual spillover’ (Verfuerth & Gregory-Smith, 2018), i.e. for positive impacts of interventions targeting school commuting behaviour to transfer to other types of journeys. There may be potential to maximise impact by widening out existing initiatives in schools to encompass both school commuting and out-of-school travel.

Whilst the success of the school-based ‘läuft’ physical activity intervention (Isensee et al., 2018) highlights the potential of school-based programmes, the mixed results of some other school-based interventions, such as the active travel campaign evaluated in Stark et al. (2018), indicate that the success of such interventions is likely to depend on a complex range of factors specific to the intervention (e.g. duration of intervention period) but also the wider context in which the intervention is delivered (e.g. enabling infrastructure). There may be potential to harness the ISM approach in two ways here. Firstly, to consider where interventions targeting specific Individual and Social factors through e.g. awareness raising, developing agency and skills, and targeting group norms, might be most likely to succeed due to the presence of enabling conditions related to other factors within the ISM domains. Secondly, to consider how an integrated suite of interventions might be usefully employed in a particular area to ensure that factors across the I, S and M domains are targeted. From this perspective, initiatives taking place in schools should take into consideration local infrastructure conditions and also consider how these soft interventions fit in in relation to changes happening in the built environment and policies such as free bus travel.

It was notable that few of the interventions focusing on Individual and Social factors attempted to address group norms at the family level. In the Nordhorn public transport intervention for children with intellectual disabilities (Haveman et al., 2013), parents were

involved to some extent through the provision of information, and in the CARTOBIKE intervention (Bjørnara et al., 2019, 2021) parents were targeted in the hope of influencing family travel. However, none of the studies targeted whole family units. Future interventions might usefully explore the potential to shift family travel behaviours through family-based interventions, for example pricing structures or mobility credit schemes that target whole family travel, or cycle skills training engaging whole families. This might help to overcome some of the tensions around targeting interventions at young children who may not have agency over family travel decisions, as well as avoiding placing too much expectation on children to act as agents of change. While there is considerable interest in the role of children as influencers of sustainable behaviours in households (Singh et al., 2022) there are also ethical issues associated with placing burden upon children to solve environmental problems created by older generations.

Four interventions sought to change Material factors, e.g. through providing equipment (as in the CARTOBIKE initiative), through changes to infrastructure (e.g. in providing protected cycle lanes), or by changing rules and regulations (e.g. through extending 20 mph speed limits). Unfortunately, only one of these interventions explicitly measured actual travel behaviour change in CYP or their families. This was the CARTOBIKE initiative, which was targeted specifically at families. Other Material-focused interventions were more broad /less targeted in that they intended to bring about change across the whole population through changes to infrastructure or speed limits. These interventions were included here due to their consideration of CYP, either directly through attempts to understand children's experiences (as in the Ryan et al. (2018) study on self-explaining roads) or indirectly via adults' perceptions of children's safety (Williams et al.; 2022; Knight et al., 2022). The fact that so few Material interventions were identified for inclusion in our review, and the lack of robust evaluation of impacts to CYP where they were included, points to a clear evidence gap around the *specific effects* of such broad-based interventions on CYP and family travel. While we did not specifically exclude studies reporting intervention impacts on a more general population (and so may have included young people, e.g. studies involving adults over 16), the design of our search strategy means that these were only picked up where the terms children and young people were used explicitly.

Replicating and upscaling interventions

The ISM framework offers a useful supporting framework for considering questions around the replicability and transferability of interventions to the Scottish context, and across local authorities in Scotland. Southerton et al.'s (2011) ISM-based international review of behaviour change initiatives, noted that simple replication of interventions does not guarantee success. Rather, it is necessary to consider local contextual factors across the ISM domains and identify to what extent existing conditions are likely to contribute to the success or failure of an intervention replicated from elsewhere. Similar considerations apply to the challenge of upscaling small-scale interventions like many of those reviewed here. It is difficult to assess the transferability of those interventions identified as successful in our review due to a lack of detailed information on the wider Individual, Social and Material contexts in which the interventions were delivered. For example, Isensee's (2018) description of the 'lauff' school-based physical activity programme provides no information on the catchments of the 29 participant schools, neither in terms of the physical environment nor any local social, economic or cultural factors. Whilst we have focused in this review on promoting sustainable travel modes, giving explicit consideration to the wider ISM context will also be important in the design of car-use reduction interventions focusing on promoting other travel behaviours around utilising digital and more local services, and car-sharing.

3.3 Intervention impacts on wider policy objectives

Evidence on the interventions' impacts to wider policy objectives was somewhat patchy. Some studies evaluated impacts to outcomes relating to overall physical activity, road safety, play opportunities, or social inequality (see Table 3.2). None of the studies reported impacts on carbon emissions. However, the mobile phone app-based study by Roider et al., (2019) found that children valued tailored feedback on the carbon emissions associated with their travel choices.

Whilst many of the interventions would be expected to contribute towards physical activity objectives, only two of the studies incorporated physical activity outcomes, with only one of these measuring (rather than modelling) physical activity (Isensee et al., 2018). The authors reported increases in moderate-vigorous physical activity and participation in organised sports as a result of this broad physical activity-focused intervention (Isensee et al., 2018). Almagor et al. (2021) modelled effects of changing travel behaviour on overall physical activity. This simulation study found that successful interventions shifting journeys for out-of-school activities to walking have the potential to deliver greater impacts to 9-11 year olds' physical activity levels than interventions shifting school travel to walking.

Several interventions were associated with positive changes to actual (Edwards et al., 2013) or perceived (Williams et al., 2022; Ryan et al., 2018; Knight et al., 2022) road safety indicators. Ryan et al. (2018) also highlighted the potential for street designs aiming to slow traffic to contribute to both children's perceptions of safety and opportunities for play, although some children expressed concern about situations where self-explaining roads were perceived to feel less safe due to vegetation impacting on visibility.

Table 3.2: Reported intervention impacts in relation to wider policy objectives

Intervention	Policy objective					
	Increasing physical activity	Improving road safety	Providing play opportunities	Reducing carbon emissions	Reducing inequalities	Reducing crime/violence
1) CARTOBIKE kindergarten trial						
2) "läuft" school physical activity program	+					
3) School based active travel campaign						
4) Free bus travel for young people		+			(+)	(-)
5) Nordhorn Public Transport Intervention Study					+	
6) Smartphone app game						
7) Edinburgh 20mph streets		+*				
8) Self-explaining roads		(+)*	+			
9) Protected cycle lanes		+*				
10) Simulated interventions for physical activity	+				-	

'+' denotes desirable effect, '-' undesirable effect. Brackets indicate mixed evidence with indications of desirable/undesirable effect

*Study looked at perceived safety only

Whilst only a few of the studies explored equality dimensions of the interventions, these highlighted that there are opportunities for sustainable travel interventions to contribute towards the objective of delivering an inclusive and just transition to net zero. The evaluation of free London bus travel for young people found mixed evidence on the impact of the scheme on transport poverty, but indications of a positive effect on opportunities for leisure travel in particular (Edwards et al., 2013; Green et al., 2014). One group not seen to benefit from this financial incentive to use public transport were disabled young people (Green et al., 2015). Haveman et al. (2013), in their study of the public transport intervention for children with intellectual disabilities, demonstrate the potential of interventions tailored to such groups of children who experience particular barriers to sustainable travel. Only one study focusing on active travel considered how different groups might be impacted. The simulation model by Almagor et al. (2021) highlighted that interventions aiming to shift travel from car to active travel modes may carry fewer direct benefits for less well-off families, as opposed to affluent families, as those that are less well off are less likely to own a car. However, going beyond the studies reviewed, we would also note that a reduction in car use also has potential to deliver many indirect impacts in deprived areas, e.g. through benefits to road safety and air quality.

In evaluating impacts of free bus travel in London, researchers were interested in potential impacts on crime in terms of hospital admissions due to assault. We assume that the rationale for this was that greater use of buses could result in more close contact which could lead to conflict among CYP. The study found evidence of an increase in assaults, however it was noted that this may have been more a continuation of a pre-existing upward trend in assaults at the time rather than due to the intervention itself.

4 Policy review

4.1 Purpose

The purpose of this review was to establish the policy actions currently being taken in Scotland to promote sustainable travel behaviours among children, young people and their families. The possible scope of the review was very broad from policy around transport and active travel, through to provision for play, children and families, and then climate change, air quality and low emission zones. It was anticipated that coverage of the topic was likely to be quite fragmented, requiring a broad net to be cast.

4.2 Methods

Ten Scottish local authorities were selected for study, based on two main considerations. Firstly, geographical context: the selected group includes urban, rural and island geographies to represent as full a range of Scottish places as possible. Secondly, the selection was informed by work on 20 minute neighbourhoods (O' Gorman, S. & Dillon-Robinson, 2021) and the Sustrans [Cycling & Walking Index](#) (Sustrans, 2022) to focus on places which have identified potential for sustainable travel. This work pointed to areas in the Cairngorms as having potential for 20 minute neighbourhoods, so the National Park Authority was chosen as the most appropriate administrative unit to include in the review. The sampled authorities were:

- Aberdeen City Council
- Argyll & Bute Council
- Cairngorms National Park Authority
- City of Edinburgh Council
- Dundee City Council
- Falkirk Council
- Fife Council
- Glasgow City Council
- Shetland Islands Council
- South Lanarkshire Council

The first stage of the review was to identify policy documents available through council websites. Three clusters of documents were investigated: transport and transport related strategies & plans; child-focused policy, e.g. play, child services, youth engagement; and a wide range of 'other' strategies including tourism, climate justice, air quality and open space strategies. Using an agreed list of key search terms, we identified 150 items of interest across the 10 authorities. Table 4.1 below shows the range of documents captured in the search.

In the second stage of the review we explored the policy documents in more detail using digital search tools. All transport related policy documents/items were searched with child-related keywords [child/ren; young person/people; infant, etc] and all child-related policy documents/items were reviewed using transport related keywords [travel; walking; mobility; accessibility etc]. A sample of documents in the 'other' category were searched with keywords relating to transport and children. The shaded cells in Table 4.1 below shows where we found documents that mentioned children, young people and travel behaviours.

The review of policies at the local authority level was supplemented by a review of national level policies (section 4.4) corresponding to the three clusters outlined above and an analysis of policy approaches in two comparator countries (section 4.5).

Table 4.1: Policy Review Search Results. 'x' indicates that one or more documents were found. Shaded cells indicate where documents mentioned CYP and travel behaviours.

Local authority	Transport-related policy					Child-focused policy					Other policy				
	Local transport strategy	Active travel strategy	Cycling strategy	Core Paths	Other transport	Play & play spaces	Children's services plan	Youth engagement	Poverty action	Child Other	Spatial plan	Community Action Plan	Air quality	Greenspace/green infrastructure	other
City of Edinburgh Council	x	x		x		x	x			x	x				
Glasgow City Council	x	x				x		x		x	x				x
Dundee City Council		x	x	x	x	x	x				x		x	x	x
Aberdeen City Council	x	x			x	x		x			x		x		
Falkirk Council	x				x				x		x	x	x		x
Fife Council										x	x	x		x	x
South Lanarkshire Council	x	x	x		x				x		x			x	x
Argyll & Bute Council		x		x	x					x	x	x		x	x
Cairngorm National Park Authority				x						x	x	x			x
Shetland Islands Council	x	x		x	x						x				x

4.3 Policy actions at local authority level

Overall, we found limited coverage of children and young people's travel within policy across the 10 Scottish local authorities. Any mention of CYP was most commonly among the policies and strategies dealing with transport and active travel. Very few of the child-related strategies mentioned travel, while a small group of other strategies mentioned sustainable travel, children and young people. Note that school travel was beyond the scope of the review, so references to school travel are not included in this analysis, although many of the references to children's travel that we found in the documents focussed on this. In some cases we found a reference to 'travel to school' even when a policy or intervention was not focussed on schools. For example, a [web page about 20mph zones](#) (City of Edinburgh Council, n.d) said that reduced traffic speeds made walking to school safer – although the 20mph zones were not limited to school streets or routes to school. There is consistent support for walking, wheeling, cycling and public transport across the 10 authorities, and consistent support for walking, wheeling and cycling to school – but other policy goals in relation to children and young people's sustainable travel behaviours vary considerably from authority to authority.

4.3.1 On transport and active travel

The transport and active travel strategies reviewed set out broad goals in relation to enabling walking, wheeling, cycling and other sustainable travel behaviours – but by and large did so without reference to children and young people. Three city authorities do mention children and young people in their policies on transport – Glasgow, Edinburgh and Aberdeen. Glasgow City Council sets out a broad aspiration for a transport system that meets the needs of young people, that is secure, sustainable and affordable (Glasgow City Council, 2022a, policy 56). The City of Edinburgh Council's 2014-19 [Local Transport Strategy](#) (City of Edinburgh Council, 2013) outlines a 'family network' delivered through quiet streets and off-road paths, while Aberdeen City Council set out a broad goal for cycle infrastructure, aiming to '*develop a network of safe and attractive cycle routes across the city centre, through the provision of low speed, low flow streets and segregated infrastructure, so that an unaccompanied 12 year old child can safely cycle through the city centre.*' (Aberdeen City Council, 2017, p. 13) In these three examples, the authorities recognise that children and families may have specific needs, and that meeting these needs may require specific design approaches. Aberdeen City Council's goal is also notable for elevating a design norm (unaccompanied 12 year old) to become an explicit policy objective. While this design norm underpins a lot of cycle infrastructure development – including Sustrans National Cycle Network - we did not find it mentioned anywhere else in the Scottish policy documents that we reviewed.

Across the sample of authorities there was quite a range of projects to support cycling among children of different ages. Younger children are supported through Play together on Pedals and funds making bikes available to pre-school groups (Glasgow City Council, 2022a and Aberdeen City Council, 2016), while other projects support older children with bike parks (South Lanarkshire Council, 2020) and bike clubs (Glasgow City Council, 2018; Falkirk Council, 2019). Glasgow City Council (2018) seems to have a very wide range of initiatives to make bikes available to children and families through swap fleets, bike libraries and e-cargo bike trials. Older children in the cities of Edinburgh and Aberdeen are being targeted through the Sustrans I Bike project tackling the reduction in cycling among high-school children and the noticeable gender difference in cycling rates between boys and girls at that age (City of Edinburgh Council, 2016; Aberdeen City Council, 2016).

Another major theme among the documents reviewed was road safety, with five authorities supporting bikeability and bike skills training for children in P5-P7 as well as general road safety training. The wider importance of equipping children with road safety skills whether walking or cycling is noted in several places, along with a recognition of the role of parents in influencing travel when roads are not perceived to be safe. Dundee City Council notes that unsafe conditions are one of the main reasons younger children are not able to travel independently (Dundee City Council, 2021). Dundee City Council and City of Edinburgh Council both support cycle training for adults and older children (Dundee City Council, 2019; City of Edinburgh Council, 2014).

Public transport is also covered in the documents, with City of Edinburgh Council (2014) and Glasgow City Council (2022a) both outlining their support for interventions on public transport fares to make them accessible to young people and families. City of Edinburgh Council (2014) noted several issues relevant to family travel, e.g. ticketing for family groups and space on trains for families with bikes.

4.3.2 Children's policy

Overall, the exploration of children's policy in the 10 sample authorities revealed a number of missed opportunities to make links to sustainable transport goals. Glasgow City Council, City of Edinburgh Council and Dundee City Council have strategies on well-being, learning and children's rights which have similar goals to support children's wellbeing. In Dundee City Council the goal is for children to grow up as healthy, confident and resilient with good physical and mental health (Tayside Regional Improvement Collaborative, 2021); in the City of Edinburgh Council there is a goal of supporting children to live a healthy life (Edinburgh Children's Partnership, 2020). However, these strategies do not mention sustainable travel behaviours and active travel as supportive of this overarching goal. Child poverty action plans also appear to miss the opportunity to include the travel behaviour of children and their families as ways of addressing transport poverty. While these action plans noted the requirement for affordable public transport and accessible services they did not include the potential for walking, wheeling and cycling to provide affordable travel options. More positively, Youth Engagement strategies in two authorities (Glasgow City Council, 2017; Aberdeen City Council, 2013) explore a series of transport issues of concern to young people. These reports provide a rich account of the travel issues young people have experienced. Bus travel appears to be popular where services are good – although cost was identified as a key barrier (prior to introduction of the national entitlement scheme for young people). In addition, young people are excellent at imagining future travel using novel technologies including hoverboards. The information from these reports provides a useful basis for local responses and initiatives to address the transport issues experienced by children and young people. In Glasgow, the City Council's commitment to a transport system that meets the needs of young people, that is secure, sustainable and affordable (Glasgow City Council, 2022a, policy 56) clearly links with the content of the Youth Engagement strategy.

Finally, only two authorities - City of Edinburgh Council and Glasgow City Council - mention street play schemes which allow communities to temporarily close a residential street in order to facilitate children playing out (City of Edinburgh, n.d; Glasgow, 2022b).

4.3.3 Other plans and policies

As outlined above, the potential intersections of sustainable travel with other policy sectors meant we looked for a broad range of policy documents including local plans, community actions plans, tourism strategies and air quality strategies. This group was the largest, but again yielded only a few references to children, young people and non-school travel. As with child focussed policy, there appear to be multiple missed opportunities to link to broad goals on active travel, accessibility, reducing car journeys and liveable neighbourhoods. The links we found among these documents include Cairngorms National Park Authority's (2015) '[Active Cairngorm strategy](#)' which sets out the case for upgrading active travel links in order to inspire more children to use active travel when they travel for school or leisure. This is a great example of a policy which sees children as more than just school pupils, and recognises leisure/play as a legitimate activity which should be supported with appropriate transport links.

4.4 National policy in Scotland

We reviewed a range of current and emerging national policies to establish where support for sustainable travel by children and young people is located, and where it might be strengthened and extended. In line with the review of local policy, scrutiny was focussed on 3 groups of documents: transport, child-related and other relevant policies and guidance documents, covering the following:

- National Transport Strategy NTS2
- Reducing Car Use for a Healthier and Greener Scotland (a route map)
- A long term vision for Active Travel in Scotland 2030
- Active Travel Framework
- National Walking Strategy
- Cycling by Design
- Designing Streets
- Draft National Planning Framework 4
- Draft Regulations on Open Space Strategies and Play Sufficiency Assessments
- National Play Strategy
- Child Poverty Action Plan
- Cleaner Air for Scotland 2
- A More Active Scotland: Scotland's Physical Activity Delivery Plan

Overall, national level policy in Scotland provides a good basis for policies aimed at enabling children, young people and their families to adopt sustainable travel behaviours. There are many ambitious policies on children's rights, play, active travel and design of place that directly support the development of inclusive environments that enable sustainable travel behaviours.

As in the local policy review, we noticed consistent support for walking, wheeling and cycling across the documents that were reviewed, and consistent support for initiatives that promote walking, wheeling and cycling to school. The default language of national policy around the travel needs of children and young people tends to prioritise travel to school or education and overlooks other everyday journeys. For example, [NTS2](#) describes an intention to support young people by delivering affordable and sustainable access to education, employment and training opportunities – but not leisure or other everyday activities. In contrast, the [Walking Strategy](#) notes that more children will have safer routes to schools *and local facilities* (emphasis added). There is scope to increase consistency in approach by changing the default language to include everyday activities alongside school and education.

The [Place Principle](#) and the national commitment to 20 minute neighbourhoods are an important cross-cutting policy strand which highlight the way in which places shape people's health, well-being and their opportunities for physical activity, play and active travel. We found place embedded in almost all of the national strategies that we considered, and the 20 minute neighbourhood concept also appeared in several places including the [Child Poverty Action Plan](#). The inclusion of narratives around place did not always consider the potential for actions on walking, wheeling and cycling to benefit children, young people and their families. For example, while the Child Poverty Action plan mentions 20 minute neighbourhoods as a means of reducing child poverty, the section on accessible childcare only discusses public transport in relation and does not

consider the potential for walking, wheeling and cycling to contribute to accessibility goals. Play was another important theme to emerge in the policy review, appearing in numerous places outside the [National Play Strategy](#). There was a clear emphasis here on making space for play through inclusive street design, as articulated in [Designing Streets](#) and [Draft NPF4](#)², and the importance of play spaces that are safe and accessible. The [Draft Regulations on Open Space Strategies and Play Sufficiency Assessments Strategies](#) acknowledge the role of public realm, streets, cul-de-sacs and quiet routes as spaces for play, and play on the way, but for practical reasons do not include these spaces/opportunities in the play sufficiency assessment (PSA) itself. Future iterations of the regulations could include play streets or other temporary play spaces within the assessment as happens in Welsh play sufficiency assessments (see section 4.5.1). There is also scope to extend assessments to consider accessibility of the whole neighbourhood not just the accessibility of designated play spaces. All of the indicators suggested in the draft regulations focus on the environment, not on the behaviours, experiences or feelings of local children. Evidence from local children about travel to play spaces, and thresholds for independent movement could be added as complementary measures. In Cardiff, preparation of the play sufficiency strategy includes use of the [Hands Up survey](#) in schools to collect information about travel habits and when/where children are able to travel on their own.

The review of local policy revealed a consistent emphasis on safety, and this is also evident in the national policy documents that we reviewed. Here, we found several mentions of the need for safe places for children to wheel, walk and cycle, for example, in the National Walking Strategy, the Play Strategy and the [Car Use Reduction Route Map](#). Intervention 2f of the car use reduction route map outlines actions on 20mph speed limits, safe to school initiatives and the intention for every child living within 2 miles of their school to be able to walk, wheel or cycling safely.

Draft NPF4 Policy 12 on blue and green infrastructure, play and sport requires that 'development proposals that include new streets and public realm should incorporate the principles of Designing Streets and inclusive design to enable children and young people to play and move around safely and independently; maximising the opportunities for informal and incidental play in the neighbourhood'. This policy could be strengthened to support independent travel from age 12/high school transition, and reinforced in updates to Designing Streets and [Cycling by Design](#). Such a policy would go a little further than the Aberdeen example given in Section 4.3.1, and extend the goal of independent movement to walking and potentially public transport.

As seen in the local level policy review, policy on transport and active travel has a key role to play in enabling sustainable travel behaviours by children, young people and their families. High level goals set out aspirations for a fairer, healthier, more affordable and more sustainable transport system, with a clear transport hierarchy prioritizing walking, wheeling and cycling, as well as public transport. A new national goal of enabling independent travel for children around the time of transition to high school would be a powerful development, consistent with national outcomes on public health, child health and well-being, [SHANARRI principles](#), [GIRFEC](#) and the [UN Convention on the Rights of the Child](#), plus goals on physical activity. There are multiple places in national transport policy where this overarching goal could be articulated, including National Transport Strategy 2, The Walking Strategy, [Cycling Framework and Delivery Action Plan](#).

² This report was assembled during the summer of 2022 and refers to the draft of NPF4 published in November 2021.

4.5 Comparator country policy approaches

In addition to Scottish national policies, we reviewed policy approaches in two comparator countries – Wales and Denmark. Wales was chosen as a policy comparator for this study because of its strong policy focus on children’s rights. We were interested to see how that focus on the rights of the child was translated into policy around movement and transport, and we reviewed a range of policy documents from the Welsh Government on transport, children and play. Denmark was chosen as a policy comparator as a small country in a similar climatic region to Scotland, but with an established cycling culture. We were interested to see how policy in Denmark addressed sustainable travel behaviour among children, young people and their families. We reviewed a range of policy documents (published in English), focussing on active travel transport and climate action. In both we followed the same two-stage approach of identifying relevant policy documents and then searching within those documents for specific keywords.

4.5.1 Wales

In Welsh transport policy we found that where children were mentioned the phrases mentioned travel to school and to other activities, and were not focussed only on travel to school. For example, [An Active Travel Action plan](#) for Wales (Welsh Government, 2016) says ‘we must create environments where children are safe to get around on foot or by bicycle for the journeys they want to make as part of their daily routine’ (p. 15). [Active Travel Guidance](#) (Welsh Government, 2021) echoes this objective with a more specific aim that ‘the network should cater for children to travel independently from the age at which they start secondary school’ (p. 31). We found the idea of independent travel around aged 12 to be an interesting one, which the Welsh Government links into the transition point from primary to secondary school and supports with specific design principles to enable children and young people to move independently.

Policy links to sustainable travel behaviours were also evident in some national health documents, e.g. [‘Healthy Weight, Healthy Wales’](#) (Welsh Government, 2019) which supports early years play, family friendly routes and the creation of more opportunities for active recreation and play. The role of 20mph zones is noted here as an intervention that supports increased opportunities for physical activity.

Welsh policy around play is well developed, and a [local authority play sufficiency duty](#) has been in place since 2012, built on child poverty legislation recognising poverty of opportunity and environment as important factors shaping children’s lives. The duty requires Welsh local authorities to assess the sufficiency of play opportunities in their area, and to prepare strategies for delivering and developing those opportunities for the children who live there. There is an emphasis on understanding and meeting the needs of the local population, not delivering a generic target of x per child. A [government template](#) outlines the specific matters which must be assessed by the local authority, ranging from ‘Matter A: population’ to ‘Matter C: space for children to play’ and ‘Matter I: play in all relevant policy’. Under each matter, the template sets out a list of individual criteria that must be addressed, using a RAG assessment (red, amber, green) indicating whether the criterion is met, partially met or not met – and then detailing supporting evidence that justifies the assessment, plus actions to be taken to address shortcomings. In relation to sustainable travel ‘Matter F: Access to space/provision’ is the most important, as this requires local authorities to consider all the factors that contribute to children’s access to play or moving around their community. Under this matter local authorities have to address 13 specific criteria including 20mph zones, road safety and speed reduction measures, improved access to parks, outdoor play and other facilities, road closures to enable play, adherence to Manual for Streets and use of child

pedestrian accident data to inform interventions. These criteria clearly articulate the idea that residential streets should be seen as a location where play can and should happen, and that access to play opportunities should be considered when making decisions about transport planning and expenditure. In addition, the needs of disabled children should be understood and provided for. [A full list of the 13 criteria under Matter F are set out in Appendix C].

Matter F links play to wider issues about walking, wheeling, cycling and travel for children, young people and their families. It emphasises the way in which streets, traffic speed and road safety issues can inhibit children from playing in the streets near their homes, and supports initiatives that seek to address these issues and enable children to play safely. It goes well beyond considering the accessibility of play spaces, and considers accessibility of the wider neighbourhood. Looking at examples of play sufficiency assessments from individual authorities (e.g. Cardiff Council, 2019), Matter F requires the local authority to link a number of different policy strategies and work programmes, e.g. road safety; play streets; 20mph zones; cycling networks planning, design and delivery; development plan policy; pedestrian routes and core paths; accident statistics; bike and road safety training in schools.

In sum, this review has revealed three key things: a high-level policy goal to enable independent travel in children from high school age; an expansive approach to play sufficiency which considers a child's whole neighbourhood; and consistent language about enabling children to walk, wheel and cycle for all of their everyday needs, not just school travel.

4.5.2 Denmark

Denmark sees itself as having a cycling culture which should be maintained and grown, 'so that more people again choose the bicycle every day for work, education and leisure activities' (Ministry of Transport, 2014). It's a high-cycling country, with ambitious modal targets. In Copenhagen the targets for sustainable mobility are for 75% of all trips to be by sustainable modes (walking, cycling or public transport) and 50% of journeys to work or school to be by cycle, (City of Copenhagen, 2012). The 2025 vision is for a city where both young and old feel safe cycling and it is normal to see parents and children cycling alongside each other in rush hour (City of Copenhagen, 2011).

A recurrent theme in the documents is the long-term benefits of promoting and enabling children to cycle, because they will grow into adults who cycle. The Danish Cycling Federation (2019) claims that '*Children who establish a delight in movement and physical activity at an early age will more naturally keep on cycling when sedentary activities start to loom larger in their daily routine later on. They will also be more inclined to opt for the bike as adults*'.

A strong road safety strand is evident, mentioning universal bike training aimed at primary age children and other interventions to develop safe road users and increase road safety among children and their parents. Alongside this, the Danish Cycling Federation has a booklet of [20 cycling games](#) (2019) that can be used in school to help children develop good bike handling skills and contribute to the school curriculum, e.g. maths, arts and physical education. The rationale for the games is multi-dimensional – contributing to gross motor skills, educational attainment, physical fitness and road safety for the child as well as societal benefits accruing from climate action, improved long-term health, educational attainment and road safety. Mastering the physical challenges of riding a bike and becoming 'bike safe' is seen as a helpful precursor to becoming 'road safe'. The traffic safety of older children is also addressed in Danish policy, particularly the decade between 15-24 years when risk is the highest (City of Copenhagen, 2013). One document notes the important difference between children's and adults' perceptions of risk and safety when cycling, with parents being less satisfied

than children and this – potentially – acting as a barrier to cycling and walking (City of Copenhagen, 2019).

Family cycling is specifically mentioned in relation to cargo bikes, which can be used as a means of transporting children and shopping and are often an alternative to having a car. The [City of Copenhagen Cycling Strategy](#) (2011) noted that 25% of cargo bike owners say that their cargo bike is a direct replacement for the car, and sets out an ambition for there to be excellent parking facilities for cargo bikes outside homes, institutions and shops by 2025. [The 2018 Bicycle Account](#) notes that 26% of households with more than two children have a cargo bike (City of Copenhagen, 2019).

In terms of infrastructure design and planning, the Danish strategies we reviewed underlined the desirability of cycle paths and streets around schools and leisure activities being designed to enable safe cycling and walking so that children and their parents feel comfortable. *'Bicycle paths at schools and recreational activities should be developed to ensure that the bicycle is a natural and safe means of transport for the majority of children and young people, both for school and leisure'* (Ministry of Transport, 2014).

Finally, although Denmark does not frame its policies in relations to children's rights, it recognises that cycling gives children and young people autonomy, freedom and independence. *'On a bicycle, children achieve this freedom much earlier than they could take their first driving licence'* (Ministry of Transport, 2014).

5 Further areas of potential for future policy

In this section we draw on the wider literature on children and young people’s travel and examples of emerging practice to identify further opportunities for interventions at different ages and across the life course. In this section we draw largely on academic literature reviews in order to highlight key areas for consideration. The examples of emerging practice (new and current interventions) are used to highlight initiatives that are being delivered. We do not have enough information to be able to comment on how effective these interventions are.

5.1 Age, stages and competencies

Independence, agency, and competency within sustainable travel behaviours vary by age and mode of transport. The impact of different ages and modes of transport are set out below and indicated in Figure 5.1 highlighting children’s broad level of independence at different ages by mode of transport.

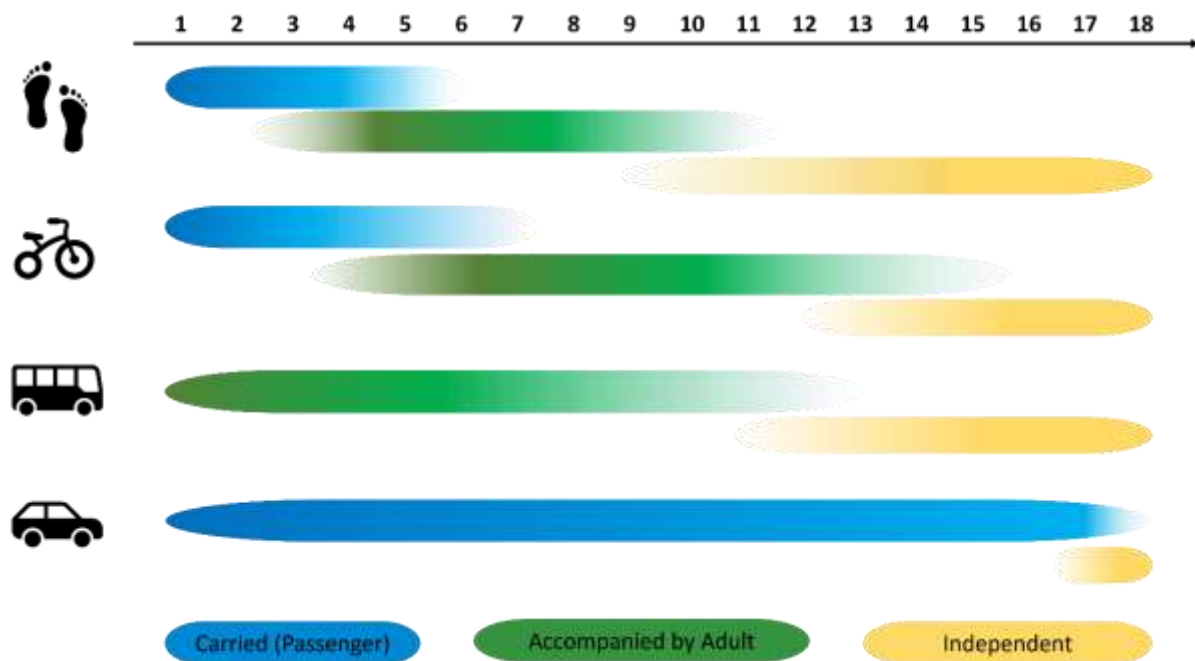


Figure 5.1 : Independence of movement by age and mode

5.1.1 Ages 0 – 4

Between 0 – 4 there is no independent mobility. Children have little to no agency within their travel behaviour decisions, which means the perceptions of parents or guardians are important at this age as children are always accompanied, even if they are walking or wheeling themselves. There are opportunities to engage families with very young children, particularly with respect to active travel. The CARTOBIKE intervention example highlights the potential for early learning and childcare settings to act as a point of engagement with such families. However, for such interventions to be successful the required infrastructure needs to be in place. This can include simple details like road surfaces being smooth to support comfort for infants/children carried on bikes, as well as secure parking for cargo bikes and facilities to enable taking a non-standard family bike on a train or a tram.

Using the Danish example, we know that children that start to cycle earlier have a greater likelihood of continuing. There are already Scottish initiatives focused on getting

children cycling early, such as the [play on pedals](#) initiative in Glasgow and Aberdeen, which could be furthered throughout Scotland.

5.1.2 Ages 5 – 11

Children may start to have some independent mobility by foot or bike during ages 5 – 11, see Figure 5.1. However, there is still limited agency, and ability to travel independently is generally determined by parents. Some children will be allowed to make short journeys by themselves during this stage, although this will vary, and girls may be more constrained/protected than boys (Marzi & Reimers, 2018). Parental perceptions of safety are still central for this age group (Nevelsteen et al., 2012). There are therefore opportunities to ensure neighbourhoods are child friendly, for example introducing play streets, like the [childmph](#) zones in Germany and Switzerland, and increasing street connectivity (see recommendation 5) (Galves et al., 2010, cited in Winters et al., 2017).

School provides a significant role and opportunity for enabling sustainable travel behaviours for this age group. There is considerable potential to go beyond interventions targeting travel to school, to promote sustainable travel more broadly and achieve multiple objectives. Education to increase skills and competencies plays an important role and there is potential to further existing road safety or bikeability training to increase engagement (see recommendation 3). There are examples of school bikeability training including play, or game elements (see recommendation 5), such as in Denmark (discussed above) or through partnering with other organisations, such as [The National Scouts Network](#) launched by Sustrans and the Scouts.

There is also potential for the use of walking and cycling buses beyond the context of the school commute, e.g. for organised sports, clubs and community activities. The literature indicates that walking buses can increase engagement and competencies in active travel for this age group (Jones et al 2019), particularly as this is a group activity, which can alleviate some potential safety concerns held by parents.

5.1.3 Ages 12 – 18

Between ages 12 – 18 CYP are likely to have much greater agency to make decisions about their own travel. They are likely to be, or transitioning to be, independently mobile by bike, foot, or public transport and have greater competency to travel by these modes. This is the age where perceptions of parents or guardians start to become less important and CYP's perceptions of safety and travel most significantly impact their travel behaviour.

Therefore, aspects such as appearance, gender norms, and the sociability of different modes start to impact travel decisions. For example, independent travel provides this age group with more spaces for social interactions, with the literature indicating that buses or cars become places to hang out independently (Lagerqvist, 2019; Fylan & Caveney, 2018; Goodman et al., 2014). However, these aspects also lead to barriers to engage in sustainable travel behaviours, for example the literature finds that cycling in non-European countries (UK, USA and Australia) is perceived as uncool at this age (Larouche et al 2020).

Teenage girls are less likely to cycle than teenage boys. Reasons for this include incompatibility with some school uniform, safety concerns (particularly at night), perceptions that cycling is a 'boy thing' (Egan and Hackett, 2022), and feeling that cycling is less social than walking, unless it's possible to cycle side-by-side on a bike path (Frater & Kingham, 2020). Prevailing bike style or fashion also impacts teenagers' likelihood of cycling to school, for example where mountain bikes are preferred over upright bikes with baskets/panniers for carrying school or sports materials (Frater & Kingham, 2020). As teenage girls are less likely to cycle, their confidence drops

throughout secondary school years, meaning that they stand to benefit from a revisiting of cycling proficiency, together with instruction on bike maintenance during this time period. Campaigns such as [#andshecycles](#) promoted through social media also have potential to shift attitudes and norms within this group.

Aspirations around learning to drive are varied within this age group. Data indicates that the number of people learning to drive over time has decreased (Chatterjee et al., 2018). However, driving is still perceived as cool, particularly due to its portrayal in the media, and the real costs of driving are underestimated by young people (Fylan & Caveney, 2018). There are opportunities for two possible interventions to combat this. The first uses school as a platform to communicate the real advantages experienced by teenagers (e.g. a slight lie-in and better access to fast food), versus perceived advantages (exploring the world), against real costs (Fylan & Caveney, 2018). The second builds on existing bikeability training occurring in schools (such as Sustrans' [! Bike](#), or TFL's [STARS accreditation scheme](#), or [cycle derby](#)) and provides cycle training at ages 15 – 16, as in Denmark, to re-emphasize active travel before young people are old enough to drive, reminding young people that independent travel is not just achieved through driving (see recommendations 3 and 8). Readdressing road safety at this age is appropriate because perceptions of risk may be underestimated in the 15-24 age group, as found in Denmark (Copenhagen Traffic Safety, 2014).

5.1.4 Reducing family car use

The above has focused on factors important for travel behaviour of different age groups, however, often these age groups can travel together as a family. The car is a common mode of transport for family travel. Research indicates that being a carless family comes with several challenges (Lagrell et al, 2018). A significant challenge is transporting CYP to out of school activities such as sports practice. Parents may rely on other parents to help with this, which leads them to feel like 'free-riders' who are unable to return the favour (Lagrell et al, 2018). Therefore, voluntary carlessness appears chiefly to be a possibility for those living in spatially dense cities (Lagrell et al, 2018).

However, the development of 20-minute neighbourhoods, in conjunction with bus networks serving destinations important for children, will assist in reducing car use (see recommendation 9). Travelling as a group is important for families, and there are often cost barriers as well as practical barriers including the design of walking and cycle routes to accommodate travelling in a social group. There is great potential for car clubs, bus and train travel to reduce family car travel if it meets family needs (see recommendation 7). For this to occur it needs to be as cheap or cheaper than driving and parking and as convenient as possible. There needs to be flexible seating arrangements with plenty of space for bikes and buggies. Moreover, the possibility of public transport is multiplied when it links in with other modes of transport, such as a family friendly cycle hire and cycle paths. Incentivising public transport with discounts is shown as effective in increasing family travel (McHardy & Robertson, 2021), and there is the opportunity to partner this with family attractions at destinations.

5.1.5 Life course transitions

In understanding how travel behaviour changes over time as we move through life it is particularly important to consider the key transition points at which changes happen. These life course transition points (or 'moments of change') have been identified as windows of opportunity during which interventions can be particularly effective (Bamberg, 2006; Verplanken & Wood, 2006). This is because these are points at which our established routines and habits are disrupted, due to changes to our everyday social and/or physical environments, and there is opportunity for new habits to be shaped. The most relevant moments of change – moving from primary to secondary school, leaving school, and starting a family - and opportunities associated with them are highlighted in

Figure 5.2. Whilst other transitions may potentially be relevant to CYP travel behaviours (e.g. starting school, returning to work after parental leave etc.), less is known about these.

1) *Moving from primary to secondary school*

This transition is commonly associated with a decline in active travel, and may be a result of a number of factors including greater distances to travel to school and negative attitudes to cycling (Larouche et al., 2020), see section 5.2.1. Our policy review supports the idea that this is a critical transition for policy on CYP travel behaviour to consider.

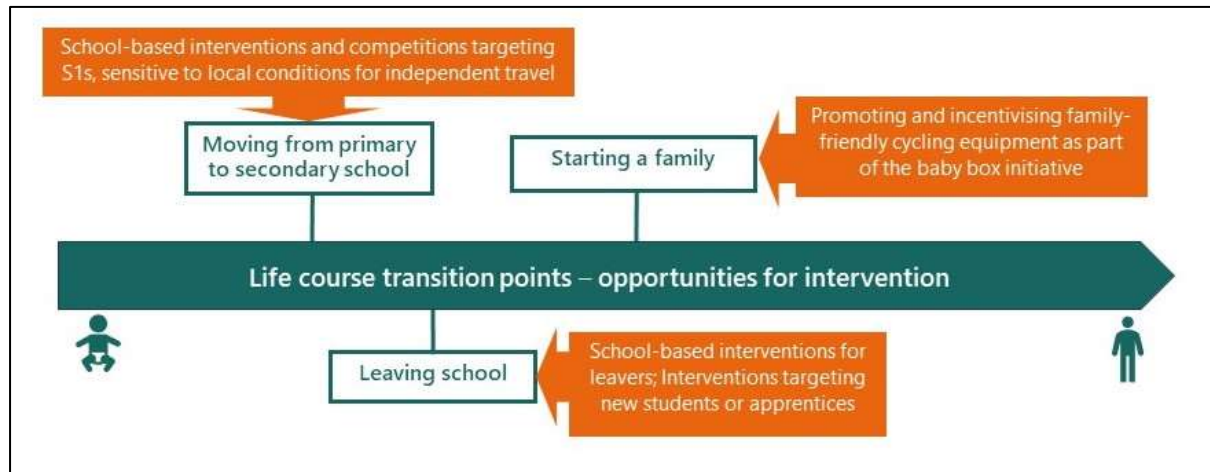


Figure 5.2: Opportunities for intervention at key moments of change

2) *Leaving school*

The transition from secondary school to work, training or tertiary education is another point at which travel behaviour changes (Larouche et al., 2020). Not only is this transition associated with changing daily destinations and journey distances, it can also be bound up with relocation, moving to independent living, or attaining an independent income.

3) *Starting a family*

There is mixed evidence on the impact of becoming a parent on travel behaviour, however several studies have reported that this stage can be associated with both increases in walking and driving, and decreased cycling and public transport use (Larouche et al., 2020). The research suggests these immediate impacts of parenthood apply more to women than men, and may be seen particularly during maternity leave (Larouche et al., 2020). At the same time, planning to 'settle down' and start a family is often a driver for people to relocate from compact, walkable, areas to less dense suburban residential areas (Whybrow et al., 2021). There is also evidence that social norms around 'good parenting' increase the likelihood of car ownership at this time (McCarthy et al 2017).

5.2 Considering future policy from an ISM perspective

Using the ISM – Individual, Social and Material - model to frame future policy development could help to ensure that policy actions take into account the complexity of the social and physical system in which travel choices are made. From an ISM perspective, the following principles may be useful to guide future the design of future policy interventions:

1) Cover the ISM bases – Consider how interventions or packages of interventions might be designed to spur change across Individual, Social and Material domains, and fill gaps in relation to ISM factors not considered in current interventions in an area. For example, consider how planned infrastructural (M) improvements be supported through the mobilisation of institutions and opinion leaders (S), initiatives designed to shift attitudes (I), sense of agency (I) and meanings (S), and mechanisms to reduce perceived costs and increase perceived benefits (I).

2) Consider interventions with local context in mind – Potential policy interventions should be appraised both with sensitivity to the Scottish context and local conditions. Place-based approaches, tailored at the local authority or community level, offer opportunities to take into account the status of different factors across the ISM domains that may support or hinder the success of a potential intervention.

6 Conclusions and recommendations

6.1 Conclusions

In this section we summarise the findings of the study in relation to the research questions set out in section 2 and outline our recommendations for policymakers.

6.1.1 What policy actions are currently being taken in Scotland to promote sustainable travel by CYP and their families? Are there opportunities for greater cross-sectoral integration in achieving this objective?

We found that coverage of issues around children and young people's travel was limited across the selected local authorities. While there is consistent support for sustainable travel behaviours generally, and walking, wheeling and cycling to school specifically, there is little transport policy that specifically articulates or addresses the requirements of children and families. Explicit considerations of what CYP and families need from the transport network were found in some urban local authorities, including ambitions to develop safe city centre cycle networks designed for unaccompanied 12 year olds (Aberdeen City Council, 2017); and a secure, affordable and accessible transport systems that meets the needs of young people (Glasgow City Council, 2022a)

We found local authorities supporting a range of projects to promote walking, wheeling and cycling. These included local initiatives focusing on road safety and bike skills, access to cycling equipment for children and adults, and social interventions promoting cycling such as bike clubs. Bikeability training and road safety projects were the most common.

We found that travel to school is used as a language default at both local and national level and there were few examples of policies which portray children as having leisure/play needs alongside their educational ones, and making journeys to places apart from school. At the same time, the narrative around active travel for children and young people is currently rather narrow, and does not articulate the full range of potential benefits that come from promoting walking, wheeling and active modes, e.g. societal benefits such as air quality, climate action, traffic reduction, road safety, tackling child poverty, and increased physical activity in the population. Other individual benefits could also be detailed, e.g. motor skills, physical activity, educational attainment and mental well-being. Policy on place, play sufficiency and 20 minute neighbourhoods provide an excellent basis for greater policy integration with Transport Policy and sustainable transport goals for children and their families. There is also support from children's policy including the [UN Convention on the Rights of the Child](#), [Getting It Right for Every Child](#) (GIRFEC) and the [SHANARRI](#) indicators and the [national outcomes](#): *Our communities are safe places where children are valued, nurtured and treated with kindness; We provide stimulating activities and encourage children to engage positively with the built and natural environment and to play their part in its care; We provide the conditions in which all children can be healthy and active*' (Scottish Government, n.d)

6.1.2 What policy interventions are most likely to change the travel behaviours of CYP and their families, based on Scottish and international evidence?

The review of interventions in the academic and grey literature found that, beyond interventions focusing on travel to school, there is very limited evidence base on interventions to shift travel behaviours of CYP and their families (either interventions targeting CYP specifically, or in relation to impacts of wider interventions on CYP). The 14 studies (covering 10 interventions) included in the review varied widely in terms of the types of intervention studied, the population/age group of interest and the measures of impact used. Many were of low methodological quality and/or lacked quantitative

measures of behaviour, limiting conclusions as to their effectiveness. We did, however, find some examples of effective interventions which suggest avenues for future policy interventions in Scotland. These include delivering broad interventions through schools and early-learning and childcare (ELC provision) going beyond targeting travel to school to encompass travel behaviour more broadly, and integrating travel objectives with wider policy objectives. While older children/young people (12-18 years) were those most commonly studied, there are indications that interventions focusing on families with very young children (0-4) may also have value. Furthermore, broad-based 'Material' focused interventions, such as changes to infrastructure, rules and regulations, are necessary in delivering a transport network that supports independent travel by CYP. However, we found that there is an evidence gap around the impacts of such interventions on CYP and families, and also a lack of evidence on interventions in rural and island areas.

Use of the ISM Tool to analyse interventions suggests that direct replication of interventions that have been effective elsewhere will not automatically lead to success. Considering future policy approaches through the lens of the ISM could help to identify the supporting conditions that need to be in place for an intervention to be successful and how packages of interventions might be designed to address factors across Individual, Social and Material domains.

6.1.3 Which policy interventions have the potential to contribute most to wider policy objectives in Scotland, including supporting an inclusive and Just Transition to Net Zero?

Our literature review of interventions found that evidence on the contribution of reported interventions to wider objectives was patchy. It is therefore not possible to draw conclusions about which particular interventions have the potential to deliver the greatest multiple benefits. Overall, interventions to increase active travel have the potential to deliver to wider policy objectives including increasing physical activity, health and wellbeing, improving road safety and providing opportunities for play. Objectives to increase active travel and promote access to local greenspace are also mutually reinforcing, although this aspect was not considered in any of the studies. Interventions identified as having the potential to contribute towards social inclusion and reducing inequalities were focused around enabling access to public transport. There is potential for future evaluations of active travel-focused interventions to consider equality dimensions, including how they might generate benefits for families who do not own cars, as well as reducing car use amongst those that do.

6.2 Recommendations

6.2.1 What actions should be prioritised by policymakers to promote sustainable travel by CYP and their families and contribute to normalising sustainable and active travel across the life course?

This section outlines an integrated set of recommendations for policymakers in national and local government. These recommendations draw on the insights from the literature and policy reviews, along with evidence from the wider literature on travel behaviours amongst CYP and families. Where possible, we have tried to anchor our recommendations within existing policy approaches to aid integration across policy areas.

1. Prioritise inclusive infrastructure to deliver a transport network that promotes independent movement from around age 12 (around the transition to high school or earlier), to support sustainable travel norms before children reach driving age.

2. Consider the potential for development of a policy indicator of children's independent travel to benchmark progress and complement indicators around school travel.
3. Harness the potential to deliver interventions in educational settings. Learning for Sustainability is embedded in the Curriculum for Excellence and affords opportunities for interventions targeting multiple objectives – sustainable travel, physical activity, safety and wellbeing – aligning with the 'Getting It Right for Every Child' (GIRFEC) approach.
4. Shift the default language in policy and focus of interventions beyond travel to school to encompass wider travel behaviour for leisure and other purposes, normalising the idea of children as needing to travel for all sorts of reasons.
5. Consider play as a cross-cutting goal. There is potential for play policy to maximise benefits to CYP by including all of the neighbourhood as potential play space, rather than focussing on a defined list of play spaces. This would be comparable to the Welsh Government's Matter F: Access to space/provision in their play sufficiency toolkit. There are also opportunities to develop street/design guidance to accommodate different age groups and their capabilities (in line with the age-groups used in the play sufficiency regulations).
6. Enhance the links between transport and child poverty action by ensuring strategies to tackle child poverty include measures on active travel accessibility alongside policy goals on public transport accessibility.
7. Enable, incentivise and raise awareness of whole-family travel opportunities. These might include providing smaller bikes, bike seats and cargo bikes through cycle share schemes; family-friendly rail fares and facilities in public transport and at interchanges; and in the design of walking and cycle routes to accommodate groups.
8. Consider key life course transitions in designing interventions e.g. moving from pre-school to primary school, primary school to secondary school, leaving school, becoming a parent. This might include opportunities to piggyback on existing interventions e.g. baby boxes.
9. Prioritise place-based intervention approaches. Place-based approaches allow priorities to be set locally, taking into consideration the social, economic and environmental context. There is potential to use the ISM Tool in such approaches, to map the factors that support or constrain sustainable travel by children and young people locally and identify priorities for future interventions.
10. Engage children of different ages, backgrounds and abilities in developing ideas and designing future interventions. Capitalise on existing tools (e.g. Place Standard tools for Children and Young People or the ISM Tool) and integrate with existing work engaging with CYP in different policy areas (e.g. local development plans, youth engagement, children's rights). The choice of appropriate tool may depend on the specific objectives of the engagement e.g. whether focused specifically on designing transport-related interventions or wider objectives around place-making.
11. Build in robust evaluation to future interventions and pilot initiatives funded by the Scottish Government. There is also a need for research to evaluate informal interventions, such as bike buses and family bike workshops being delivered by the third sector and by community organisations. Adopting ISM-thinking in evaluation design could help to diagnose reasons for intervention success or failure.

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8 Appendix A: Literature review method

We adopted a rapid evidence assessment methodology for our literature review component. This comprises elements of a systematic literature review (e.g. replicable search strategy, transparent inclusion/exclusion criteria), conducted over a short timescale for the timely production of policy relevant research (Thomas et al., 2013). Our search strategy involved separate processes for identifying academic and grey literature. Academic literature searching and screening followed a protocol based on PRISMA best practice guidance for implementing systematic reviews (Page et al., 2021). Grey literature was identified through relevant organisational websites and social media crowdsourcing and was screened according to the same inclusion criteria as the academic literature. Further details of these methods and the process of analysis are set out below.

Search strategy – academic literature

An initial set of keywords was developed in consultation with the project steering group.

CYP keywords	Travel keywords	Intervention keywords	Potential Exclusion terms
Child/children Young people Young person Youth Adolescent Teen/teenager Family Families Infant/baby Toddler	Travel Transport Active travel Walking/walk Cycling/cycle Wheeling Scooting/scootering Mobility/mobilities Public transport Bus Rail Train Tram	Intervention Treatment group Control group Experiment Evaluation/evaluate Behaviour change Pre-post	School Education Training University

A preliminary search using the full list of keywords returned 13,586 records, which was considered an unmanageable volume. Further refinement of the keywords included removal of keywords related to specific transport modes which were generating a large volume of irrelevant literature (e.g. train, cycl*, walk). The final search terms adopted are shown below. No exclusion terms were applied to avoid potentially relevant material being excluded.

CYP keywords	Link	Travel keywords	Link	Intervention keywords
child* OR teen* OR adolescen* OR "young person" OR "young people" OR "youth" OR "family" OR "families" OR "infant" OR "baby" OR "toddler"	AND	travel* OR transport* OR "active travel" OR mobil* OR "public transport"	AND	"intervention" OR experiment* OR evaluat*

Searches were conducted in the Web of Science database and were restricted to English language original research articles published in the last decade (July 2012 to June 2022), with author affiliated with institutions in countries falling within the geographic scope of Western Europe and New Zealand (see inclusion/exclusion criteria below).

Search strategy – grey literature

Organisational website searches

The following organisational websites were searched for relevant documents:

Priority level	Organisations
Tier 1: priority organisations	The Scottish Government; Transport Scotland; UK Government; Sustrans; Paths for All; Young Scot; Free Bus (freebus.scot); 'Our Place' (ourplace.scot); Scottish Youth Parliament; Cycling UK (Scotland); Play Scotland; Playing Out; All Party Parliamentary Group on Cycling and Walking; Transport for London; European Cyclists Federation (international); World Health Organization
Tier 2: other organisations of potential interest	Child-friendly cities network (Unicef), International Play Association.

Combinations of the agreed keywords were used as search terms. These were tailored according to the website and recorded in a spreadsheet. Google Site Search was used where possible to allow Boolean searches to take place.

Social media crowdsourcing

A calls for information were posted on Twitter and LinkedIn, through project team members personal accounts and accounts of our institutions and CXC. The following text was agreed with the CXC secretariat:

How can we reduce car use and increase sustainable travel by children, young people and their families? We need your help to find information on successful interventions and good practice to inform current research for @ClimateXChange by @HuttonSEGS and @HWU_TUI [1/2]

Please reply to this thread with info about initiatives, projects, exemplars, case studies, best practice and/or research reports (not academic papers pls). We're particularly interested in journeys other than the school run, and examples from UK and Europe. RTs welcome! Thanks! [2/2]

Inclusion/exclusion criteria

The following set of criteria were adopted for both the review of academic and grey literature.

	Include	Rationale	Applied at:
Geographic area	Western Europe and New Zealand	High-income countries comparable with Scottish context	search
Language	English language	Research team skills	search
Sustainable travel modes	Walking, wheeling, cycling, public transport (buses, trains, trams)	Broad scope reflecting funder evidence needs	screening
Population of interest	Children and young people under the age of 18 and their families	Defining children in line with UNCRC	screening
Journeys	Non-school related travel	Funder evidence needs already met with respect to school-related travel	screening
Study type	Studies evaluating intervention impacts	Allow assessment of the effectiveness of interventions	screening
Time period	Past 10 years	Needs to be limited due to breadth of scope re: sustainable travel modes and population.	search

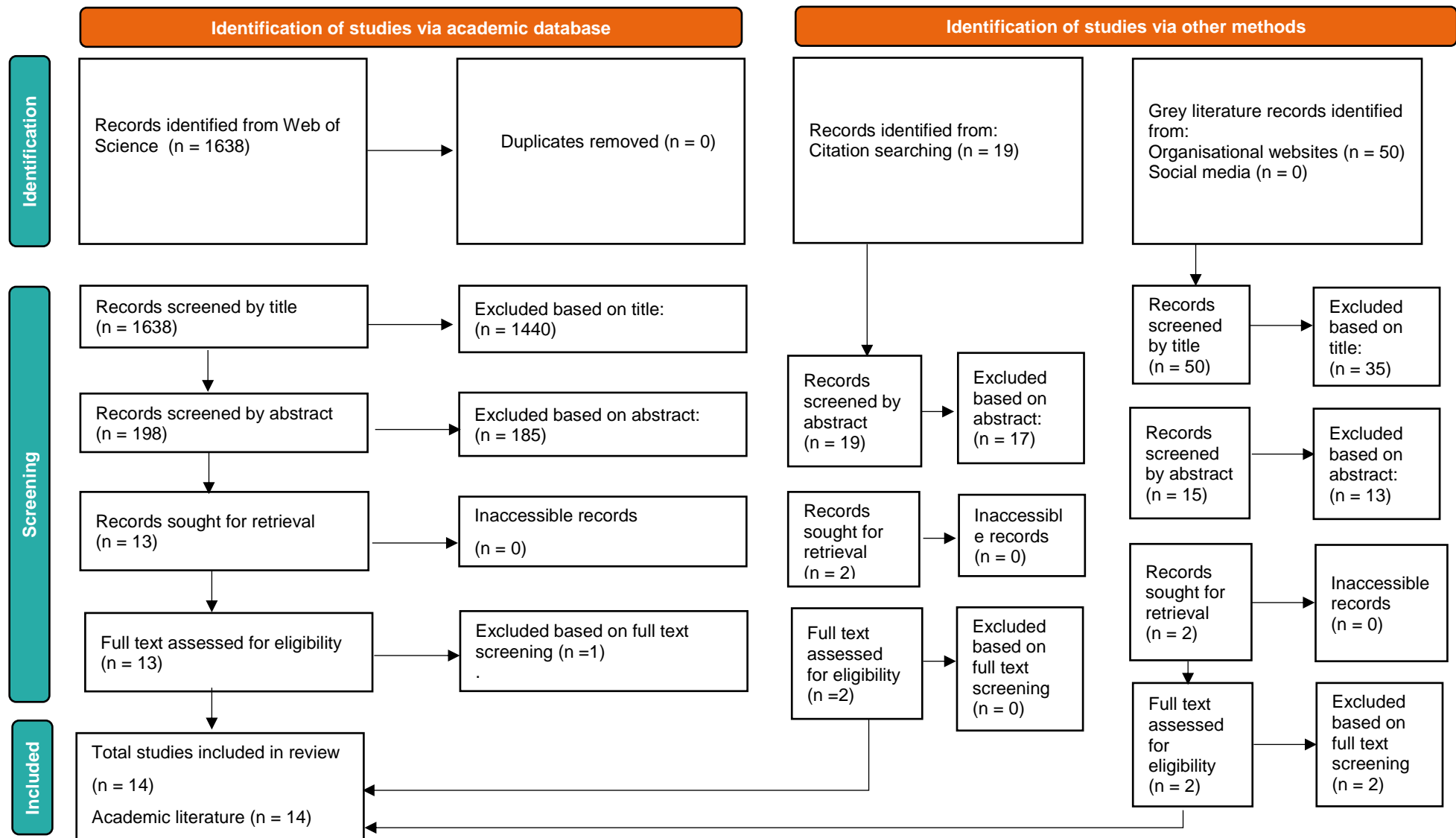
Document types	Original research articles; grey literature pdf documents	Reviews excluded to avoid double counting and allow assessment of effectiveness of different interventions. Relevant reviews retained for background information.	search
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Screening process

Records returned from academic and grey literature searches were screened initially by title, applying the inclusion/exclusion criteria above. Those identified as potentially relevant were screened by title. Those accepted based on the abstract screening were assessed for eligibility as part of the full text review. To check screening consistency, ~10% of abstracts were screened by a second reviewer, with an agreement rate of 0.94.

Data extraction and analysis

Information about each study was recorded in a matrix which was then used to synthesise across the studies. This information included details about the population (including age range of participants), geography, details about the intervention, study design and methods for sampling, data collection and analysis, and impacts (both travel-related and wider impacts). In our analysis we applied the following age categorisations: 0-4 years; 5-11 years; 12-17 years. These broadly align with stages in children's education (pre-school, primary, secondary). To facilitate comparisons between studies, we used a traffic light system to score studies in terms of methodological quality (low, medium or high) and impact on travel behaviour (low, medium or high). The methodological quality criteria used to score studies included: use of control/comparator groups, randomisation of participants to intervention groups, whether 'before' and 'after' intervention data was gathered from the same set of participants, use of long-term follow-ups, sources of bias in participant sampling and recruitment, sample size, data collection methods (e.g. objective vs. self-report). Impact scores were assigned based on reported effect sizes and consistency of reported impacts across different travel behaviour outcome measures, and reflect the extent of positive change in the desired direction (i.e. high impact = shift towards more sustainable travel behaviour).



Overview of process of study identification

9 Appendix B: Overview of intervention studies

The characteristics of the intervention studies included in the review are summarised below in Table B.1 and discussed in the following paragraphs. Details of each of the 10 interventions studied are presented in Table B.2.

Table B.1: Characteristics of intervention study database

		No. of studies	No. of interventions
Literature type	Academic literature	14	10
	Grey literature	0	0
Study type	Quantitative	9	7
	Qualitative	2	1
	Mixed	3	2
Location	UK	6	3
	NW Europe	6	5
	S Europe	0	0
	New Zealand	2	2
Geography	Urban only	8	5
	Urban and rural	2	2
	Rural only	0	0
	Island	0	0
	Unclear	4	3
Population*	Parents/carers of children 0-4	2	1
	Children 5-11	3	3
	Children/YP 12-17	9	6
	Adults	2	2
Study design	Randomised control trial	3	2
	Pre-post study	7	5
	Other experimental	1	1
	Cross-sectional	2	2
	Other	1	1
Study design features	Employed randomisation	4	3
	Employed control/comparator group/condition	7	5
	Longer-term follow up data collected	2	2

*Some studies included participants from more than one group

Geographic coverage

The majority of studies focused on interventions in the UK and other countries in North Western Europe. Six studies reported research in the UK; these included two studies reporting on two separate projects in Scotland and four papers reporting on a single intervention in England. Six studies focused on five interventions in NW Europe (Germany, Austria and Norway). A further two studies reported research from New Zealand. No studies from Southern Europe met the inclusion criteria. Studies were largely focused on urban areas. While two studies included rural areas or participants living in rural areas, neither conducted separate analysis to identify differences between rural and urban.

Study populations

The age group included in the largest number of studies was the 12-17 group, with nine studies (covering six interventions) working with children in this group. Three studies evaluated intervention impacts on children in the 5-11 group, with two of these (covering two interventions) collecting data from/with children (Haveman et al., 2013; Ryan et al., 2018) and a further study modelling interventions in a simulated population of children

within this age group (Almagor et al., 2021). Only two studies (one intervention) concerned families of children aged 0-4 (Bjørnara et al., 2019; Bjørnara et al., 2021).

Study design and research methods

Most of the studies used quantitative research methods (nine studies) or mixed methods (three studies). Two used solely qualitative methods (Ryan et al., 2018; Goodman et al., 2014). Studies were diverse in their design. Three studies (two interventions) used randomised control trials (RCTs), the design best suited to determining whether observed changes are caused by an intervention. The most common study design was pre-post study (seven studies covering five interventions), in which outcomes are measured before and after the implementation of an intervention. Other study designs included an online and field experiment (Knight et al., 2022), two cross-sectional studies (collecting data at one time point only, both qualitative studies), and a computer simulation approach (Almagor et al., 2021).

Types of interventions

Each intervention was classified according to the types of measures they included (see Table B.2). *Awareness raising* interventions were the most numerous intervention type studied (four interventions), followed by *traffic calming measures* (two interventions). Other types of intervention – using *financial incentives*; *providing equipment*; *providing active travel infrastructure*; *developing skills*; and *travel planning* -- each featured in a single intervention only. Some interventions incorporated multiple intervention types within a suite of linked activities which were evaluated together as a single intervention.

Interventions were mapped against the ISM – Individual, Social and Material – domains. Four of the interventions focused primarily on addressing Material factors to influence behaviour change and five addressed primarily Individual or a mix of Individual and Social factors (Table B.2). One intervention was not categorised, as the means for achieving the behavioural changes modelled were not specified.

Table B.2: Details of interventions studied

Intervention	Studies	Study population	Location	Intervention summary	Intervention types	Intervention primary purpose
1) CARTOBIKE kindergarten trial	Bjørnarå et al., 2019, Bjørnarå et al., 2021	Parents of kindergarten children	Norway	Providing parents of kindergarten children with bikes and e-bikes with trailers, safety gear, and technical assistance	Providing equipment	Increase active travel
2) "läuft" school physical activity program	Isensee et al., 2018	12-15 year old school children	Germany	School-based physical activity competitions - step count pedometer class competitions and competition to collectively develop creative ideas to increase PA at school	Raising awareness	Increase physical activity
3) School based active travel campaign	Stark et al., 2018	12-14 year old school children	Austria	School-based active travel awareness raising campaign incorporating information giving, reflection (including tailored feedback on travel behaviour in relation to classmates and group discussion), 'active days' (trying out different modes and discussing), one-week 'mobility challenge' to reduce car use compared to their individual baseline.	Raising awareness	Increase active travel
4) Free bus travel for young people	Edwards et al., 2013, Green et al., 2014, Green et al., 2015, Goodman et al, 2014	12-17 year olds	UK (London)	Introduction of free bus travel for 12-17 year olds	Financial incentives	Increase public transport access
5) Nordhorn Public Transport Intervention Study	Haveman et al., 2013	7-18 year old school children with intellectual disabilities	Germany	Suite of interventions including: in-school and on-bus training in competencies for travelling by public bus, supported by trainers and trip companions; individualised travel planning and action plans; information for parents and teachers; Disability Awareness training for bus drivers; provision of mobile phones to children for back up support during travel.	Raising awareness; Developing skills; Travel planning	Increase public transport access

Intervention	Studies	Study population	Location	Intervention summary	Intervention types	Intervention primary purpose
6) Smartphone app game	Roider et al., 2019	12-18 year olds	Austria	Gamification of active travel through app-based competition awarding higher points for more sustainable travel choices and feedback on environmental impacts	Raising awareness	Increase active travel
7) Edinburgh 20mph streets	Williams et al., 2022	Adults (over 16s)*	Scotland (Edinburgh)	Increasing coverage of 20mph zones across city	Traffic calming measures	Improve road safety
8) Self-explaining roads	Ryan et al., 2018	Children aged 10-13 as student investigators engaging children age 5-13	New Zealand	Introducing Self-Explaining Roads design measures to slow vehicle traffic in residential streets	Traffic calming measures	Improve road safety
9) Protected cycle lanes	Knight et al., 2022	Adult cyclists*	New Zealand	Provision of protected (vs. unprotected) cycle lanes	Providing active travel infrastructure	Increase active travel
10) Simulated interventions for physical activity	Almagor et al., 2021	Simulated population of 9-11 year olds	Scotland (Glasgow)	Computer simulation exploring effects of (unspecified) hypothetical successful active travel interventions on physical activity level	Other	Increase physical activity

*Study included due to measurement of adult attitudes around CYP travel (e.g., willingness to allow children to travel, perceptions of child safety).

10 Appendix C: Welsh Government Play Sufficiency Duty

Matter F **Access to space/provision**

The Local Authority should consider all the factors that contribute to children's access to play or moving around their community.

1. The Local Authority keeps an up to date record of the number of 20 mph zones/school safety zones in residential areas
2. The Local Authority has an identified mechanism for assessing the impact of speed reduction and other road safety measures on the opportunity for children to play outside in their communities
3. The Local Authority has a plan(s) to reduce the negative effect of busy roads and junctions through the introduction of speed reduction measures and provision of safe crossing points/routes for pedestrians and cyclists
4. The Local Authority has a plan(s) to improve walking and cycle access to parks, outdoor play facilities and local leisure centres from residential areas
5. There is potential for the Local Authority to take further action to reduce traffic speed and improve road safety to promote play opportunities
6. The Local Authority uses road safety grants and/or other funding to support delivery of cycling training for children to national standards
7. The Local Authority uses road safety grants and/or other funding to provide pedestrian safety training for children
8. The Local Authority has an accessible and well-known way of arranging temporary road closures, to support more children to play outside their homes
9. The Local Authority refers to *Manual for Streets* when considering new developments and changes to the highway network/urban realm
10. The Local Authority works to nationally recognised good practice guidelines when developing walking and cycling facilities
11. The Local Authority uses child pedestrian road accident casualty data to inform the location and design of interventions which help children get around independently in their communities
12. The Local Authority considers children's needs to access play opportunities when making decisions about public transport planning and expenditure
13. The requirements of disabled children are understood and provided for within traffic and transport initiatives

These criteria are set out in a table, with a series of columns that need to be completed by the local authority carrying out the assessment

The Criteria column: sets out the data that needs to be available and the extent to which Local Authorities meet the stated criteria.

The RAG status column Red, Amber Green (RAG) status is a tool to communicate status quickly and effectively. Red = not met; Amber = partially met; Green = Fully met

The 2019 column enables the local authority to indicate the direction of travel with the insertion of arrows.

The Evidence to support strengths column: should be used to provide the reason for the chosen criteria status and how the evidence is held.

The Shortfall column: should be used to explain the areas in which the Local Authority does not fully meet the criteria.

The Identified Action for Action Plan column: should be used to show the Local Authority action planning priorities for that Matter.

The Comments section: asks some specific questions for each matter that should enable you to give a clear overview of how the Local Authority complies with the intention and implementation of this matter as set out fully in the Statutory Guidance. It also provides the opportunity to identify challenges and how they might be overcome.

The Play Sufficiency Assessment Form is available here [Play sufficiency: assessment form | GOV.WALES](#)

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