Appendix D

Rapid Review 1: Framing modal shift 'push' interventions for effective communication

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What framing should local authorities use when discussing 'push' interventions to promote modal shift away from car use to active travel (such as road user charges, vehicle emission zones, re-prioritisation of parking spaces) to effectively communicate with the public? A rapid review of the evidence.

Highlights

- Most literature on framing both 'push' policies and broader environmental policies aims at achieving public acceptability and support, not wider communication aims such as increasing public understanding of impacts.
- Any framing used must be perceived as relevant to the issue. Using frames that are seen as not relevant may decrease support.
- Fairness, equity, and effectiveness should be addressed in the communication of any modal shift 'push' policy.

Summary

Encouraging modal shift away from cars through interventions such as low-emission zones and congestion charges, is a priority for many Local Authorities and other stakeholders, yet it is not always clear how to communicate these interventions most effectively with the public. This review aims to summarise what is and isn't known about how to frame these policies to effectively build public awareness and understanding about their likely impacts. The review reveals a significant gap in research directly focused on how to best communicate the purpose and mechanics of such "push" interventions. Theoretical research exists around framing environmental issues, but there is limited research from real-world case studies on communicating interventions to promote modal shift away from car-use. Most published research is focused on how to gain public acceptability or support for 'push' policies encouraging modal shift, rather than achieving wider communication aims such as improving public understanding of modal shift impacts. Research focused on gaining public acceptance often favours persuasive framing strategies rather than providing neutral, informative communication.

Studies on framing strategies often have methodological limitations. For example, a heavy reliance on hypothetical survey data may restrict the generalizability of their findings. Some research suggests that highlighting the benefits for air quality could improve public support for congestion charges. Additionally, framing parking policies towards a goal, emphasising the gain of easier parking or improved health, might increase perceived fairness and acceptability. However, there was no clear consensus on which frames are most effective overall. There is conflicting evidence on how personal values, beliefs, and the perceived relevance of the frame to the policy may influence how frames are received. Further research in this area would be useful.

Multiple studies showed the importance of potential policies being fair, effective, and equitable. Some suggest that earmarking funds raised from car-use levies towards public transport improvements could enhance perceptions of equity. Future research should prioritise framing for awareness and understanding, communicate the full impact of any 'push' interventions for modal shift, and improve study quality to provide stronger guidance.

Background

In our increasingly urbanised world, car use presents a significant challenge. Traffic congestion, air pollution, and greenhouse gas emissions all rise in tandem with car dependence. [1, 2] To promote a modal shift towards more healthy and sustainable transportation options like cycling, public transport and walking, evidence has increasingly shown that 'pull' or 'carrot' policies (policies that only improve or promote the active travel environment) are not sufficient. [3] Instead, implementers also need to implement 'push' policies; policies to encourage a shift away from cars where possible. These can take the form of policies such as congestion charges, low-emission zones, or parking restrictions, and help to make alternative modal options more attractive. Disincentivizing car use, along with promoting active transport, is key to realising the climate and health co-benefits from a shift to sustainable transport. [4, 5]

However, the success of these policies hinges not only on their design but also on how they are communicated to the public. Framing, promoting a particular definition or interpretation of a policy, can influence public perception and understanding. [6-8] Effective communication from local authorities is crucial to ensure the public understand proposed or implemented policies fully and are aware of their purpose. [9] By understanding how to best frame car-use demand policies and public perspectives on them, local authorities can make and implement better policies that harness their potential to support the transition to healthier and more sustainable communities, at the same time as contributing to climate change mitigation.

Basic definitions used within the review

Goal Framing: Framing the goal or consequence of an action or behaviour. [76] The three types of goal framing are:

- *Hedonic framing:* Prioritises pleasure, improving one's feelings and the avoidance of discomfort.
- *Normative framing:* Activates a moral obligation, a sense of what ought to be done.
- *Gain framing:* Highlights changes in personal resources, either a **gain or loss.** [77]

Valence Framing: Framing information in a **positive** or **negative** light. [76]

Strategic Issue Framing: A type of emphasis framing, emphasising a subset of potentially relevant considerations to focus attention on those considerations. [78]

Semantic framing: Using the order of words and phrases to prioritise a key point. [79]

Modal Shift towards active transport: Change in travel patterns from one form of transportation (private vehicles) to another more sustainable version (active transport - walking, cycling, wheeling, public transport).

'Push' intervention: Interventions to encourage a move away from cars - such as congestion charging, low emission zones, no vehicle zones, road user charging, changes to parking policies.

Vehicle Miles Tax: A fee on vehicles that is charged per mile driven.

Key findings

Research on framing of 'push' policies to promote modal shift often focuses on achieving public acceptability and support as an outcome.

Three studies assessed the framing of different specific car-use disincentives (parking fees, vehicle miles tax, congestion charge, low emission zones). [13-16] Aside from specific car-use disincentives, two further studies examined car reduction policies more generally. [17-19] None of the studies focused on effective communication in general, enhancing understanding or raising awareness of the policy as an outcome. Instead, they assessed the effect of different framings on public acceptability, support, and attitudes.

Much of the published framing literature looks more generally at climate or environmental policies.	One review and seven studies assessed the impacts of framing of other climate mitigation policies or other environmental issues. [14, 20-25] The outcomes that they assess are mainly focused on behaviour change and public acceptance or support. Although there may be some transferability of the framing insights from these topics to policies on car-use disincentives, many of these studies [20-23, 25] lacked generalisability outside of the study context.
One study found framing parking policy through gain, hedonic or normative framing had an impact on perceived fairness and acceptability.	One study examined the impact of framing a parking fee policy in Sweden using three goal frames (gain, hedonic and normative), using a hypothetical scenario. [16] ▪ The **gain** frame centred the description of the policy around becoming easier to find parking spaces with the policy, thus saving time. ▪ The **hedonic** frame included better health for citizens, along with a more attractive city. ▪ The **normative** frame discussed a moral obligation to help solve climate problems. These are linked to issues frames discussed below. All three frames increased the perceived fairness and acceptability towards the parking fee compared to the control. The normative frame had a larger effect than the gain frame on acceptability.
Public support for congestion charging policies may be improved by using issue framing that highlights the positive impact on air pollution.	One experimental study [13], looking at the hypothetical implementation of a congestion charge in Geneva. This study found that public support for a congestion charge over CHF 2 (= £1.76, 29.3.24) was increased by providing information on the air pollution benefits when compared to the control treatment, although air pollution information had no impact on charges less than CHF 2. By contrast, information around decreased congestion had no effect on public support. A paper using unpublished survey data in Canada, suggested that framing the implementation of congestion charging around the ancillary benefits to improved air quality may generate more public support compared to a framing that highlighted the benefits of reduced congestion after applying a charge. [26] The authors of a paper exploring the positive attitudes of a congestion charge implemented in Stockholm after a successful trial and referendum, reflected on how the policy was framed as an 'environmental charge' and highlighted the positive impacts of the policy on reducing air pollution, which they felt may have influenced its success. [27]
There is no clear consensus on frames that impacted general car-use demand policies.	Three studies examined communication around car-use demand policies more generally, looking at outcomes related to public acceptability and support. One study analysed the effect of four strategic issue frames (health, climate, wildlife habitat and local environment) across three countries, China, Germany, and the United States [17]. It found that none of the issue frames had robust effects on public support for policies to reduce fossil-fuel car use, across the three countries. These findings contrasted with Walker [19] who sampled 240 university students from Exeter and found that framing a car-use reduction policy with a non-climate public health frame could stimulate greater public support for the policy. This study also found that semantic framing (choice of words and phrases) had an impact on public support. When the public health frame and the climate frames were included in the policy description, there was more support when the public health frame was placed before the climate framing, compared to the reverse order (climate, then public health).

	Huber [18] looked at gain and loss framing of seven policy instruments aimed at reducing vehicle emissions (including EV promotion) in Switzerland. They found no systematic effect of the policy proposals' framing on public support for the policies.
Evidence on the use of health framing to increase public support for environmental policies, including those aim to decrease vehicular emissions, is generally positive.	One UK study found use of a health framing had a positive influence on public support for a policy regarding electric vehicle subsidies (along with climate and economic frames) but did not influence public support for low emission zones. [14] In a study of 9,750 participants across China, US and Germany, neither willingness to pay for greenhouse gas emissions nor public support for a car-use demand policy were impacted by use of a health framing. [17] A smaller study by Walker [19] found a positive impact from use of a health frame, with public support increasing for a car-use reduction policy with a public health frame compared to a climate frame. The effectiveness of public health framing depended on the perceived relevance of the framing to the policy (policy-frame match). Although not examining health issue framing directly, Westin [16] found that a hedonic frame which included health (along with another factor - improving the city's attractiveness) increased perceived fairness, attitudes and acceptability for a parking fee policy.
Gain and valence framing can have an impact on car use, environmental policy support and attitudes but it was not clear if gain/positive or loss/negative framing was most effective; Some studies found more impact from positive framing, while others found more impact from negative/loss framing.	One study found that using a gain frame of a parking policy (in this case finding a parking space being easier) had a positive impact on perceived fairness, attitudes and acceptability, compared to no frame. [16] A positive impact on intended behaviour change was found by Mir [23], who found that a positive framing of benefits of modal shift towards active transport was more effective than using a negative framing of the impacts of active travel. Decrinis [22] found a positive impact on uptake of company electric cars from an email prompt using the gain framing that highlighted the possible cost savings compared to a prompt with no frame. A systematic review on how to communicate air pollution to change behaviour found four studies which suggested that communicating positive gains from behaviour change may be more engaging than communicating the potential losses. [24] It found one study that reported no impact of either a positive or negative frame on intentions to reduce driving speed. Another study examined how perceived differences in CO2 emissions from alternative travel modes changed depending on whether positive or negative framing was used (comparing two modes (bike/full car/single occupancy 4x4) and framing the CO2 amount produced as either a higher or lower between the modes). [20] This study found that negative framing was more effective than a positive frame in increasing the perceived differences of CO2 emissions from alternative travel modes. Selena Krishen [15] looked at attitudes towards a vehicle miles tax (VMT), finding that participants who received the negatively framed message had higher attitudes towards the VMT than those who received a positively framed message. In terms of more general environmental policies, Davis [21] found an increase in intended environmentally sound behaviour (recycling, conservation, green shopping) following communication using a frame that described negative consequences of participants inaction on themselves and their own generation, compared to a frame that referenced environmental gains or future generation's losses.

Some studies found the same frame may have a different impact on car-use demand policies depending on the audience member's personal values. Other studies found no differential impact by personal values.	Underlying values and beliefs may impact the way that different frames are interpreted. Two studies found that a person's existing norms, beliefs and values can impact how they will perceive the framing of a car-use demand policy. [16, 19] Westin [16] suggests that biospheric values (concern about the natural environment) may positively influence support for pro-environmental policies like increased parking fees. The study also found a link between altruistic values (concern about others) and stronger environmental responsibility and social norms. Another study found no interaction between participants' level of climate scepticism and the impacts of a public health frame. [19] One study found that personal values do not influence how people respond to different car-use demand policy frames. Fesenfeld [17] did not find any robust interaction effects between any of the tested frames and individual-level factors.
The published evidence showed that making a frame personally relevant did not have any impact on support or behaviour change for travel mode policies and may have negative consequences.	Walker [19] found that framing a climate policy in relation to issues that affect participants personally can have negative impacts if that issue is not seen as being directly relevant to the policy. Mir [23] found that compared to a generic air pollution framing, tailoring the air pollution frame to be more personally relevant did not impact participants' willingness to use active travel.
Addressing equity and fairness is important in achieving public acceptability and support for 'push' modal shift interventions. Earmarking raised funds towards public transport may help to achieve this.	Across studies examining public acceptability and support for car-use disincentives, fairness & equity were highlighted as important factors to achieve and communicate. [14, 18, 28-32] Effectiveness was also found to be an important influencing factor. [18, 27-30, 32-34] Some studies suggested that earmarking raised funds for public transport may help with the perception of equity and/or improve public support. [13, 26, 30, 35-37] However, the earmarking of funds does not guarantee support, as discussed by Vigar [38] in the case of the proposed Manchester congestion charge. Despite raised funds for the Manchester charge being earmarked for public transport, the framing used by the media focused on the congestion charge itself, even when articles discussed or quoted people talking about the public transport improvements that would accompany the charge. [38] Communicating the economic costs and benefits of policies and addressing implementation concerns may help to address perceived effectiveness. [29, 31, 35]
Methodological issues are prevalent, limiting conclusions that can be drawn.	No studies were found to be methodologically strong. Quality assessment showed issues with bias, particularly in relation to selection and non-response. Many studies were not representative of the target population or had limited information regarding the target population. Population sample sizes were often small, which contributed to the limited generalisability of many studies.

A simplified summary table of the framing conditions and effects can be found in the Table 1 below. To understand the nuances of each frame and more detailed information, please refer to the original reports.

Table 1: Simplified summary of framing conditions - for full detail and context please refer to source papers

Framing category	Framing tested	Positive effect on…	No effect on…	Location	Sample size	Reference
Health issue framing	Benefits for the protection of human health		Public support for policies aiming to reduce the use of fossil-fuel cars	China, Germany, US	9,750	Fesenfeld et al. (2021)
			Willingness to pay for vehicle GHG emissions			
	Negative impact of car use on public health	Public support for car use reduction policies (vs climate frame)		University of Exeter, UK	240	Walker et al. (2018)
	Improve air quality, reduced risks to specific diseases	Public support for EV subsidies		UK	5,665	Poortinga et al. (2023)
	Improve health of local people, reduce air pollution, reduce traffic & accidents		Public support for LTNs			
Climate issue framing	Benefits for the protection of global climate		Public support for policies aiming to reduce the use of fossil-fuel cars	China, Germany, US	9,750	Fesenfeld et al. (2021)
			Willingness to pay for vehicle GHG emissions			
	Tackle climate change and reduce emissions	Public support for EV subsidies	Public support for LTNs	UK	5,665	Poortinga et al. (2023)
Air pollution issue framing	Reduce pollution and noise from traffic, improving health	Public support for congestion charges > 2CHF	Public support for congestion charges <2CHF	Geneva, Switzerland	1,414	Baranzini et al. (2021)
	Reduce air pollution	Public support for congestion charging		Canada	481	Axsen and Wolinetz (2021)
Economic issue framing	Help cut motorists bills, help reduce EV prices	Public support for EV subsidies		UK	5,665	Poortinga et al. (2023)
	Benefits to local businesses due to increased access		Public support for LTNs			
Hedonic goal framing	A more attractive and healthier city	Perceived fairness and acceptability of increased parking fees		Sweden	802	Westin et al. (2020)
	Using colour and emoticons on a label	Willingness to pay for vehicle GHG emission reductions		Canada	1,985	Wang et al. (2021)
	The heart electric, the soul Porsche' (email)		Uptake of a company electric car	Germany	170	Decrinis et al. (2023)

Normative goal framing	A moral obligation to reduce cars as a climate solution	Perceived fairness and acceptability of increased parking fees		Sweden	802	Westin et al. (2020)
	Be an ambassador for a sustainable Porsche future (email)		Uptake of an electric car	Germany	170	Decrinis et al. (2023)
Gain goal framing (vs control)	Easier to find parking spaces, save time	Perceived fairness and acceptability of increased parking fees		Sweden	802	Westin et al. (2020)
	Switch to electric & reduce your costs by EUR 100/month (email)	Uptake of a company electric car		Germany	170	Decrinis et al. (2023)
Gain goal framing (vs *loss* framing)	Promote switching to electric vehicles' (gain) compared to 'reduce vehicle emissions' (loss)		Overall perceived effectiveness and fairness of policies (car taxes, purchase incentives, car bans, parking regulations, information campaign, energy label, road pricing) (either frame)	Switzerland	2,034	Huber et al. (2020)
Positive framing (vs *negative* framing)	positive outcomes of the reduction of air pollution (decrease disease, less acid rain, less GHG) compared to negative outcomes of air pollution (increase disease, increase acid rain, increase GHG)	Intended change towards a more sustainable mode of transport		Sharif University, Terhan, Iran	220	Mir et al. (2016)
Loss goal framing (vs *gain* framing)	This travel mode produces *less* CO_2 than the other mode' vs ' produces *more'*	Perceived differences in CO2 emissions of transport modes		EU	194	Avineri et al. (2013)
	Losing the environment we have, loss of air & water quality, reduced quality of life' vs ' gaining a better environment, improved air & water qual, improved quality of life'	Intended environmental behaviour		A western university	112	Davis (1995)
Negative framing (vs *positive* framing)	Unable to expand and improve infrastructure' (negative) vs 'able to expand...' (positive)	Perceived effectiveness of a vehicle miles tax		Nevada University, US	120	Selen Krishen et al. (2014)

Research Recommendations

More research on effective framing to communicate about "push" policies encouraging modal shift in travel is needed. Future research could focus on several key areas:

- Studies should examine how framing influences awareness and understanding rather than just support for proposed policies.
- Research should further explore how framing insights from related topics, such as broader environmental or transport policies, and different car-use demand management policies might be applied effectively to each other.
- Enhancing study quality with larger, more representative samples and diversifying research beyond major cities may help make research findings more robust and generalisable to new contexts and settings.
- Investigate whether tailored framing messages (e.g. framing a message with a towards an issue that resonates with a particular demographic) can improve policy awareness/comprehension for a variety of population groups.

Methods

This review employed AI-powered literature search tools (Elicit AI [39] and Consensus AI [40]) to accelerate the search process. The research question, along with variations (limited to the past 15 years, past 10 years, and 'UK' before local authorities), was input into the tools. The search was not limited to the UK but this term was used to find UK relevant papers. 161 papers from Elicit and 87 papers from Consensus were extracted. Rayyan Review software (Rayyan) was used to identify duplicates, and these were resolved manually. To ensure comprehensiveness, supplemental searches were conducted through Google Scholar and citation searching via Scite AI [41], adding 4 and 8 more potentially relevant papers. A total of 260 reports were screened for relevance at the title and abstract stage, with 52 progressing to full-text review. Reports from any country and year were included.

Relevant information was extracted from papers manually, as was evidence synthesis. Gemini AI [42] was used to assist with the write up of summaries and to proofread and refine written text. The four most relevant studies were quality assessed using the 2018 Mixed Methods Appraisal Tool. [43] Quality and risk of bias of the remaining studies mentioned was considered but not formally assessed. Further detail on the methods used within the review can be found in Appendix C.

Limitations

While this rapid review aimed to be as inclusive as possible, the streamlined search process may have resulted in unintentionally omitting some relevant studies. Additionally, the specific algorithms employed by the AI search tools are not publicly available, potentially limiting replicability of the search strategy by other users. The Google Scholar search aimed to help find any missing or uneven searches.

Limited formal quality assessments were performed, with no overall assessment of the certainty of evidence, due to the rapid nature of the review.

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