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# Transport Safety and Health Behaviours

## Exploring Gaps in Understanding the Pathways Between Transport Safety and Health Behaviours

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# Transport Safety and Health Behaviours

## Overview

This document considers the relationship between perceptions of transport safety and health behaviours, and highlights potential gaps in current understanding. Previous research on transport safety and health has primarily focused on how factors like traffic volume and speed, as well as the perceived safety of transport infrastructure, can encourage active travel, such as walking and cycling. Other areas of research have explored domain-specific links between perceived road safety and driving behaviours, as well as perceptions of safety on public transport and their impact on user experiences.

This document considers additional pathways through which transport safety may impact health behaviours and outcomes. Beyond the obvious links between transport safety and active travel (improved infrastructure, walkability, and cyclability of routes encourages greater physical activity), there are other less intuitive channels through which transport safety influences health behaviours. These include mental health and well-being, perceptions of risk and control, and perceived uncontrollable mortality risk, all of which, in turn, can affect health behaviours. These pathways are underexplored, resulting in a gap in research examining the relationship between transport safety perceptions and broader health behaviours, such as diet, smoking, and alcohol consumption. This document highlights the need for further investigation into this area and suggests potential future directions to better understand and quantify the potential health behaviour benefits of improved transport safety.

## Traffic, Driving Exposure, & their Relationships to Health

Research suggests that perceptions of local road safety and slower traffic speeds are positively associated with lower levels of obesity and Body Mass Index (BMI)[1]. For example, a study, pooling data from 12 countries, identified perceptions of local traffic safety as the strongest environmental factor linked to lower BMI and reduced odds of being obese [2].

Evidence also suggests that more time spent driving influences health behaviours and outcomes. A study of 37,570 adults in New South Wales, Australia, found that longer daily driving time was linked to higher odds of smoking, insufficient physical activity, short sleep, obesity, and poor physical and mental health [3]. A cross-sectional study of 386,493 UK Biobank participants found that driving 3 hours or more per day was associated with higher odds of being obese, smoking, insufficient sleep, low fruit/vegetable intake, and low physical activity [4].

## Active Travel

Research literature largely attributes the link between perceptions of road safety and Non-Communicable Diseases (NCDs; such as obesity, diabetes, and cardiovascular disease) to active travel [5]. This suggests that road safety initiatives promoting active travel (by encouraging walking and cycling as alternatives to other modes of transport) can increase physical activity, helping to tackle NCDs. Perceptions of road safety can significantly influence levels of active travel among pedestrians, pedal cyclists and other road users [6, 7]. Walking routes that are perceived to be unsafe can deter walking, and concerns about route safety also affect comfort and cycling choices [6, 7]. In 2020, the National Travel Attitudes Study found that 66% of adults in England

felt that cycling on the road is too dangerous (14% disagree and the remaining are undecided)[8]. Among respondents who did not consider cycling impossible due to disability, the most commonly cited factors they believed would encourage more cycling were improved safety and better cycling infrastructure [9].

Active travel can have positive effects on health behaviours, health outcomes, and mental health [10, 11]. Higher rates of active travel can contribute to reductions in traffic and air pollution [12], with some evidence for additional social and economic benefits [13]. While improving road safety is intended to make people feel safer and live healthier lives, it is important to consider potential unintended consequences of increased active travel. For example, the health benefits of increased physical activity may be offset by the increased risk of injury associated with active travel [14], as well as greater exposure to pollutants due to longer travel times and higher inhalation rates [15]. Analysis from the Transport Research Laboratory (TRL) of UK National Travel Survey data estimated that if half of the short trips currently carried out by car in England were replaced with walking, there would an estimated 406 additional pedestrian casualties annually [16]. Replacing short car trips with cycling was estimated to result in a net increase of 740 casualties (accounting for the 'safety in numbers' effect of more cyclists on the road, and the expected reduction in car occupant injuries). Due to the complexities of disentangling these relationships, few studies examine how behavioural factors and exposure to different elements of the transport environment interact [17]. Evaluating the health impacts of transport infrastructure and built environment policies requires understanding complex relationships across multiple pathways. Research that explores these pathways can capture and predict both intended and unintended consequences of transport initiatives, such as exposure to pollutants, injury, changes in active travel, and other health behaviours [17].

# Additional Pathways Between Transport Safety & Health

Looking beyond the obvious link between transport safety and active travel described above (namely that improved infrastructure, walkability, and cyclability can encourage greater physical activity and use of roads and pathways), there are other channels through which transport safety influences health behaviours. These include its impact on mental health and well-being, perceptions of risk and control, and perceived uncontrollable mortality risk, which in turn affect health behaviours.

## *Mental.Health*

**Perceptions of Transport Safety → Mental Health and Wellbeing → Health Behaviours**

Experiences and perceptions of transport safety, along with modes of transport themselves, can significantly impact mental health, though the links are not always straightforward [18]. Perceptions of road traffic conditions and their impact on walking are associated with positive mental wellbeing. For example, in a survey of participants across four urban neighbourhoods in England, those who perceived local traffic as 'heavy' and 'fast', and affecting their ability to walk locally, reported significantly lower wellbeing scores compared to those without these perceptions [19]. People who experience road traffic accidents are more likely to report depression and alcohol abuse, even after adjusting for other relevant risk factors [20]. Experiencing road traffic accidents is also associated with elevated psychological distress, including PTSD, depression, and anxiety, [21, 22].

A 2018 TRL review highlighted the complex relationships between transport and mental health, showing that mental health can influence driver behaviour and travel choices, while public transport systems can also impact mental health [23]. Factors like lack of perceived safety, poor

infrastructure, vehicle design, noise, signage, and poor lighting contribute to stress and anxiety across various transport modes, affecting the overall population. One of the biggest ways in which transport is reported to impact anxiety is through perceptions of interactions with other travellers, particularly in terms of how fellow travellers behave and how they feel others perceive them [24]. The subtle yet persistent strain of daily commutes on mental health and well-being may drive people to adopt compensatory behaviours, such as consuming junk food, alcohol, or smoking, as sources of comfort, often without recognising a connection to transport safety.

Understanding the impact of experiences and perceptions of transport safety on mental health is vital for capturing how transport safety influences health behaviours, as mental health can significantly affect health decision-making. Just as health behaviours can impact mental health, mental health itself can also influence health decision-making, behaviours, and lifestyle choices. Psychological distress is associated with risky health behaviours [25]. There are bidirectional relationships between poorer mental health and higher levels of smoking [26], consumption of junk food and ultra-processed foods [27], and drug and alcohol disorders [28].

## *Perceptions.of.Risk.and.Control*

**Perceptions of Transport Safety → Perceptions of Risk and Control → Health Behaviours**

The Lloyd's Register Foundation World Risk Poll (WRP) has repeatedly asked people around the globe about the greatest risk to their safety, and each time, the answer has been the same: road traffic accidents [29]. Worry about harm from traffic accidents is closely tied to perceptions of roads and highways: as satisfaction with road and highway conditions improves, concern about road safety decreases [29]. Experiences and perceptions of transport safety can shape individual risk perceptions, which, in turn, influence behaviours. Perceptions of risk and beliefs about control affect patterns of risky behaviour, which can subsequently influence the safety experiences and perceptions of others. For example, drivers with a high sense of control often underestimate road risks and engage in unsafe behaviours, endangering both themselves and others [30]. Furthermore, adolescents who act riskily in traffic are more likely to exhibit other risky behaviours, such as smoking and alcohol misuse [31]. Understanding clusters of risky behaviours, and their shared predictors, can help inform more effective interventions. Addressing the underlying factors influencing both risky road behaviours and other health-risk behaviours, such as poor diet, smoking, and alcohol misuse, can lead to more comprehensive strategies to improve both road safety and overall public health.

Numerous factors can influence individual perceptions of road and transport safety. Individual variations in how drivers perceive the risk of unsafe driving behaviours have been found to influence hazard ratings, indicating that overall risk sensitivity to driving strongly affects safety perceptions in both urban and rural environments [32]. Additionally, factors such as journey length, vehicle age, road design and markings, trust in road signage, and general preferences for certain road types, can also influence overall perceptions of road safety [33]. With respect to perceptions of control, in a study of 525 road users in Cameroon, participants with higher levels of fatalistic beliefs perceived dangerous traffic situations as less risky and reported engaging in less safe behaviours [34].

Much of the literature on risk perceptions and feelings of road safety focuses primarily on immediate, situational experiences of risk. For road users, the emphasis is often on 'in-the-moment' perceptions of control and safety while driving, which influence risk-taking on the roads. This focus is understandable, given that road safety research prioritises reducing traffic accidents due to their significant health, economic, and societal impacts. For pedestrians and cyclists, the literature tends to concentrate on the walkability and cyclability of roads, and how it may facilitate active travel. However, this overlooks the longer-term impacts of perceptions of risk and their

relationship to broader health decision-making. Experiences of transport safety can shape an individual's general sense of risk and feelings of control. While these perceptions may initially be triggered by momentary exposures to dangerous roads, risky driving behaviours, or experiences on public transport, their effects can extend well beyond those moments and persist in contexts unrelated to active transport use. This enduring sense of risk can influence health behaviours.

There is good evidence for the link between general risk perception and health behaviour [35, 36]. Risk attitudes and general perceptions of risk predict health-related behaviours such as consuming alcohol, smoking and other health-impacting decisions and behaviours [37, 38]. Furthermore, the extent to which someone is made to feel in control of life events is positively associated with their health behaviours, outcomes, and mental health [39, 40]. Among 7,115 participants across 18 European countries, individuals in the highest quartile of internal locus of control (the belief that one can influence events and outcomes in their own life) were more than 40% more likely to engage in healthy behaviours compared to those in the lowest quartile [41]. Given that transport safety is a significant risk category in people's lives, and considering the influence of perceptions of risk and control on health behaviours, it is important to examine how transport safety shapes levels of perceived risk and their long-term impacts on health behaviours.

## ⚠ *Perceived.Uncontrollable.Mortality.Risk*

**Perceptions of Transport Safety → Perceived Uncontrollable Mortality Risk → Health Behaviours**

Perceived Uncontrollable Mortality Risk (PUMR) refers to the portion of a person's risk of death that they believe cannot be reduced by altering their behaviour [42-45]. Greater PUMR has consistently been shown to predict lower levels of health effort [42, 46-48]. This supports the idea that increased exposure to health and safety risks beyond personal control can reduce motivation to engage in positive health behaviours. This concept ties into the Double Dividend of Safety – that reducing those risks which people are unable to mitigate for themselves will not only make people safer, but will also encourage healthier behaviours.

Research into PUMR suggests that humans have evolved psychological mechanisms to respond to environmental cues of risk, which help determine the optimal level of investment in preventative health and subsequently influence health behaviours [42, 46-48]. In the context of transport safety, environmental cues of uncontrollable risk may take many forms. High levels of traffic noise or the perceived speed of passing vehicles may unconsciously evoke feelings of risk. Similarly, poor lighting, broken infrastructure, low-visibility transit stops, proximity to unsafe areas, or erratic behaviours and social cues from fellow travellers may signal danger. These cues can be overt and immediate, or operate subtly below the level of conscious awareness. Even when unnoticed, they can still affect perceptions of risk, heighten vigilance, increase stress, and influence decision-making and behaviours.

Understanding environmental cues of risk is important for understanding how perceptions of transport safety shape health behaviours. This underscores the need to design transport environments that not only improve actual safety but also foster a sense of security. Transport safety is shaped by infrastructure, modes of transport, local and national policies, and the behaviours of individuals. As mentioned above, transport safety is widely perceived as the greatest risk to people's health and safety worldwide [29]. This positions transport safety as a key category of risk likely to influence PUMR and, in turn, health effort and behaviours. While there is a growing body of evidence linking PUMR to health effort in general, the specific relationship between transport safety, PUMR, and health behaviours remains underexplored. This represents a critical opportunity to expand our understanding of how transport safety influences health through its impact on PUMR.

For a more detailed explanation of the origins of the double dividend of safety concept, please refer to our related 'Theory and Evidence' document available at doubledividendofsafety.org.

## Uncovering Wider Health Benefits of Transport Safety

Understanding the broader public health impacts of transport safety interventions is vital to capture the multiple ways transport experiences and perceptions influence health behaviours and outcomes. A recent synthesis of evidence highlighted that 20mph speed limits and zones have clear benefits in reducing injuries, collisions, and casualties, suggesting that small speed reductions across large areas could have substantial health benefits [49]. However, it was noted that the wider health effects of such interventions, including their impact on attitudes towards safety, active travel, air pollution, accidents, and health behaviours, requires further evaluation [49]. Investigating the full impact of transport safety interventions is challenging due to the difficulty in measuring data not routinely collected, unlike traffic injuries and accidents [49].

While many studies focus on the links between transport safety and active travel, or perceptions of road safety and driving behaviours, there is a notable gap in research directly examining the relationship between transport safety perceptions and broader health behaviours such as diet, smoking, and alcohol consumption. Future studies should explore these relationships between perceived transport safety and health behaviours, by considering the pathways described above.

## Future Research Directions

The following are possible research questions that could help expand knowledge and understanding of the relationships between transport safety and health behaviours:

- How does the relationship between perceptions of transport safety and health behaviours differ across transport user groups, such as car occupants, pedestrians, pedal cyclists, motorcyclists, and users of public transport?
- Which health behaviours are most strongly influenced by experiences and perceptions of transport safety?
- What types of transport safety interventions have the most significant impact on promoting positive health behaviours across different transport modes?
- What are the social and economic costs associated with the health behaviour impacts of low perceived transport safety?
- What is the relationship between perceived and objective levels of safety and health behaviours, and do they align in their influence?
- What are the key factors of transport safety that impact perceived uncontrollable mortality risk, and health behaviours?
- What role does public policy play in shaping the effectiveness of transport safety interventions on health behaviours?

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