Journal of Transport & Health 39 (2024) 101932

Contents lists available at ScienceDirect

Journal of Transport & Health

journal homepage: www.elsevier.com/locate/jth

Understanding parental support for infrastructure and policy changes that encourage active travel among children

Shannon Sahlqvist [a,*], Karen Lim [a], Venurs Loh [a,b], Jenny Veitch [a], Jo Salmon [a], Anna Timperio [a]

[a] Deakin University, Institute for Physical Activity and Nutrition (IPAN), School of Exercise and Nutrition Sciences, Geelong, Australia
[b] College of Sport, Health and Engineering, Victoria University, Melbourne, Australia

ARTICLE INFO

Keywords:
Preference
Cycling
Walking
School
Road space reallocation
Traffic flow
Traffic speed

ABSTRACT

Introduction: Creating a safe environment for active travel is regarded as necessary to encourage greater uptake, particularly for children. Doing so, however, may be politically challenging due to perceived community opposition. This study explored parental support for active travel infrastructure and policy changes, and differences by socio-demographic characteristics and child travel characteristics.
Methods: Through an online survey, Victorian (Australia) parents (n = 917) of children in grades 3–6 reported their level of support for 11 policy and infrastructure initiatives, postcode (to determine area-level disadvantage and urbanicity), age, gender, highest level of education, household car ownership, child's active school travel, child's bike access, distance from home to school, and whether they spoke a language other than English at home and were born outside Australia (cultural and linguistic diversity (CaLD)). The proportion of parents indicating support for each initiative was calculated. Ordinal logistic regression examined differences in support by key characterises, with all socio-demographic and travel characteristics entered simultaneously.
Results: Almost all participants were female (88%), 20.3% lived in an area of most-disadvantage, 9.3% were CaLD and 32.4% had one or no household vehicle**.** Over 80% supported: additional road crossings around schools, more drop-off zones within walking distance of schools, wider footpaths allowing for a mix of users, and separated bike lanes. Initiatives that received the least support (less than 60%) related to changes in the roads around schools, including banning cars at drop-off and pick-up times and converting roads to shared streets or one-way traffic. Greater support for several key initiatives was found among respondents in areas of more disadvantage, who were CaLD, and who had one or no household vehicle.
Conclusion: Parents were supportive of the initiatives. The least supported initiatives were those that restricted car travel. These findings can inform future infrastructural changes to support active travel.

* Corresponding author
E-mail addresses: shannon.sahlqvist@deakin.edu.au (S. Sahlqvist), k.lim@research.deakin.edu.au (K. Lim), Venurs.Loh@vu.edu.au (V. Loh), jenny.veitch@deakin.edu.au (J. Veitch), jo.salmon@deakin.edu.au (J. Salmon), anna.timperio@deakin.edu.au (A. Timperio).

https://doi.org/10.1016/j.jth.2024.101932
Received 11 June 2024; Received in revised form 16 September 2024; Accepted 8 October 2024
Available online 24 October 2024
2214-1405/

1. Introduction

Active travel (walking and cycling to get from place to place including to and from public transport stops) as an alternative to car travel can have numerous co-benefits. It is associated with a meaningful decrease in CO_2 emissions, making it important to mitigate climate change (Brand et al., 2021), and can be regularly integrated into daily life providing a direct and meaningful source of physical activity for children and adults (Martin et al., 2016; Sahlqvist et al., 2013). For example, findings from a meta-analysis indicate that walking to school provides children with 17 min of daily moderate-to-vigorous physical activity (MVPA), accounting for just under a quarter of the recommended daily MVPA (Martin et al., 2016). Opportunities to promote health-enhancing physical activity through active travel are particularly relevant in countries like Australia where levels of physical activity and active travel are low (Schranz et al., 2018; Australian Bureau of Statistics, 2018a; Australian Bureau of Statistics, 2022a) with evidence suggesting that only 37% of Australian primary school children use active travel as their *usual* mode of travel to school (Schranz et al., 2018).

A multitude of individual, parental, societal, environmental and policy factors interact to influence active travel in children (Timperio et al., 2018). Most notable among them is travel distance (in particular, to school), likely reflecting the impracticality and inconvenience of walking or cycling long distances (e.g. Ikeda et al., 2018),. Parental concern related to road safety is also a critical barrier to children's active travel (Lorenc et al., 2008). To create safe streets for pedestrians and cyclists and reduce car dependency, researchers and policy makers are agreed that purposively designed infrastructure and street-level attributes that limit exposure to, or reduce the speed of, vehicular traffic are recommended (World Health Organization, 2018; Yang et al., 2010; Smith et al., 2017). Examples include sidewalks (footpaths) and dedicated cycling paths that are separated from vehicular traffic, physical traffic calming infrastructure on local streets, a reduction in the speed limit on streets near schools (e.g., to 30 km/h), safe road crossings, and shared streets where cars are expected to travel at the speed of pedestrians and cyclists (Tranter and Larouche, 2018). Nonetheless, there is an absence of quality evidence to support the effectiveness of such schemes. Typically, interventions to promote school active travel (AST) have primarily focused on 'soft' interventions including, for example, Safe Routes to School programs, school travel planning, the initiation of a walking school bus program or promotional campaigns (Larouche et al., 2018). Evaluations of 'hard' interventions that alter the built environment or the flow/speed of traffic are less common. In Denmark, two separate evaluations of infrastructural changes on school streets (including, for example, one-way streets, regulation of car drop off zones, dedicated cycle path, speed humps) combined with 'soft' interventions, found no changes in school cycling among children attending intervention schools relative to control schools (Christiansen et al., 2014; Østergaard et al., 2015). Beyond the school journey, following the implementation of a 1-mile dedicated bike lane in New Orleans (USA), there was an observed increase in cyclists on the route, and a corresponding decrease in cyclists on adjacent routes (Parker et al., 2013). Conversely, no increase in walking and cycling was seen in adult residents following the introduction of bicycle boulevards (low traffic volume streets that include traffic calming, diversion, signage and intersection treatments) (Dill et al., 2014). In London (UK), the provision of cycling lanes and the closure of roads to through traffic (as part of a more comprehensive suite of measures to create pedestrian and cycling friendly environments) resulted in an increased likelihood among adults of any past week cycling, at both 1- (Aldred et al., 2019a) and 5-year follow up (Aldred et al., 2024).

Perceived public disapproval serves as a critical obstacle to implementing walking, and particularly cycling, infrastructure and policy changes, more so when these changes are thought to threaten the ease, affordability, and convenience of car travel (Aldred et al., 2019b; Field et al., 2018). A UK study of over 400 partners involved in the implementation of active travel initiatives including local transport officers, consultants, academics, business owners and politicians found that one-third identified public opposition as a barrier to cycling investment (Aldred et al., 2019b). For example, in London (UK), the implementation of initiatives to restrict the flow of vehicular traffic (known as modal filtering) to encourage walking and cycling was met with hostility and organised protests (Aldred et al., 2019a). Despite such examples of opposition, there is little robust evidence to indicate whether these views are reflective of the wider community, particularly of parents who are concerned about their child's safety if walking or cycling to/from school.

A recent active travel priority setting exercise in Australia involving 140 participants from academia, all levels of government and the not-for-profit and private sectors, identified that the second highest priority for advancing active travel was to better understand community resistance, in particular, the provision of active travel infrastructure, road space reallocation and lower urban speed limits (Beck et al., 2021). The authors called for more research to be conducted in partnership with communities to identify what infrastructure and policy changes are likely to be supported. Therefore, this study explores perceived parental support for infrastructural and policy changes to support active travel, including on the journey to and from school, among children and differences by key area-, family- and individual-level factors.

2. Methods

The cross-sectional data presented in this manuscript were collected opportunistically from primary caregivers (herein termed parents) of children in grades 3–6 (aged between 7 and 12 years) as part of a wider investigation into the effect of a state-wide campaign to promote school active travel among primary school aged children in Victoria, Australia. The survey was conducted between September and November 2020. Deakin University Human Ethics Advisory Group (HEAG-H 133–2020) provided ethical approval.

2.1. Australian context

Victoria, like all Australian states and territories, is characterised by sprawling cities with low population density. The dominant mode of travel is the car and 91% of households have at least one vehicle (Australian Bureau of Statistics, 2021). On arterial roads, cars can typically travel at a maximum speed of 60 or 70 km/h, with a maximum speed of 50 km/h on local and residential streets. On roads adjacent to schools, the speed limit is 40 km/h during periods before and after school. There is campaigning to further reduce the speed on roads adjacent to schools to 30 km/h. For example, in the lead up to the 2022 Australian federal election, an alliance of 13 health, education and cycling not-for-profit organisations, advocated for a reduction in urban speed limits in residential streets, shopping streets and school zones (We Ride Australia, 2022). They further advocated for the provision of safe routes and pedestrian priority crossings within 500–1500 m of schools and designated drop off zones (We Ride Australia, 2022).

2.2. Participants and recruitment

To be eligible, participants were required to live in the state of Victoria, understand written English and have a child in Grade 3–6. Paid and unpaid Facebook (Meta Platforms Inc, California) advertisements targeting parents living in Victoria ran intermittently for approximately eight weeks. The advertisements invited participants to complete a short survey about how their child travelled to school with the opportunity to receive a $10 retail e-gift card on completion. Approximately 2000 parents from an existing database who had agreed to be contacted about future research (Sahlqvist et al., 2019) were emailed a similar invitation and were also asked to share this invitation among their contacts. To supplement these methods of recruitment, when participants were emailed their e-gift card, they were invited to forward information about the study to family/friends who met the eligibility criteria (approximately 15% of participants were recruited this way).

In all instances, those interested followed a link to an online screening and registration page that contained brief information about the study and asked potential participants to confirm whether they had a child in their care in Grade 3–6 at a Victorian primary school and provide their residential postcode (to determine eligibility). Those deemed eligible were provided with detailed information about the study. After indicating their consent, participants were sent a personalised email with a link to the survey.

2.3. Measures

The online survey was hosted by Qualtrics (Qualtrics, Provo, UT) and included questions on socio-demographic characteristics, child's school travel behaviour and parent perceived support for potential infrastructure and policy changes to support active travel among children. Pilot testing with a small convenience sample ($n = 4$) was conducted prior to implementation. No questions required a forced response and, except for the question about gender, none had a 'prefer not to answer' option.

2.3.1. Socio-demographic characteristics

Participants reported their age, gender (male, female, transgender, other, prefer not to say), the number of registered motor vehicles in their household (collapsed into 1 vs > 1), whether they were born in Australia (yes, no) and whether they spoke a language other than English at home (the latter two questions were used to determine cultural and linguistic diversity (CaLD) based on speaking a language other than English at home and being born in a non-English speaking country (Pham et al., 2021). As an indicator of individual level socioeconomic status (SES), participants also reported their highest level of education (Timperio et al., 2005; Sherar et al., 2011).

2.3.2. Child's school travel behaviour

Participants were asked to answer questions in relation to their Grade 3–6 child whose birthday was the closest to the date of survey completion (if more than one eligible child lived in the household). Parents reported if their child had access to a bike (yes, no). They also reported the distance from home to their child's school using the following categories: <500m, 500m–1km, 1–2 km, 2–3 km, 3–4 km, 4–5 km, >5 km; the latter three collapsed into ≥2 km for analysis. At the time of data collection, schools were closed due to COVID-19 restrictions, so participants reported on their child's usual travel behaviour in Term 1 (February/March) of 2020, before any COVID-19 related restrictions had come into effect. Specifically, parents were asked to select all modes of travel (walk, bike/scoot/skate, private vehicle, public transport/school bus) their child *usually* used to get to and from school in Term 1, 2020. If either walk or bike/scoot/skate were selected, they were then asked to report how many times in a usual week their child used each of these modes. From these data, children were categorised as engaging in no AST, some AST (1–4 trips/week) or frequent AST (≥5 trips/week). Children who engaged in any AST were further categorised according to the mode(s) of AST they used: walk only, bike/scoot/skate only, or a combination of both. While public transport is often considered active travel, we did not categorise it as so in this study, as the question was asked in such a way as to allow parents to report any walking or cycling their child did as part of a public transport journey.

2.3.3. Support for infrastructure and policy

Participants were asked to rate (on a five-point Likert scale with responses ranging from very un-supportive to very supportive) how supportive they would be of eleven infrastructure or policy changes implemented in their neighbourhood to encourage walking and cycling, including to/from school. Infrastructure changes included: wider footpaths to allow for groups and a mix of users to walk and cycle; additional road crossings around schools; drop-off zones within walking distance of schools that allow children to walk part of the way; bike lanes that are physically separated (e.g., by bollards) from motor vehicle traffic and that connect people with where they want to go; temporary bike lanes that connect people where they want to go. The policy changes included: provision of fines for people who park their car in a bike lane; temporarily preventing cars from accessing streets around schools at drop-off and pick-up times; 30 km/h speed limits on streets near schools; and shared streets near schools where cyclists and motorists all travel at the same speed as pedestrians. These initiatives were selected either because they are emerging as key initiatives within the Australian context and/or because they are supported by at least some evidence as an approach to increase school active travel (Tranter and Larouche, 2018).

2.4. Data management and analysis

Data analysis was conducted in STATA SE 15.1 (StataCorp LLC, College Station, TX). Two area-level indicators (SES and urbanicity) were applied based on residential postcode (provided during the screening process) (Australian Bureau of Statistics, 2018). Each participant was categorised as living within a high (least disadvantaged), mid or low (most disadvantaged) SES area using tertiles from the 2016 Index of Relative Socio-economic Disadvantage and as living in a major city or in an inner regional, outer regional or remote area based on the Australian Bureau of Statistics remoteness structure (later collapsed into major city or inner regional/outer regional/remote) (Australian Bureau of Statistics, 2018b). Participant characteristics according to their child's use of AST were compared using chi-square tests.

Responses regarding support for each infrastructure initiative were collapsed into three categories: 'unsupportive' (encompassing very and somewhat unsupportive), 'neither supportive nor unsupportive' and 'supportive' (encompassing very and somewhat supportive). Unadjusted, bivariate associations between respondent characteristics and support for the proposed initiatives were assessed using chi-square tests. Ordinal logistic regression models were used to examine differences in support (dependent variable with three ordered categories) by participant characteristics. A separate model was run for each proposed initiative with the following characteristics entered simultaneously: area-level disadvantage, urbanicity, parent education level, CaLD background, number of vehicles in household, distance between home and school, parent reported frequency of any AST, type of parent reported AST (none, walking only, any biking/scooting/skating) and whether the respondent's child had access to a bike. Variance inflation factors were generated using the '*collin*' user-contributed package in Stata (Ender, 2010) and were inspected to rule out collinearity between participant characteristics.

Analyses were completed for all responders ($n = 971$), as well the subsample of responders whose child engaged in AST at least once in the previous week ($n = 518$). In the latter analysis, mode of active travel to school (categorised as: walked only, biked/scooted/skated only, or a combination of both) was added to the model and parental education was re-categorised as tertiary or non-tertiary due to the low numbers of participants originally categorised as being of low education. An exact threshold to indicate statistical significance was not applied. Rather, 95% CI and exact p-values have been provided to determine the strength of the evidence according to the following: $p < 0.005$ provides strong evidence, $p < 0.05$ provides some evidence, $p < 0.1$ provides weak evidence and p

Table 1
Characteristics of sample: overall (n = 971) and by child's use of active school travel (AST) in a usual week.

	All participants (n = 971)	Child used AST ≥1 trip/week (n = 518)	Child did not use AST (n = 453)	p-value[a]
	N (%)	N (%)	N (%)	
Area-level SES				
Most disadvantaged tertile	197 (20.3)	85 (16.4)	112 (24.7)	0.001
Middle tertile	303 (31.2)	158 (30.5)	145 (32.0)	
Least disadvantaged tertile	471 (48.5)	275 (53.1)	196 (43.3)	
Urbanicity				
Major city	752 (77.4)	430 (83.0)	322 (71.1)	<0.001
Inner regional/outer regional/remote	219 (22.6)	88 (17.0)	131 (28.9)	
Highest qualification				
Non-tertiary	321 (33.1)	139 (26.8)	182 (40.2)	<0.001
Tertiary	650 (66.9)	379 (73.2)	271 (59.8)	
CaLD	90 (9.3)	54 (10.4)	36 (7.9)	0.184
Private or company car/van in household				
One or none	256 (26.4)	168 (32.4)	88 (19.4)	<0.001
More than one	715 (73.6)	350 (67.6)	365 (80.6)	
Distance to school				
<500m	75 (7.7)	74 (14.3)	1 (0.2)	<0.001
500m- 1 km	206 (21.2)	181 (34.9)	25 (5.5)	
1–2 km	221 (22.8)	178 (34.4)	43 (9.5)	
≥2 km	469 (48.3)	85 (16.4)	384 (84.8)	
Child has access to bike	887 (91.3)	486 (93.8)	401 (88.5)	0.003
Child's AST				
No trips	453 (46.7)	0	453 (100)	<0.001
1–4 trips per week	107 (11.0)	107 (20.7)	0	
≥5 trips per week	411 (42.3)	411 (79.3)	0	
Child's mode of AST[b]				
None	453 (46.7)	0	453 (100)	<0.001
Walked only	258 (26.6)	258 (49.8)	0	
Biked/scooted/skated only	97 (10.0)	97 (18.7)	0	
Walked and biked/scooted/skated	163 (16.8)	163 (31.5)	0	

Notes: CALD – Cultural and linguistic diversity. SES – socioeconomic status. AST – active school travel.
[a] Chi-square test.
[b] Of children who engaged in AST at ≥1 trip/week.

≥ 0.1 provides no evidence (Greenland et al., 2016; Ioannididis, 2019).

3. Results

Overall, 1965 people responded to the initial invitation with 1177 eligible and emailed a link to the survey. Of those, 1031 attempted the survey and 971 completed the survey in full and were included in analyses. Those who did not complete the survey in full (n = 60) and those who did had similar characteristics (age, gender, area-level SES, urbanicity, highest qualifications, child's access to bike, household cars, and distance to school), however, those who did not complete the survey in full had lower odds of having a child using AST for ≥ 5 trips/week (OR 0.37, 95% CI 0.06, 0.12, p = 0.002).

Socio-demographic and travel characteristics are outlined in Table 1. Participants had a mean age of 43 (SD 6) years and the majority were female (88%). Just over half their children used one or a combination of modes of AST at least once per week. Of these children, half exclusively walked, while 19% exclusively biked/scooted/skated.

Based on the 2021 Census, this sample was more educated than the general population in Victoria (53.3% in Victoria) (Australian Bureau of Statistics, 2021). A smaller proportion of the sample were born overseas (23.5% in the current sample compared with 35.0% in Victoria) and spoke a language other than English at home (12.7% compared with 30.2% in Victoria). A higher proportion of the sample also had access to more than one car (53% in Victoria (idcommunity. Victoria). Finally, the sample reported that their children had higher than average rates of AST (Schranz et al., 2018). These differences may partly reflect the sample of predominantly female caregivers of primary school age children who, to participate, were required to understand written English.

There were differences in several socio-demographic characteristics by children's AST behaviour (see Table 1). A higher percentage of children who engaged in AST had access to a bike, resided in a major city and lived within 2 km of their school. A greater proportion of parents whose child engaged in AST had a tertiary qualification compared to parents of children who did not engage in AST. In the subsample of children who reported any AST we also explored differences in socio-demographic characteristics between children who biked/scooted/skated to school at least once and children who only walked to school. Compared to children who only walked, those who biked//scooted/skated at least once were more likely to live in low and middle SES areas, to live further from school, engage in AST more frequently and to have access to a bike (results not shown).

3.1. *Overall support for infrastructure*

Fig. 1 shows the level of support for the 11 proposed changes (see also Table S1 in supplementary material). The proportion of participants who reported being supportive of each initiative was higher than those who reported being unsupportive. The infrastructural upgrades that received support from over 80% of participants included: more drop-off zones within walking distance of schools; wider footpaths allowing for groups and a mix-of users; additional road crossings around schools; and physically separated bike lanes. The three least supported initiatives (less than 60% of participants) related to changes to the roads around schools including placing a temporary ban on cars at drop-off and pick-up times and converting the roads to shared streets or to one-way traffic. There was slightly more support for implementing 30 km/h speed limits (69%).

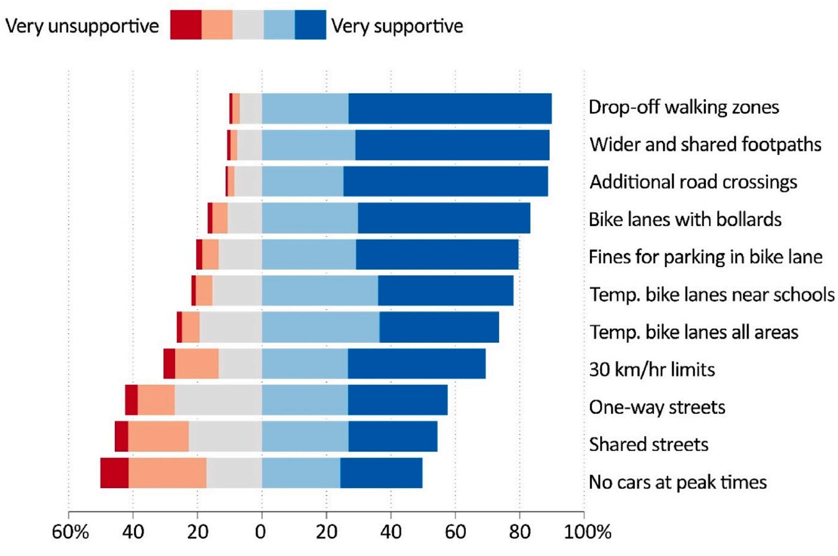

Fig. 1. Level of parental support (very unsupportive, unsupportive, neither supportive nor unsupportive, supportive, very supportive) for infrastructure and policy changes implemented in the neighbourhood to encourage walking and cycling (n = 971, except bike lanes with bollards, n = 970).

3.2. Adjusted differences in support by key characteristics

The findings from the adjusted models controlling for area-, family- and individual-level characteristics are reported in Table 2. There was some/strong evidence of differences in support for almost all characteristics except urbanicity. In terms of area-level disadvantage, participants residing in the middle and least disadvantaged tertiles had approximately 50% lower odds of supporting 30 km/h speed limits (middle tertile: OR = 0.51; least disadvantaged: OR = 0.41) and one-way streets (middle tertile: OR = 0.57; least disadvantaged: OR = 0.54). Participants living in the middle tertile of disadvantage, also had lower odds (OR = 0.64) of supporting shared streets compared with those from the most disadvantaged tertile.

There was some/strong evidence that participants with a tertiary education were more likely to support physically separated bike lanes (i.e. bike lanes with bollards; OR = 1.59) and administering fines to drivers parked in a bike lane (OR = 1.59) compared to those without a tertiary education. There was some/strong evidence that participants from CaLD backgrounds had about twice the odds of supporting 30 km/h speed limits (OR = 2.14), one-way streets (OR = 2.08) and restricting cars from travelling on school roads at peak times (OR = 1.96).

There was some/strong evidence that participants who had more than one vehicle in their household had lower odds of supporting seven of the proposed changes compared with participants who had one or no cars. These included: bike lanes with bollards (0R = 0.55), temporary bike lanes near schools (OR = 0.65), temporary bike lanes more generally (OR = 0.63), 30 km/h speed limits (OR = 0.61), one-way streets near schools (OR = 0.66), shared streets (OR = 0.61) and restricting cars from travelling on school roads at peak times (OR = 0.64). There was also some evidence that participants whose children had access to a bike had higher odds of supporting bike lanes with bollards (OR = 2.11), temporary bike lanes near schools (OR = 1.72), and temporary bike lanes more generally (OR = 1.78) compared with participants whose children had no access to a bike.

There was some evidence that distance to school was associated with differences in support. Compared with those who lived within 500m of their child's school, the odds of supporting temporary bike lanes was lower than among those who lived between 500 m and 2 km of school (OR = 0.42) and the odds of supporting the implementation of 30 km/h speed limits was lower among parents who lived between 1 and 2 km (OR = 0.46) and >2 km from school (OR = 0.39). There was some evidence that participants whose children occasionally walked or biked/scooted/skated to school had more than double the odds of supporting temporary bike lanes compared with participants of children who engaged in no AST (OR = 2.21). There was also some evidence that participants whose children frequently walked or biked/scooted/skated to school had nearly double the odds of supporting bike lanes with bollards (OR = 1.89) compared with parents whose children did not engage in AST. Finally, there was some evidence that parents who reported that their child engaged in AST by walking only were more likely to support restricting car access at peak times compared with those whose child did no AST (OR = 1.43).

3.3. Adjusted differences in key characteristics among parents whose children walked or cycled to school at least once/week

Findings were broadly similar when analyses were restricted to those participants whose child had engaged in any AST in a usual week (see Supplementary Material) except that there were no differences in support according to whether a child had access to a bike or whether the child occasionally or frequently engaged in AST. Importantly, there was some evidence that parents of children who both walked and biked/scooted/skated to school had higher odds of supporting one-way streets (OR = 1.86, 95% CI 1.15, 3.01) and 30 km/h speed limits (OR = 1.62, 95% CI 1.06, 2.47), relative to those who only walked or only biked/scooted/skated.

4. Discussion

This study explored parental support for eleven infrastructure or policy changes that could be implemented to encourage children to walk or cycle more. Broadly, participants supported the proposals, with at least 50% in support of all eleven. Both in Australia (Beck et al., 2021) and elsewhere (Aldred et al., 2019b; Field et al., 2018), community resistance is cited as one of the key barriers to investment in walking and cycling infrastructure, primarily because it fuels political opposition, which is also a critical barrier to investment (Aldred et al., 2019b; Beck et al., 2021; Wilson and Mitra, 2020). Our findings suggest, however, that perceptions of resistance may be overinflated, at least in the case of parents of primary school aged. Similarly, in the UK, those involved in the implementation of active travel initiatives have argued that public resistance is often perceived (Aldred et al., 2019b) and may instead reflect the views of local business, lobby groups and/or the media rather than the community as a whole. This is supported by a recent evaluation of the mini-Holland neighbourhoods in London, where, despite perceptions of widespread opposition, only 33% of respondents reported that there was 'too much' investment in cycling following implementation (Aldred et al., 2019a). Critically, however, this study assessed support for hypothetical ('in theory') walking or cycling initiatives rather than support for changes following real world implementation ('in reality'), by presenting parents with possible changes to the built environment or to traffic flow and speed. Whether this support remains when these types of initiatives are implemented and experienced, particularly those that may impact or disrupt car drivers by for example increasing vehicular travel time, is unknown.

The three initiatives that received almost universal support (approximately 90% of parents) related primarily to the implementation of infrastructure to support walking. These included drop-off zones within walking distance of schools, wider footpaths to allow groups and a mix of users, and additional road crossings around schools. Acknowledging that distance is the strongest predictor of school active travel (Ikeda et al., 2018) and that approximately three-quarters of Australian primary school children live further than what is perceived to be a practical walking distance to school (Royal Children's Hospital Melbourne, 2019), drop-off zones near schools offer a viable option for children to actively travel for at least part of the journey. A pilot study conducted in two schools in Belgium

Table 2
Adjusted odds ratio[a] (95% CI) of parental support[b] for infrastructure and policy changes in the neighbourhood to encourage walking and cycling, according to area-level, family and child characteristics (n = 971).

	Drop-off zones		Wider and shared footpaths		Additional road crossings		Bike lanes with bollards		Fines for parking in bike lane		Temp. bike lanes near schools		Temp. bike lanes all areas		30 km/h limits		One-way streets		Shared streets		No cars at peak times	
	OR (95% CI)	*p*	OR (95% CI)	*p*	OR (95% CI)	*p*	OR (95% CI)	*p*	OR (95% CI)	*p*	OR (95% CI)	*p*	OR (95% CI)	*p*	OR (95% CI)	*p*	OR (95% CI)	*p*	OR (95% CI)	*p*	OR (95% CI)	*p*
Area-level SES																						
Low (n = 197)	Ref.		Ref.		Ref.		Ref.		Ref.		Ref.		Ref.		Ref.		Ref.		Ref.		Ref.	
Medium (n = 303)	0.82 (0.44, 1.56)	0.549	0.22 (0.04, 1.07)	0.061	0.88 (0.48, 1.64)	0.686	0.78 (0.47, 1.29)	0.334	0.71 (0.44, 1.14)	0.161	1.29 (0.82, 2.02)	0.260	0.96 (0.62, 1.47)	0.846	0.51 (0.32, 0.81)	0.004	0.57 (0.38, 0.84)	0.005	0.64 (0.44, 0.94)	0.023	0.81 (0.55, 1.16)	0.249
High (n = 471)	1.11 (0.58, 2.08)	0.748	0.31 (0.06, 1.51)	0.151	0.74 (0.41, 1.34)	0.339	0.97 (0.58, 1.62)	0.934	0.71 (0.44, 1.16)	0.179	1.34 (0.86, 2.08)	0.187	1.01 (0.66, 1.55)	0.939	0.41 (0.26, 0.64)	0.000	0.54 (0.37, 0.80)	0.002	0.77 (0.60, 1.06)	0.120	1.02 (0.70, 1.48)	0.909
Urbanicity																						
Major city (n = 752)	Ref.		Ref.		Ref.		Ref.		Ref.		Ref.		Ref.		Ref.		Ref.		Ref.		Ref.	
Regional (n = 219)	1.462 (0.81, 2.64)	0.208	1.58 (0.51, 4.93)	0.429	1.14 (0.67, 1.99)	0.629	1.21 (0.76, 1.90)	0.413	1.20 (0.78, 1.83)	0.401	1.46 (0.96, 2.22)	0.072	1.18 (0.80, 1.73)	0.397	1.21 (0.83, 1.76)	0.316	0.73 (0.52, 1.02)	0.071	1.00 (0.71, 1.42)	0.959	1.06 (0.76, 1.49)	0.706
Highest qualification																						
Non-tertiary (n = 321)	Ref.		Ref.		Ref.		Ref.		Ref.		Ref.		Ref.		Ref.		Ref.		Ref.		Ref.	
Tertiary (n = 650)	1.02 (0.64, 1.63)	0.919	1.93 (0.87, 4.29)	0.102	1.29 (0.83, 1.99)	0.255	1.59 (1.10, 2.30)	0.012	1.56 (1.12, 2.20)	0.009	1.13 (0.81, 1.58)	0.485	1.01 (0.73, 1.38)	0.951	0.96 (0.70, 1.30)	0.790	1.01 (0.76, 1.35)	0.903	0.79 (0.60, 1.06)	0.120	0.95 (0.71, 1.26)	0.728
CaLD																						
Not CALD (n = 880)	Ref.		Ref.		Ref.		Ref.		Ref.		Ref.		Ref.		Ref.		Ref.		Ref.		Ref.	
CALD (n = 89)	1.16 (0.53, 2.53)	0.706	0.76 (0.21, 2.74)	0.679	0.58 (0.31, 1.06)	0.078	1.04 (0.55, 1.96)	0.884	1.51 (0.80, 2.83)	0.203	1.37 (0.76, 2.46)	0.290	1.27 (0.74, 2.17)	0.382	2.14 (1.18, 3.86)	0.012	2.08 (1.24, 3.48)	0.005	1.32 (0.83, 2.10)	0.238	1.96 (1.22, 3.14)	0.005
Private or company car/van in household																						
0 or 1 vehicle (n = 256)	Ref.		Ref.		Ref.		Ref.		Ref.		Ref.		Ref.		Ref.		Ref.		Ref.		Ref.	
>1 vehicle (n = 713)	0.68 (0.41, 1.14)	0.149	0.92 (0.37, 2.24)	0.853	0.77 (0.47, 1.25)	0.295	0.55 (0.35, 0.86)	0.008	0.81 (0.55, 1.18)	0.270	0.65 (0.44, 0.95)	0.026	0.63 (0.44, 0.88)	0.009	0.67 (0.47, 0.94)	0.023	0.66 (0.49, 0.90)	0.010	0.61 (0.44, 0.82)	0.001	0.64 (0.47, 0.86)	0.003
Distance to school																						
<500m (n = 75)	Ref.		Ref.		Ref.		Ref.		Ref.		Ref.		Ref.		Ref.		Ref.		Ref.		Ref.	
500m - 1 km (n = 206)	0.74 (0.30, 1.86)	0.513	0.88 (0.17, 4.58)	0.879	1.13 (0.51, 2.58)	0.754	0.77 (0.35, 1.71)	0.530	0.57 (0.27, 1.20)	0.141	0.42 (0.19, 0.94)	0.035	0.63 (0.32, 1.22)	0.175	0.63 (0.33, 1.23)	0.180	0.85 (0.48, 1.49)	0.576	0.78 (0.45, 1.38)	0.410	1.31 (0.75, 2.28)	0.338

(continued on next page)

Table 2 (*continued*)

	Drop-off zones		Wider and shared footpaths		Additional road crossings		Bike lanes with bollards		Fines for parking in bike lane		Temp. bike lanes near schools		Temp. bike lanes all areas		30 km/h limits		One-way streets		Shared streets		No cars at peak times	
	OR (95% CI)	*p*	OR (95% CI)	*p*	OR (95% CI)	*p*	OR (95% CI)	*p*	OR (95% CI)	*p*	OR (95% CI)	*p*	OR (95% CI)	*p*	OR (95% CI)	*p*	OR (95% CI)	*p*	OR (95% CI)	*p*	OR (95% CI)	*p*
1–2 km (n = 221)	0.72 (0.28, 1.82)	0.486	1.72 (0.28, 10.55)	0.556	1.36 (0.58, 3.20)	0.481	0.81 (0.36, 1.83)	0.626	0.58 (0.27, 1.24)	0.166	0.45 (0.20, 1.00)	0.052	0.64 (0.33, 1.27)	0.209	0.46 (0.23, 0.91)	0.026	0.78 (0.43, 1.39)	0.406	0.73 (0.41, 1.29)	0.284	1.12 (0.63, 1.97)	0.689
>2 km (n = 467)	1.13 (0.41, 3.11)	0.809	1.79 (0.27, 11.67)	0.540	0.89 (0.37, 2.17)	0.806	1.06 (0.45, 2.51)	0.890	0.76 (0.34, 1.74)	0.507	0.56 (0.24, 1.32)	0.192	0.77 (0.37, 1.58)	0.485	0.39 (0.19, 0.80)	0.010	0.87 (0.47, 1.62)	0.681	0.77 (0.42, 1.42)	0.411	1.05 (0.57, 1.92)	0.866
Child has access to bike																						
No (n = 83)	Ref.		Ref.		Ref.		Ref.		Ref.		Ref.		Ref.		Ref.		Ref.		Ref.		Ref.	
Yes (n = 886)	0.80 (0.35, 1.82)	0.601	0.65 (0.14, 2.94)	0.581	1.22 (0.61, 2.42)	0.569	2.11 (1.25, 3.55)	0.005	1.53 (0.91, 2.58)	0.106	1.72 (1.04, 2.85)	0.033	1.78 (1.11, 2.89)	0.018	0.89 (0.53, 1.49)	0.659	0.97 (0.60, 1.56)	0.905	0.74 (0.46, 1.19)	0.222	1.16 (0.73, 1.85)	0.521
Child's AST (any)																						
No trips (n = 451)	Ref.		Ref.		Ref.		Ref.		Ref.		Ref.		Ref.		Ref.		Ref.		Ref.		Ref.	
1–4 trips/wk (n = 107)	1.29 (0.53, 3.14)	0.568	0.67 (0.17, 2.71)	0.585	0.58 (0.27, 1.28)	0.181	1.40 (0.68, 2.87)	0.354	1.21 (0.63, 2.31)	0.567	2.21 (1.04, 4.45)	0.025	1.78 (0.95, 3.33)	0.072	1.25 (0.69, 1.49)	0.453	1.13 (0.66, 1.94)	0.642	0.98 (0.58, 1.66)	0.954	0.89 (0.53, 1.52)	0.688
≥5 trips/wk (n = 411)	1.03 (0.50, 1.61)	0.920	1.92 (0.56, 6.57)	0.296	0.72 (0.39, 1.35)	0.312	1.89 (1.07, 3.34)	0.027	1.56 (0.94, 2.59)	0.085	1.34 (0.83, 2.18)	0.227	1.27 (0.81, 2.01)	0.291	1.05 (0.68, 1.63)	0.808	0.88 (0.59, 1.33)	0.570	0.95 (0.63, 1.41)	0.800	1.08 (0.73, 1.62)	0.677
Child's AST (none vs walk vs bike)																						
No AST (n = 453)	Ref.		Ref.		Ref.		Ref.		Ref.		Ref.		Ref.		Ref.		Ref.		Ref.		Ref.	
Walk only (n = 258)	0.92 (0.40, 2.15)	0.859	0.89 (0.36, 2.19)	0.815	0.87 (0.33, 2.28)	0.785	1.37 (0.72, 2.62)	0.335	1.06 (0.59, 1.91)	0.826	1.26 (0.69, 2.31)	0.437	1.01 (0.55, 1.86)	0.963	1.03 (0.69, 1.55)	0.869	0.76 (0.49, 1.17)	0.221	1.17 (0.80, 1.73)	0.401	1.43 (1.01, 2.03)	0.039
Any bike trip (n = 260)	1.41 (0.53, 3.67)	0.485	0.83 (0.34, 1.97)	0.674	0.77 (0.31, 1.96)	0.597	1.72 (0.87, 3.41)	0.116	1.84 (0.94, 3.61)	0.076	1.53 (0.82, 2.85)	0.182	1.16 (0.62, 2.18)	0.638	1.51 (0.97, 2.32)	0.062	0.95 (0.61, 1.49)	0.852	1.12 (0.76, 1.64)	0.558	1.23 (0.87, 1.74)	0.224

CALD – Cultural and linguistic diversity. SES – socioeconomic status. AST – active school travel.

[a] Odds ratios are relative to the reference category having odds of 1 and were calculated using ordinal logistic regression with all other respondent characteristics into the models.

[b] Participant indicated they were 'somewhat' or 'very' supportive.

reported that drop off areas, located between 500 and 800 m of each school, resulted in increases in before/after school hours step counts/day and weekly walking trips. However, parents felt that younger children (aged 6–9 years) needed supervision on the journey and providing this supervision was perceived by teachers and parents as logistically challenging and unsustainable (Vanwolleghem et al., 2014). This highlights that further considerations may be required to support active travel for different age groups.

In comparison to initiatives that focused almost exclusively on walking, the four proposals that prioritised cycling received less support. This may reflect the relative popularity of walking compared with cycling (Australian Bureau of Statistics, 2013–2014; Australian Bureau of Statistics, 2022b), particularly as a mode of travel to school both in Australia generally (Australian Bureau of Statistics, 2022b; Cycling and Walking Australia New Zealand, 2021), and in the current sample specifically. Furthermore, in the state of Victoria, children under 13 are allowed to cycle on footpaths (along with accompanying adults) and therefore this sample (which consisted of parents of primary school aged children) may not perceive cycling initiatives as a priority. Notwithstanding the lower comparative support for cycling related infrastructure, these initiatives were still supported by most parents.

The four proposals that received the least support (ranging from 50% to 69%) related generally to creating safe places for walking and cycling by restricting private vehicle travel. Available evidence suggests that 'carrot and stick' approaches that promote active travel by disincentivising car travel simultaneous to making walking and cycling safer and more convenient are the most effective at promoting modal shift away from car travel (Pucher et al., 2010; Nello-Deakin, 2020; Ogilvie et al., 2004).

It is perhaps not surprising that the initiatives that received lower levels of support related to either promoting cycling (as opposed to promoting walking) or restricting car travel. These types of infrastructure and policy changes can be highly politized, even in Denmark, a country considered 'cycle friendly' (Wilson and Mitra, 2020; Freudendal-Pederson, 2015). The term 'bikelash' has been coined to explain the organised opposition to these types of infrastructural changes (Wild et al., 2018) which is thought to stem from those who oppose the disruption to road space and established transport mode hierarchies that prioritise the car (Field et al., 2018; Wild et al., 2018; Piatkowski et al., 2017). In some cases, it has also been suggested that public opposition arises from legitimate concerns regarding the inequity of such initiatives as they may disproportionately affect those from lower SES backgrounds and areas who may have no option but to travel by private vehicle (Eliasson and Mattsson, 2006; Rachele et al., 2017). The latter concern may be particularly relevant in Australia, in which major and regional cities are characterised by urban sprawl. Fringe suburbs offer more affordable housing but lack quality public transport options (Dobson and Li, 2022; Bureau of Infrastructure Transport and Regional Economics, 2019). Mapping of journeys in Melbourne, for example, indicates that those who live in inner and middle suburbs and work in a central business district use public transport at a much higher rate than residents and workers in outer and fringe suburbs (Dobson and Li, 2022).

Another key difference between those initiatives that were most and least supported is their 'dose' and the likelihood that they will create meaningful increases in walking and cycling. For instance, it seems reasonable that additional road crossings and drop-off zones near schools would be palatable to parents, however, they may not have the same impact as shared streets or limiting cars at peak times, which received less support.

One strategy proposed to mitigate this opposition to bike lanes is to allow communities to refine the design in response to user experience (Field et al., 2018). The construction of temporary bike lanes provides this solution as they can be adapted and modified based on community response (Sadik-Khan and Solonomow, 2016), and, given the findings from the current study, may be well supported by the community. That being said, temporary bike lanes installed in Sydney and Melbourne (Australia) in response to the COVID-19 pandemic have been divisive and some have since been removed. Although there is a lack of empirical evidence, media reports indicated both support and opposition, with opponents arguing they endangered cyclists (e.g. Koziol, 2022; Bicycle Network, 2022). These bike lanes were installed rapidly and under uncommon circumstances, and it may be that community opposition could have been mitigated with planned community consultation. Indeed, polling by an Australian not-for-profit cycling safety organisation found that 89% of Australians support the installation of temporary bike lanes in their local area to increase cyclist safety (The Amy Gillett Foundation, 2020).

Our findings revealed differences in support for initiatives by all characteristics except urbanicity. Broadly, we speculate that these differences may reflect, among other things, differences in cultural norms, and a participant's potential to realistically engage in active travel. It may also be that those living in more advantaged areas already have existing access to quality walking and cycling infrastructure so do not place value on creating 'safer' streets for walking and cycling.

Participants from CaLD backgrounds had twice the odds of supporting three of the four proposals to disincentivise car travel which may reflect differences in their travel patterns. Although research into the travel patterns of people from CaLD backgrounds is limited, an Australian study found that South Asian immigrants were more likely to commute via public transport than Australian-born adults (Shafi et al., 2017) and studies from outside Australia suggest that recently arrived immigrants usually drive less (Delbosc and Shafi, 2023). Conversely, parents from CaLD backgrounds had lower odds of supporting wider footpaths and it may be that in comparison to their country of birth the existing walking infrastructure in Victoria is of high quality. Not surprisingly, those with access to more than one car were less supportive of seven of the initiatives including all four that related to restricting car travel, perhaps reflecting the value that these households place on cars. Clearly, a greater understanding of why some demographic groups support active travel initiatives more than others is required.

4.1. Study limitations

A strength of the study was the inclusion of a large sample of geographically diverse Victorian parents; however, the sampling method, which included snowballing, may have created a biased sample. Distance to school was based on self-report, which may not have been accurately reported. The study only investigated the views of parents, and they may be more inclined than the general population to support initiatives that could improve the safety of their children. Future research should investigate support for these proposals in other population groups such as young and older adults including those without children. It may also be that support for infrastructure and policy initiatives to promote walking and cycling is higher if positioned in the context of children's safety rather than general safety.

Participants were provided with a brief written description of each proposal. Without the use of images or videos to help with visualisation it is possible that interpretations differed. The study was conducted in 2020 at the beginning of the COVID-19 pandemic. At the time of survey completion, social isolation measures were in place and cycle count data in key locations indicated that rates of cycling had substantially increased from previous years (Bicycle Network, 2020). The momentary increase in the popularity of cycling may partly explain the findings, specifically in relation to support for the provision of cycling related infrastructure.

4.2. Policy implications

In providing insights into what active travel related infrastructure and policy changes are supported by the community, this study addresses a recognised gap between policy and research by focusing on understanding public opinion and therefore the political context in which decisions are made (Giles-Corti et al., 2015). The findings suggest that there is a high level of support for purpose-built walking and cycling infrastructure and policies and this can be used by both those responsible for policy and/or infrastructure changes and non-government agencies to counter the negative feedback often received when such schemes are proposed or implemented.

5. Conclusion

There are numerous health and environmental gains associated with promoting active travel as an alternative to car travel. A supportive built environment that ensures a safe and convenient journey for pedestrians and cyclists is deemed necessary. Community resistance is recognised as a key impediment to changing the built and political environment. Engaging with community members to better understand this resistance is a research priority. We found that parents are generally in support of infrastructure and policy initiatives to support walking and cycling on the school journey. Support differed according to key demographic characteristics but the reasons for these differences are not clear. Acknowledging the study limitations, future work should involve children and parents in co-designing safe walking and cycling infrastructure to support AST.

Financial disclosure

Bicycle Network Victoria partially funded this study. The funders were not involved in the study design, collection, analysis or interpretation of the data, in writing the report or in the decision to submit the article for publication.

CRediT authorship contribution statement

Shannon Sahlqvist: Writing – original draft, Validation, Project administration, Methodology, Investigation, Conceptualization. **Karen Lim:** Writing – review & editing, Investigation, Formal analysis. **Venurs Loh:** Writing – review & editing, Validation, Methodology, Investigation, Conceptualization. **Jenny Veitch:** Writing – review & editing, Validation, Methodology, Investigation, Conceptualization. **Jo Salmon:** Writing – review & editing, Validation, Methodology, Investigation, Conceptualization. **Anna Timperio:** Writing – review & editing, Validation, Methodology, Investigation, Conceptualization.

Funding

This study was funded by Bicycle Network Victoria. JS is supported by a Leadership Level 2 Fellowship, National Health and Medical Research Council (NHMRC; APP 1176885).

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgements

The authors would like to acknowledge Ms Kate Dullaghan in her role as Project Manager and thank all research participants involved in this study.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jth.2024.101932.

Data availability

The data that has been used is confidential.

References

Aldred, R., Croft, J., Goodman, A., 2019a. Impacts of an active travel intervention with a cycling focus in a suburban context: one-year findings from an evaluation of London's in-progress mini-Hollands programme. Transport. Res. Pol. Pract. 123, 147–169.
Aldred, R., Watson, T., Lovelace, R., Woodcock, J., 2019b. Barriers to investing in cycling: stakeholder views from England. Transport. Res. Pol. Pract. 128, 149–159.
Aldred, R., Goodman, A., Woodcock, J., 2024. Impacts of active travel interventions on travel behaviour and health: results from a five-year longitudinal travel survey in Outer London. J. Transport Health 35, 101771.
Bicycle Network, 2020. Bike Rider Numbers Continue to Grow [press release]. Melbourne, Victoria. https://bicyclenetwork.com.au/newsroom/2020/05/07/bike-rider-numbers-continue-to-grow/.
Australian Bureau of Statistics. Victoria 2021 Census All persons Quickstats https://www.abs.gov.au/census/find-census-data/quickstats/2021/2.
Australian Bureau of Statistics, 2013-2014. Participation in Sport and Physical Recreation. Australian Bureau of Statistics, Australia. Canberra.
Australian Bureau of Statistics, 2018a. Physical Activity, 2017-18 Financial Year. Australian Bureau of Statistics, Canberra, Australia.
Australian Bureau of Statistics, 2018b. 1270.0.55.005 - Australian Statistical Geography Standard (ASGS): Volume 5 - Remoteness Structure, July 2016. Australian Bureau of Statistics, Canberra, Australia.
Australian Bureau of Statistics, 2018. 2033.0.55.001 - Census of Population and Housing: Socio-Economic Indexes for Areas (SEIFA), Australia, 2016.
Australian Bureau of Statistics, 2021. Transport: Census. ABS, Canberra, Australia.
Australian Bureau of Statistics, 2022a. Physical Activity, 2021-21 Financial Year. Australian Bureau of Statistics, Canberra, Australia.
Australian Bureau of Statistics, 2022b. Australia's Journey to Work. Australian Bureau of Statistics, Canberra.
Beck, B., Thorpe, A., Timperio, A., Giles-Corti, B., William, C., de Leeuw, E., et al., 2021. Active transport research priorities for Australia. J. Transport Health, 101288.
Bicycle Network, 2022. Melbourne's pop-up bike lane progress may take a step backward [press release]. Melbourne, Victoria. https://bicyclenetwork.com.au/newsroom/2022/06/03/melbournes-pop-up-bike-lane-progress-takes-a-step-backward/#:~:text=World%20Bicycle%20Day%20celebrations%20in,as%20Victorian%20Chamber%20of%20Commerce.
Brand, C., Gotschi, T., Dons, E., Gerike, R., Anaya-Boig, E., Avila-Palencia, I., et al., 2021. The climate change mitigation impacts of active travel: evidence from a longitudinal panel study in seven European cities. Global Environ Chang 67.
Bureau of Infrastructure Transport and Regional Economics, 2019. Relationship between transport use and income in Australia. Information Sheet 102. Canberra.
Christiansen, L.B., Toftager, M., Ersbøll, A.K., Troelsen, J., 2014. Effects of a Danish multicomponent physical activity intervention on active school transport. J. Transport Health 1 (3), 174–181.
Cycling and Walking Australia New Zealand, 2021. National Walking and Cycling Participation Survey.
Delbosc, A., Shafi, R., 2023. What do we know about immigrants' travel behaviour? A systematic literature review and proposed conceptual framework. Transport Rev. 43 (5), 914–934.
Dill, J., McNeil, N., Broach, J., Ma, L., 2014. Bicycle boulevards and changes in physical activity and active transportation: findings from a natural experiment. Prev. Med. 69, S74–S78.
Dobson, J., Li, T., 2022. Five maps that show why free public transport benefits the affluent most. The Conversation. https://theconversation.com/5-maps-that-show-why-free-public-transport-benefits-the-affluent-most-179847.
Eliasson, J., Mattsson, L.-G., 2006. Equity effects of congestion pricing: quantitative methodology and a case study for Stockholm. Transport. Res. Pol. Pract. 40 (7), 602–620.
Ender, P.B., 2010. Collin: Collinearity Diagnostics. UCLA.
Field, A., Wild, K., Woodward, A., Macmillan, A., Mackie, H., 2018. Encountering bikelash: experiences and lessons from New Zealand communities. J. Transport Health 11, 130–140.
Freudendal-Pederson, M., 2015. Whose commons are mobilities spaces? - the case of Copenhagen's cyclists. ACME 14 (2), 598–621.
Giles-Corti, B., Sallis, J.F., Sugiyama, T., Frank, L.D., Lowe, M., Owen, N., 2015. Translating active living research into policy and practice: one important pathway to chronic disease prevention. J. Publ. Health Pol. 36 (2), 231–243.
Greenland, S., Senn, S.J., Rothman, K.J., Carlin, J.B., Poole, C., Goodman, S.N., Altman, D.G., 2016. Statistical tests, P values, confidence intervals, and power: a guide to misinterpretations. Eur. J. Epidemiol. 31 (4), 337–350.
idcommunity. Victoria, Number of Cars Per Household. https://profile.id.com.au/australia/car-ownership?WebID=110#:~:text=Analysis%20of%20car%20ownership%20in,influenced%20by%20access%20to%20transport.
Ikeda, E., Stewart, T., Garrett, N., Egli, V., Mandic, S., Hosking, J., et al., 2018. Built environment associates of active school travel in New Zealand children and youth: a systematic meta-analysis using individual participant data. J. Transport Health 9, 117–131.
Ioannididis, J., 2019. Options for Publishing Research without Any P-Values. Oxford Press, Washington, D.C., USA.
Koziol, M., 2022. Sydney's pop-up cycle-ways are unlawful but government says they're hear to stay. The Sydney Morning Herald.
Larouche, R., Mammen, G., Rowe, D.A., Faulkner, G., 2018. Effectiveness of active school transport interventions: a systematic review and update. BMC Publ. Health 18 (1), 206.
Lorenc, T., Brunton, G., Oliver, S., Oliver, K., Oakley, A., 2008. Attitudes to walking and cycling among children, young people and parents: a systematic review. J. Epidemiol.Community Health 62 (10), 852–857.
Martin, A., Boyle, J., Corlett, F., Kelly, P., Reilly, J., 2016. Contribution of walking to school to individual and population moderate-vigorous intensity physical activity: systematic review and meta-analysis. Pediatr. Exerc. Sci. 28, 353–363.
Nello-Deakin, S., 2020. Environmental determinants of cycling: not seeing the forest for the trees? J. Transport Geogr. 85, 102704.
Østergaard, L., Støckel, J.T., Andersen, L.B., 2015. Effectiveness and implementation of interventions to increase commuter cycling to school: a quasi-experimental study. BMC Publ. Health 15 (1), 1199.
Ogilvie, D., Egan, M., Hamilton, V., Petticrew, M., 2004. Promoting walking and cycling as an alternative to using cars: systematic review. BMJ 329 (7469), 763.
Parker, K.M., Rice, J., Gustat, J., Ruley, J., Spriggs, A., Johnson, C., 2013. Effect of bike lane infrastructure improvements on ridership in one New Orleans neighborhood. Ann. Behav. Med. 45 (Suppl. l_1), S101–S107.
Pham, T.T.L., Berecki-Gisolf, J., Clapperton, A., O'Brien, K.S., Liu, S., Gibson, K., 2021. Definitions of culturally and linguistically diverse (CALD): a literature review of epidemiological research in Australia. Int. J. Environ. Res. Public Health 18 (2).
Piatkowski, D.P., Marshall, W.E., Krizek, K.J., 2017. Carrots versus sticks: assessing intervention effectiveness and implementation challenges for active transport. J. Plann. Educ. Res. 39 (1), 50–64.
Pucher, J., Dill, J., Handy, S., 2010. Infrastructure, programs, and policies to increase bicycling: an international review. Prev. Med. 50, S106–S125.
Rachele, J.N., Learnihan, V., Badland, H.M., Mavoa, S., Turrell, G., Giles-Corti, B., 2017. Neighbourhood socioeconomic and transport disadvantage: the potential to reduce social inequities in health through transport. J. Transport Health 7, 256–263.
Royal Children's Hospital Melbourne, 2019. Royal Children's Hospital National Child Health Poll. Travelling to school: Habits of Australian families. Royal Children's Hospital Melbourne, Parkville, Victoria. Poll Number 13.
Sadik-Khan, J., Solonomow, S., 2016. Streetfight: Handbook for an Urban Revolution. Viking, New York.

Sahlqvist, S., Goodman, A., Cooper, A.R., Ogilvie, D., 2013. Change in active travel and changes in recreational and total physical activity in adults: longitudinal findings from the iConnect study. Int. J. Behav. Nutr. Phys. Activ. 10 (1), 28.

Sahlqvist, S., Veitch, J., Abbott, G., Salmon, J., Garrard, J., Acker, F., et al., 2019. Impact of an Australian state-wide active travel campaign targeting primary schools. Prev. Med. Rep. 14, 100866.

Schranz, N., Glennon, V., Evans, J., Gomersall, S., Hardy, L., Hesketh, K.D., et al., 2018. Results from Australia's 2018 report card on physical activity for children and youth. J. Phys. Activ. Health 15 (s2), S315–S317.

Shafi, R., Delbosc, A., Rose, G. (Eds.), 2017. Do South Asian Migrants in Australia Travel Differently to Native-Born Australians?. Australasian Transport Research Forum, Auckland, New Zealand, 27 - 29 November 2017.

Sherar, L.B., Griew, P., Esliger, D.W., Cooper, A.R., Ekelund, U., Judge, K., Riddoch, C., 2011. International children's accelerometry database (ICAD): design and methods. BMC Publ. Health 11 (1), 485.

Smith, M., Hosking, J., Woodward, A., Witten, K., MacMillan, A., Field, A., et al., 2017. Systematic literature review of built environment effects on physical activity and active transport – an update and new findings on health equity. Int. J. Behav. Nutr. Phys. Activ. 14 (1), 158.

The Amy Gillett Foundation, 2020. Australia Needs More Bike Lanes [Available from: https://www.amygillett.org.au/temp-bike-lanes#:~:text=In%20May%202020%2C%20the%20Amy,people%20riding%20bikes%20for%20transport.

Timperio, A., Salmon, J., Telford, A., Crawford, D., 2005. Perceptions of local neighbourhood environments and their relationship to childhood overweight or obesity. Int. J. Obes. 29, 170–175.

Timperio, A., Veitch, J., Sahlqvist, S., 2018. Chapter 10 - Built and physical environment correlates of active transportation. In: Larouche, R. (Ed.), Children's Active Transportation. Elsevier, pp. 229–242.

Tranter, P., 2018. 16 - taming traffic to encourage children's active transportation. In: Larouche, R. (Ed.), Children's Active Transportation. Elsevier, pp. 229–242.

Vanwolleghem, G., D'Haese, S., Van Dyck, D., De Bourdeaudhuij, I., Cardon, G., 2014. Feasibility and effectiveness of drop-off spots to promote walking to school. Int. J. Behav. Nutr. Phys. Activ. 11 (1), 136.

We Ride Australia, 2022. Three Transport Priorities for the Federal Election [press release]. https://www.weride.org.au/policy-planning/three-transport-priorities-for-the-federal-election/#:~:text=The%20Three%20Transport%20Priorities%20are,congestion%2C%20and%20increase%20physical%20activity. (Accessed 16 February 2024).

Wild, K., Woodward, A., Field, A., Macmillan, A., 2018. Beyond 'bikelash': engaging with community opposition to cycle lanes. Mobilities 13 (4), 505–519.

Wilson, A., Mitra, R., 2020. Implementing cycling infrastructure in a politicized space: lessons from Toronto, Canada. J. Transport Geogr. 86, 102760.

World Health Organization, 2018. Global Action Plan on Physical Activity 2018 - 2030: More Active People for a Healthier World.

Yang, L., Sahlqvist, S., McMinn, A., Griffin, S.J., Ogilvie, D., 2010. Interventions to promote cycling: systematic review. BMJ 341, c5293. https://doi.org/10.1136/bmj.c5293.