Scoping paper:

Increasing physical activity levels through active transport – Transport behavioural change interventions delivered to school children (2014)

1. Background to topic

Approximately 1 in 4 Australian children aged 5 to 17 years is now considered obese [1], with 68.1% of boys and 70.2% of girls aged 2 to 17 years failing to consistently meet daily physical activity guidelines [2]. Obesity is associated with a negative effect on child emotional and mental health [3-5] and overweight or obese children are more likely to develop cardiovascular diseases, diabetes and certain types of cancer across their lifetime [6-8]. Obesity in children may also negatively affect cognitive performance, with an association between physical activity levels, body composition and academic performance in school-aged children [9-12], and obese children may have a lower quality of life than normal weight children [13-17].

It is widely recognised that physical activity levels across a range of domains should be actively promoted in order to address this issue, not just in the domain of sport and exercise [18, 19]. More active forms of transport, such as walking, cycling and use of public transport, have been recognised as possible avenues to increase the daily physical activity levels of populations through incidental exercise and to incorporate more physical activity into daily life [20-23]. Active transport to and from school (ATS) has the potential to increase physical activity levels amongst children and youth, with resultant physical and mental health, environmental and social benefits [24-30]. Recent studies have suggested that walking and especially cycling to school may result in a healthier body composition [31-34] and improved cardiorespiratory fitness amongst children and adolescents [35-38].

Studies have shown that rates of walking and cycling to school in Australia are low and have been in decline in recent years [39, 40]. The majority of Australian primary and secondary school children do not participate in ATS on a weekly basis[18]. It has been estimated that as few as 35% of 6 to 7 year olds[41] and 20% of 12 to 17 year olds[42] participate in ATS at least once per week. Changes to urban lifestyles, parental work patterns, family compositions, urban environments, transport systems, trip distances, perceptions of safety and social norms have all been cited as contributors to the increase in car dependence for travel to and from school [24, 43-47]. The level of parental support towards ATS, perceived child self-efficacy and independent mobility may also affect ATS [48-52]. Whilst overall rates of active transport are currently low in Australia there is significant scope to increase modal share of walking and cycling in trips of shorter distances [53, 54].

Despite the fact that ATS programs are in place in Australia and in many countries internationally limited rigorous evaluation has been undertaken into their effectiveness and cost-effectiveness[28]. Moodie et al[55] evaluated the Walking School Bus program using the ACE approach in 2009 and found the program was neither effective nor cost-effective as an obesity prevention measure under the modeling assumptions. Significant under-utilised capacity was however cited as a contributing factor and sensitivity analyses demonstrated that improvements in utilisation may have improved the cost-effectiveness of the program. Attribution of some program costs towards other outcomes (including environmental outcomes and reduced congestion) may also have been theoretically valid in order to highlight program benefits in terms of obesity.

The TravelSmart Schools curriculum program was also evaluated in 2011 and was found to be cost-ineffective under base-run assumptions [56]. Cost-effectiveness was achieved when around 55% or more of the total costs were attributed to non-obesity related objectives. Cost-effectiveness was also approached when the definition of benefit was broadened to include whole-of-school community benefits. This demonstrates that whilst the program was not cost-effective under base-run assumptions ATS interventions may still have some merit as obesity prevention measures under differing conditions.

Recent analysis of a hypothetical ATS intervention, based on the Brisbane City Council Active School Travel program, found that the cost-benefit ratio for the program ranged from 2.8:1 to 8.4:1 (dependent on time horizon and discount rate used) [57]. Whilst the analysis relied on assumptions of effect and used indicative costs from a pilot study, this demonstrates that under certain conditions ATS interventions may be cost-effective methods of increasing physical activity. This scoping paper therefore investigates ATS interventions as a means of promoting incidental exercise amongst school-aged children, leading to improvements in physical activity, with possible effects on BMI and obesity.

2. Intended policy impact

Upstream initiatives that encourage walking, cycling and use of public transport may lead to public health benefits including decreased congestion, decreased air and noise pollution, a decrease in motor vehicle accidents and an increase in physical activity levels. Transportation policies and programs that increase physical activity levels may have an impact on BMI/obesity levels across the population.

3. Current policy status

a. Australia

Policies incorporating active transport:

Current Australian strategies and policies with an active transport component include:

Walking, Riding and Access to Public Transport: Supporting Active Travel in Australian Communities [58].
The ministerial statement outlines a coordinated national approach to increasing active travel as a mode of transport. Principles to support walking, riding and access to public transport are grouped into four domains to highlight the range of actions that will be required to increase active transport rates across Australian communities. They are: 1. Planning, to include walking and riding when planning for land use and transport; 2. Building appropriate infrastructure for walking and cycling needs; 3. Encouraging greater participation in walking, riding and public transport; 4. Governing across agencies and levels of government.

Our Cities, Our Future - A national urban policy for a productive, sustainable and liveable future [59].
Proposes 14 key objectives and principles to guide policy development in urban planning, many of which are either directly or indirectly relevant to active transport: 1. Improve labour and capital productivity; 2. Integrate land use and infrastructure; 3. Improve the efficiency of urban infrastructure; 4. Protect and sustain our natural and built environments; 5. Reduce greenhouse gas emissions and improve air quality;

6. Manage our resources sustainably;
7. Increase resilience to climate change, emergency events and natural hazards;
8. Facilitate the supply of appropriate mixed income housing;
9. Support affordable living choices;
10. Improve accessibility and reduce dependence on private vehicles;
11. Support community wellbeing;
12. Improve the planning and management of our cities;
13. Streamline administrative processes;
14. Evaluate progress.

The Australian National Cycling Strategy 2011-2016 [60].

A commitment between federal and state and territory governments to 6 priorities and objectives designed to increase cycling participation:

1. Cycling promotion;
2. Infrastructure and facilities;
3. Integrated planning;
4. Safety;
5. Monitoring and evaluation;
6. Guidance and best practice.

The goal of the strategy is to double cycling participation between 2011 and 2016. Uptake in cycling as per the strategy guidelines is evaluated through the biennial National Cycling Participation Survey. The 2013 Implementation Report of the strategy found a slight overall decrease in cycling participation between 2011 and 2013[61].

Healthy Spaces and Places [62].

Funded by the Australian Government Department of Health and Ageing, Healthy Spaces and Places is a collaboration between the Australian Local Government Association (ALGA), the National Heart Foundation of Australia and the Planning Institute of Australia. It identifies the following key design principles in the provision of healthy, active communities:

1. Active transport;
2. Aesthetics;
3. Connectivity;
4. Environments for all people;
5. Mixed density development;
6. Mixed land use;
7. Parks and open spaces;
8. Safety and surveillance;
9. Social inclusion;
10. Supporting infrastructure.

Creating Places for People: an urban design protocol for Australian cities

A collective commitment between peak community and industry organisations and governments at all levels to best practice urban design. The protocol is founded on five key concepts of productivity, sustainability, liveability, leadership and design excellence.

An Australian vision for active transport [53].
A partnership between the Australian Local Government Association, Bus Industry Confederation, Cycling Promotion Fund, National Heart Foundation of Australia and International Association of Public Transport calling for nine action points to better support and promote active transport across communities: 1. Develop an integrated national active transport strategy that embraces policy and planning for the major components: walking, cycling and public transport; 2. Develop clear and realistic targets for active transport and physical activity outcomes; 3. Provide local government authorities with substantial, sustained and targeted funding for active transport; 4. Support the development and widespread application of Healthy Spaces and Places planning principles; 5. Encourage active domestic tourism by funding major regional projects such as rail trails, cycle routes and hiking tracks; 6. Promote a safe environment for people who choose to walk, cycle or take public transport and review jurisdictional approaches to the legislative protection of vulnerable road users; 7. Fund social marketing programs to promote the many benefits of walking and cycling for people of all ages; 8. Support cycle training and pedestrian education in schools; 9. Provide incentives for employers to encourage employees to walk, cycle or take public transport to work.

Moving Australia 2030 [63]
A partnership between the Australian Local Government Association, Australasian Railway Association, Bus Industry Confederation, Cycling Promotion Fund, Heart Foundation, Planning Institute of Australia, Tourism and Transport Forum and UITP Asia-Pacific outlining the impact of our current transportation system (including health impact) and then proposing a transport vision for 2030. Active travel is given an important role in this vision, with calls for increased governmental support and for the incorporation of health benefit factors in cost benefit frameworks for all federally funded transport projects.

The recent Ministerial Statement on active transport has been welcomed as an important step in Commonwealth participation in all forms of transport, not just cars and freight [64]. No further details could be found at this time on how the actions outlined in the statement are to be implemented or funded. The National Guidelines on Transport System Management are currently under review, with the updated version expected to be published in 2015 [65]. The review proposal outlines work to be conducted into guidance on active transport appraisal but no further details are publicly available at this time.

State and local governments are also increasingly recognising the relative value of active transport, with policies and strategies promoting active transport [66, 67], walking [68] and cycling in particular [69-71]. In 2012-13 Australian state and territory governments invested $112.8 million (or the equivalent of $4.88 per head of population) in cycling infrastructure and programs [72].

Australian active transport to school policies and programs:
ATS has been identified as a potential source of incidental physical activity by the federal government [58], suggesting moderately supportive social, environmental and regulatory environments within Australia for increasing children's physical activity levels through active transport [73]. Whilst the Commonwealth government has recently identified the importance of active transport[58], the funding of most policies and programs to promote ATS falls to state and territory and local governments.

Examples of ATS programs currently implemented in Australia include:

State/Territory	ATS intervention
Victoria	Ride2School [74] Walk To School [75]
Western Australia	Ride2School [76] TravelSmart to Schools [77] Walking School Bus [78]
Queensland	Healthy Active School Travel Program (HAST) [79]
South Australia	Way2Go [80]

An issue has been the relatively large number of separate programs that have been implemented, and the impact that this fragmented approach to ATS may have had on the effectiveness of interventions. Recent focus has been on attempting to adopt a more integrated, holistic approach to ATS [81].

b. Internationally

Key policies incorporating active transport:

Key international policies and strategies with an active transport component include:

The Toronto Charter for Physical Activity: A Global Call to Action [82].
Outlines four actions to increase physical activity globally including the introduction of policies that support physical activity (urban and rural planning that support active transport, fiscal policies, education and advocacy) and reorienting services and funding to prioritise physical activity (transportation and planning).

Global Action Plan for the Prevention and Control of Noncommunicable Diseases 2013-2020 [83].
Calls for policy measures to promote physical activity through everyday activities, including active transport.

Transport, Health and Environment Pan-European Programme (THE PEP).
The PEP was established in 2002 to bring together key players from the transport, health and environmental sectors across Europe, Caucasus, Central Asia and North America. Three priority areas and related actions constitute the policy framework for THE PEP: 1. Integration of environmental and health considerations into transport policy; 2. Urban transport with a focus on integrated public transport and safe conditions of alternative modes of transport; 3. Demand-side management and modal shift away from automobile dependence.

Active transport to school internationally

Levels of ATS vary quite dramatically between countries, as can be seen from the recent Active Healthy Kids Report Cards into physical activity behaviours of children [84](Table 1). The grade for each indicator was based on the percentage of children and youth meeting a defined benchmark, where A was 81%-100%, B was 61%-80%, C was 41%-60%, D was 21%-40%, F was 0-20% and INC indicated insufficient evidence for assessment.

Table 1 ***Active Healthy Kids Report Card, grades per country included in the study***

Country	Grade for active transport to school	Grade for overall physical activity levels
Finland	B	D
Kenya	B	C
Mozambique	B	B
Nigeria	B	C
Mexico	B-	C+

England	C	D+
Scotland	C	F
South Africa	C	D
New Zealand	C-	B
Australia	D	D-
Canada	D	D-
Ghana	D	D
Ireland	D	D-
United States	F	D-
Colombia	INC	D

Many European countries with significantly higher rates of active transportation, such as Finland [85], Sweden [86], Switzerland [87], the Netherlands [88] and Germany [89], are considered to have policy environments conducive to better supporting more active modes of travel [27]. This includes support of ATS programs, as well as built environment, transport, economic and social initiatives and policies to encourage high rates of walking, cycling and use of public transport. Commuting by walking or cycling in many of these countries is considered a cultural norm [90]. In other countries, such as some of the African nations represented in the Active Healthy Kids study, walking as a means of transport is a necessity, particularly in rural areas [91]. China also historically has a high ATS participation rate [92], although in recent years rapid motorisation has occurred.
Countries with low rates of active transport to school include the United States [93] and Canada [94]. In 2010 the *White House Task Force on Childhood Obesity Report to the President[95]* in the USA recommended a target of improvement for active transport rates to school of an extra 6.5% by 2015. A grading of D- for overall physical activity levels for Canada in the Active Healthy Kids Report Card has also led to calls for greater efforts to increase ATS [94].

4. The focus of this scoping paper

The focus of this scoping paper will be on the Australian Ride2School intervention specifically, due to its current implementation in Victoria and Western Australia and the fact that is has been recognised for its relatively low resource costs and potential for positive results [81]. The Ride2School program uses behaviour change methodologies to improve the number of school children actively commuting to school year round [74]. While promoting walking and 'wheeling' (i.e. the use of scooters and skateboards), the program places the greatest emphasis on modal shift to cycling [96].

In Victoria, the Ride2School program was initially funded $2.9million from 2006 to 2010 as part of the Victorian Governments 'Go for your life' Flagship Bike Plan. Bicycle Network Victoria was subsequently funded a further $2.71 million for four years (2011-2015) by the Department of Planning and Community Development to expand the program to primary and secondary schools across the state, with additional support provided by VicHealth, VicRoads, Sustainability Victoria, Diabetes Australia- Victoria, Malvern Star and Crumpler [96, 97]. The Ride2School program is supported in Western Australia by Bicycling Western Australia and the Western Australian Department of Transport [76].

5. Evidence of efficacy/effectiveness

a. Overview of evidence

Evidence is required in the following areas:

I. Exposure

Prevalence and frequency of active transport to school

A recent systematic review found that significant differences exist in how ATS prevalence and frequency data is collected, with no standard definition or tool currently in use, and that the majority of studies rely on self-report measures[98]. Limited studies into child travel behaviours have been undertaken using more objective measures, such as GPS[29] and accelerometry [99, 100].

Comprehensive national level data on prevalence of ATS is not currently collected in Australia. Limited state level data is available, however methodologies differ between studies and most of these measures are also self-reported. The 2009 Victorian Child Health and WellBeing Survey[101] estimated that 49.8% of Victorian children aged 4 to 12 years make all of their trips to school by car. 27.18% of trips made to primary school in Victoria on an average school day using 2009-2010 data were made by walking or cycling[102], an estimate similar to the 20% of 12 to 17 years olds using active transport to/from school at least once per week in the Cancer Council Victoria study[42]. The 2004 CLAN study[103] reported that only about 12% of children actively commuted for each school trip in a typical week in Melbourne, with approximately 40% of children actively commuting for between 1-5 trips per week and approximately 22% of children actively commuting for between 6-10 trips per week.

Data from New South Wales suggests a similarly low rate of ATS, with over 60% of 5 to 9 year olds being driven to school in 1999-2003 compared to around only 20% in 1971[40]. Merom et al[104] found that active commuting prevalence in Sydney, NSW was higher in the after school trip than the to school trip, and that 29.7% of the study population were active commuters (95%CI:26.5-32.9), 24% were active on at least five walking/cycling trips and 13% walked or cycled on all 10 trips surveyed. Data from the Victorian Integrated Survey of Travel and Activity (VISTA) also found that travel to school by car was higher in the journey from home to school (68.68% of primary school children) than the journey from school to home (64.67% of primary school children), with more children engaging in active transport on the journey home from school (25.7% walking or cycling to school, 28.63% walking or cycling home from school) [102].

Duration of active transport to school

Comprehensive data on distance and duration of children's commute to school is also not routinely collected in Australia. Australian Bureau of Statistics data suggests that 64.5% of males and 62.2% of females aged 5 to 17 years had engaged in active transport for an average of 18.5 minutes per day in the last week but this estimate is an aggregate of all modes of active transport to all destinations [2]. Another source of national level data cites the average time spent on active transport per day in 9 to 16 year olds at 45 minutes [105], but again this is not broken down into trip purpose or transport mode.

VISTA [102] collected data on the time groups of journeys to and from education, with 91.7% of journeys to primary school in Victoria by walking or cycling taking less than 25 minutes. When examining the trends in transport mode amongst NSW school children van der Ploeg et al [40] stated that travel durations had remained relatively stable between 1971 and 2001 and accounted for approximately 20 minutes of physical activity for a return journey, however no further information or data was given. Another Australian study estimated that boys aged 9-16 years spent an average of 22 minutes per day on active transport, while girls the same age spend approximately 14 minutes per day [106].

A systematic review by Lee et al [107] found an average duration of 28 minutes physical activity through ATS, however the number of studies reporting outcomes in terms of commute duration were small (n=7) and significant variation between studies existed. A systematic review by Faulkner et al[108] reported on four studies that had demonstrated at least 20 minutes difference in daily moderate-to-vigorous physical activity (MVPA) between active and passive school commuters. A review by Bassett et al[30] found that active commuting to school contributed approximately 16 minutes of MVPA per day.

Distance to school

Whilst distance to school is an important perceived barrier to ATS [43, 45, 109], evidence shows that many trips considered suitable for active transport (that is less than 1 kilometre for walking and up to 5 kilometres for cycling) are currently being made by car [24, 101, 102]. In Victoria it has been estimated that approximately 74% of Victorian school children live within 5 kilometres of their primary school yet two-thirds of trips to school were made by car [102].

Evidence from European countries with high rates of ATS suggest that almost all (>90%) children actively commute when the distance is less than 1km, and a large proportion (75%) actively commute when the distance is 3-5km[85]. Whilst increasing distances to school due to factors such as urban sprawl and more relaxed school zoning procedures have likely attributed to some of the decline in ATS [93] it is clear that scope exists for improved uptake in ATS in those living within suitable distances.

Relative contribution to total energy expenditure of ATS

It has been estimated that ATS in the Netherlands represents 30% of total physical activity energy expenditure [88]. In Australia, a country with far lower active transport participation rates, it has been estimated that active transport accounts for just over 10% of all MVPA-related energy expenditure in children aged 9 to 16 years of age [106].

Exposure to the Ride2School program

It is unclear exactly how many Victorian school children have been exposed to the Ride2School intervention from publicly available documents, and up-to-date data on exposure and intervention specification may be required from Bicycle Network Victoria and other stakeholders in order to model this intervention. Almost all children (93%) in a recent survey of Victorian school children however reported that they owned a bicycle [110, 111].

II. Impact

Evidence from the literature

Despite the fact that ATS programs are in existence in several countries around the world the evidence on their effect is limited and considered fairly weak, with little rigorous evaluation [26, 28, 112]. Whilst many studies have explored the relationship between ATS, physical activity, health and body composition [25, 113-119] the quality of the evidence of effect is limited, largely due to the significant challenges in designing intervention studies in the transport and built environment sectors [120, 121]. Challenges include:

- That controlled experiments of transport-related interventions are often not feasible due to the nature of the intervention (e.g. large scale, not suited to RCT type studies) [122];

- That the time periods required to observe changes can be long [122] ;

- That these types of interventions may have only a small impact but on very large populations [122];

- That the benefits of increased physical activity will accrue most rapidly when moving from sedentarism to moderate levels of physical activity however data is rarely available at the required level [123, 124].

- That comprehensive data on pace, frequency and intensity of active transport mode is also rarely available, or when it is available may be subject to bias [125].

- That limited evidence exists on whether an increase in active modes of transport results in activity substitution, with the overall effect of no change in physical activity (e.g. a person who has walked to school then decides not to participate in an organised sport) [126].

- That limited evidence also exists on the relationship between energy intake and physical activity, and whether an increase in active transport may lead to an increase in energy intake [127].

- That many other factors influence the choice of mode of transport, including age, sex, socioeconomic status, the built environment, perceptions of safety and culture [43, 128-133].

Several systematic and non-systematic reviews have examined the association between ATS and physical activity levels, cardiovascular fitness and/or body weight using cross-sectional or prospective studies from the literature. Whilst the majority of these reviews have shown a positive association between ATS and physical activity levels in children, the relationship between ATS and body weight is less clear and causality cannot be established due to study design [28, 107, 108, 131, 134-136].

Rigorous experimental studies into the impact of ATS initiatives are relatively limited. A recent systematic review of the effects of interventions for promoting ATS found that six of the 14 reported studies reported a small impact on active transportation participation (0.2<cohen's d<0.49) [137]). Whilst the heterogeneity of the included studies made specific recommendations difficult, the authors noted that ATS may present a small but promising opportunity to increase physical activity levels amongst children. A main conclusion of the study was that more rigorous evaluations, using experimental study designs, should be conducted. Other reviews that have considered the impact of ATS programs and policies incorporating randomised controlled trials or controlled studies have also drawn the same conclusion of inconclusive evidence of their effectiveness and the need for more rigorous studies to be undertaken [138-141].

With a paucity of rigorous evidence in the literature, debate surrounds whether the intensity, duration and volume of physical activity involved in ATS is sufficient to result in positive health effects for children [125]. It has been suggested however that any increase in physical activity amongst children is beneficial, and that increased rates of ATS may lead to more active transport to other destinations [142] and to better physical activity habits in later life [108, 143-147]. ATS on its own is unlikely to meet the daily recommended physical activity guidelines for children and therefore would need to be one component in a multi-strategy approach to increase the energy expenditure of Australian children.

Impact of the Ride2School program

An evaluation of the effectiveness of the Ride2School program has been undertaken by a team of Deakin University researchers [96, 97]. At the time of the evaluation (mid 2006-Jan 2008) the Ride2School program operated at two levels, 'program schools' or 'low touch schools'. 15 'program schools', coeducational government schools located in disadvantaged areas in regional/rural and metropolitan Victoria, participated in the program evaluation study. 'Low touch schools', defined as those participating in a scaled back version of Ride2School were not included in the evaluation [96].

The Ride2School program was found to have mixed results in terms of impact on rates of ATS [97]. A small change in the proportion of active trips was demonstrated in parent-reported data (an increase of 1.7%, from 47.9% at baseline to 49.6% at follow-up), but a decline was reported in student-reported data (from 51.1% to 48.7%). Methodological issues were cited by the authors, with variability in program delivery between schools, potential participation bias by schools that already had comparably high rates of active transport suggesting that schools with an existing interest may have been more likely to participate, fairly low student and parent response rates and a relatively short time period for evaluation. The complexity surrounding variable program delivery and impact has been previously noted [27].

III. Impact on industry

It is expected that the impact on industry of a modal shift to ATS would be minimal. Studies suggest that most school children already own a bicycle [110, 111] and therefore the impact on the bicycle industry would be fairly limited. It is expected that there would be no impact on the motor vehicle industry, as people would still require cars to travel to other destinations. A positive productivity impact may be experienced if ATS interventions lead to less congestion around schools during school hours (particularly at drop off and pick up times) [148, 149].

Potential to use evidence as the basis for an intervention

Evidence of exposure – active transport to school

Variable	Source	Results for use in modelling
Proportion of children using active transport to travel to school in a usual 5 day period.	Victorian Child Health and WellBeing Survey 2006	26.2% of trips to school by Victorian primary school children by active transport. (22.7% walking, 3.5% cycling)
Mode of transport for journey to/from primary school on an average school day, metropolitan Melbourne	Victorian Integrated Survey of Travel and Activity (VISTA) 2009	27.18% of trips to school by walking or cycling. 66.66% by car 5.8% by public transport 0.36% by other
Proportion of Victorian children living within 5 kms of primary school	Victorian Integrated Survey of Travel and Activity (VISTA) 2009	73.74% (25.65% within 0-0.9km, 22.53% within 1-1.9kms, 10.56% within 2-2.9kms, 9.16% within 3-3.9kms, 5.84% within 4-4.9kms)
Proportion of 5-17yr olds who had participated in active transport (all forms, all destinations) in the last week	ABS Australian Health Survey 2011-12: Physical Activity, Table 18.3.	By sex: Males- 64.5% Females – 62.2% By age: 5 – 8 years: 54% 9-11 years: 62.2% 12-14 years: 69.3%

		15-17 years: 70.6% Also available by index of relative socio-economic disadvantage.
Avg time spent on active transport (all forms, all destinations), children 5-17 years, minutes per day.	ABS Australian Health Survey 2011-12: Physical Activity, Table 19.1.	By sex: Males – 19 mins, Females – 18 mins By age: 5 – 8 years: 13 mins 9-11 years: 18 mins 12-14 years: 20 mins 15-17 years: 24 mins Also available by index of relative socio-economic disadvantage.
Avg time spent on active transport (all forms, all destinations), children 9-16 years, minutes per day.	2007 Australian Children/s Nutrition and Physical Activity Survey	All- 45 mins
Proportion of total active transport time (all destinations) spent on journey to/from school	From Booth et al 2006[150], as cited in Garrard 2009[27].	50%
Time group (mins) of journey to primary school by walking/bicycle in Victoria	Victorian Integrated Survey of Travel and Activity (VISTA) 2009	0-4 mins – 10.01% 5-9 mins – 28.7% 10-14 mins – 26.47% 15-19 mins – 16% 20-24 mins – 10.55%

Impact of Ride2School program on active transport rates:

Variable	Source	Results for use in modeling
Proportion of trips previously made by car now made by active forms of transport at follow-up.	Garrard J, Crawford S, editors. Evaluation of the Victorian Ride2School program: impacts and insights into promoting active travel to school. Australasian Transport Research Forum (ATRF), 33rd, 2010, Canberra, ACT, Australia; 2010.	Parent-reported data: 1.7% modal shift Baseline 47.9% made by walk/cycle/scoot, follow-up 49.6% made by walk/cycle/scoot
Change in attitude of parents towards cycling to school	Garrard J, Crawford S, editors. Evaluation of the Victorian Ride2School program: impacts and insights into promoting active travel to school. Australasian Transport Research Forum (ATRF), 33rd, 2010, Canberra, ACT, Australia; 2010.	5.9% Baseline 55.9% of parents considered cycling to school a possibility, follow-up 61.8% of parents.

Health impact

Variable	Source	Results for use in modeling
BMI z-score of children aged 6 years who used active travel to aged 8 years	Pabayo et al 2010, Quebec, Canada	Children who used active travel had an average BMI z-score 0.3 ($p=0.003$) standard deviations lower than other children.

6. Feasibility of intervention implementation in Australian context

Ride2School is currently implemented in Victoria, and given adequate funding could be implemented in all Australian states and territories.

7. Economic evaluations of ATS programs incorporating physical activity impacts that exist in the literature

Study	Method	Intervention	Health valued as	Result/s
Moodie M, Haby M, Galvin L, Swinburn B, Carter R. Cost-effectiveness of active transport for primary school children - Walking School Bus program. The international journal of behavioral nutrition and physical activity 2009;6:63	CEA	Walking School Bus program.	Cost savings through diseases averted - Ischaemic heart disease, ischaemic stroke, hypertensive heart disease, type 2 diabetes, osteoarthritis, endometrial cancer, colon cancer, post-menopausal breast cancer and kidney cancer (relative risks from change in physical activity). Validated method used to convert change in energy balance to change in weight. BMI calculated using mean height, converted to DALYs and cost offsets over lifetime.	Not effective or cost-effective as an obesity prevention measure. Incremental saving of 30 DALYs and nett cost per DALY saved of AUD$0.76M ($0.23M:3.32M) (Aust threshold AUD50,000 per DALY).
Moodie M, Haby MM, Swinburn B, Carter R. Assessing cost-effectiveness in obesity: active transport program for primary school children--TravelSMART Schools Curriculum program. Journal of physical activity & health 2011;8(4):503-15	CEA	TravelSmart schools program.	Cost savings through diseases averted - Ischaemic heart disease, ischaemic stroke, hypertensive heart disease, type 2 diabetes, osteoarthritis, endometrial cancer, colon cancer, post-menopausal breast cancer and kidney cancer (relative risks from change in physical activity). Validated method used to convert change in energy balance to change in weight. BMI calculated using mean height, converted to DALYs and cost offsets over lifetime.	Intervention cost-ineffective under base-run assumptions, incremental saving of 95 DALYS (95%UI-40:230) and net cost per DALY saved AUD$117,000 (95%UI dominated;$1.06M).
Fishman, E., et al. (2011). Cost and Health Benefit of Active Transport in Queensland. Queensland, Prepared by CATALYST for Health Promotion Queensland.	CBA	Hypothetical ATS intervention. Limited information is given on the intervention except that some data was taken from a pilot program of the Brisbane City Active School Travel program. Economic evaluation forms part of a broader document, looking at the costs and potential health benefits of active transport in general.	Health values taken from the New Zealand Transport Agency (NZTA) [151] and adjusted for the Queensland population, morbidity and mortality attributable to physical inactivity and health sector costs per inactive adult.	Results indicate that investment in ATS is justifiable using public funds. Cost-benefit ratios ranged from 2.8:1 to 8.4:1, dependent on time horizon and discount rate chosen.
Note: *An email from a Senior Adviser at Translink QLD (dated 10 October 2014) has advised that an evaluation of effectiveness also incorporating an*	CBA	Healthy Active School Travel (HAST) Program QLD	Publication not yet available	Publication not yet available

economic evaluation of the HAST program has been commissioned and is currently being undertaken. The economic evaluation will comprise of a CBA, incorporating health, transport, educational and other benefits. A final report is expected in mid-late 2015.	

8. Stakeholders

a. Policy makers/regulators

- Department of Planning and Community Development
- VicHealth
- VicRoads
- Sustainability Victoria
- Department of Education
- Department of Transport
- Australian Bicycle Council, Austroads

b. Industry

- Malvern Star
- Crumpler

c. Advocates

- Bicycle Network Victoria
- Diabetes Australia Victoria

d. Academics

- Dr A Carver, Deakin
- C-PAN, Deakin

9. Issues specific to this intervention

a. Modelling

Evidence of the effectiveness of the intervention is considered weak.

b. Other issues (e.g. equity)

Cycling and walking are low cost modes of transport, and therefore investment in active forms of transport may particularly benefit the young and the economically disadvantaged [112]. Encouraging active transport as a means of increasing physical activity amongst low socioeconomic groups may be a more equitable and inclusive form of physical activity promotion, as these groups may be less likely to engage in sport and exercise programs and more likely to participate in active forms of transportation [27, 41]. Schools have been identified as ideal environments for population-based physical activity interventions as they are inclusive of all socioeconomic groups [152].

A recent Australian study found that active transport in children aged 9 to 16 years accounted for a higher proportion of all MVPA-related energy expenditure for those in the lowest income band in comparison to those in the highest income band (14% vs 10% across all income groups) [106]. Possible explanations for higher rates of ATS in lower socioeconomic groups include that these households may own less cars, although the differences in car ownership across socio-economic position are decreasing with time [153]. Children from lower socioeconomic position may also be more likely to attend their nearest school (rather than a selective or private school which may be located a greater distance from their place of residence).

10. Intervention's potential to meet intervention selection criteria

a. Potential impact of addressing the problem of obesity

Although evidence for the potential impact of the intervention is weak ATS may play an important role in improving rates of incidental exercise in Australian children.

b. Relevance to current policy decision-making

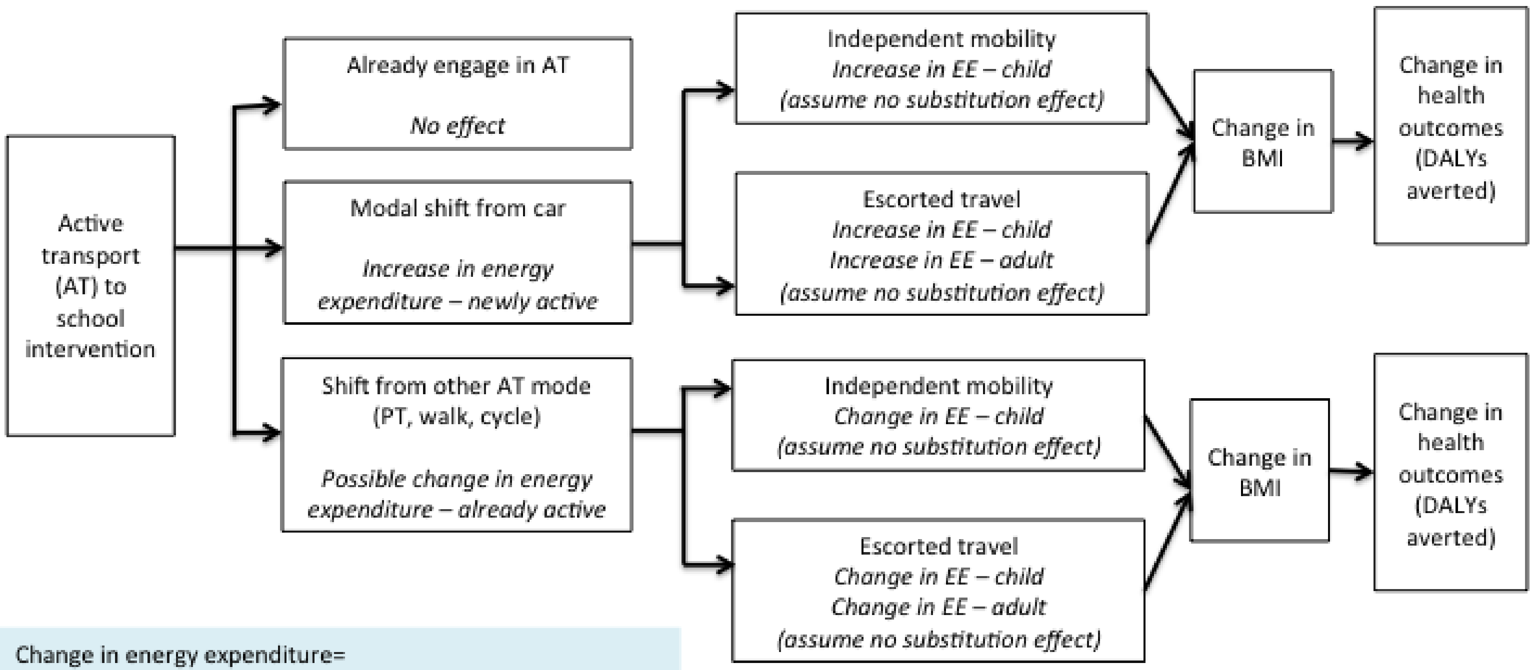
The Ride2School program is currently Government funded and therefore the results of the economic evaluation should be relevant to current policy decision-making.

c. Availability of evidence of efficacy/effectiveness to support the analyses (using a broad definition of evidence)

Evidence from a process evaluation undertaken by Deakin researchers could be used, but suffers from some methodological limitations.

11. Intervention program logic

LOGIC PATHWAY: ACTIVE TRANSPORT TO SCHOOL



Change in energy expenditure=
Diff. in METS x weight x time travelled

Energy costs (METS):
Walking moderate pace, walking for transport – 3.5 METS
Bicycling <10mph leisure – 4 METS
Bicycling, general – 7.5 METS
Driving a car – 2.5 METS
Passenger in a car, bus or train – 1.3 METS

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