

Impact of an Australian state-wide active travel campaign targeting primary schools

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ABSTRACT

Active travel can have health and environmental benefits. This study evaluated the impact of a month-long (October, 2015) campaign encouraging primary school children in Victoria, Australia to engage in active school travel. With support from local councils, schools participated in the campaign by monitoring active school travel and delivering promotional activities. A longitudinal study evaluated campaign impact. Carers (n=715) of Victorian primary school children were recruited via social media and completed online surveys at baseline (T1; 0 wk) and during (T2; +2 wks) and after the campaign (T3; +6 wks). Carers reported their child's travel behaviour over the last five school days, and whether their child and/or their child's school participated in the campaign. Separate generalised linear models were used for T2 and T3 outcomes adjusting for T1 values and potential confounders. A greater proportion of children who participated in the campaign engaged in any active school travel at T2 (OR = 2.49, 95% CI = 1.63, 3.79) and T3 (1.62, 95% CI = 1.06, 2.46) compared with non-participating children. Similarly, these children had a higher frequency of active school travel at T2 (IRR = 1.60, 95% CI = 1.29, 1.97) and T3 (IRR = 1.45, 95% CI = 1.16, 1.80). Campaign participation resulted in small, short-term increases in active school travel.

List of Abbreviations

GLM: Generalised linear models

SEIFA: Socio-Economic Indexes for Areas

LGA: Local government authority

SES: Socio-economic status

Keywords

walking, cycling, active travel, young people, intervention, school

BACKGROUND

Active school travel (i.e., walking and cycling) is one way young people can incorporate physical activity into their day, with increases in active travel associated with increases in physical activity (Smith et al., 2012). More broadly, increasing active travel and thereby decreasing car use, has associated environmental and community benefits including improved air quality, reduced traffic congestion, increased community liveability and reduced greenhouse gas emissions (Woodcock et al., 2009; Younger et al., 2008).

In Australia, the prevalence of active school travel is low (Salmon and Timperio, 2007; van der Ploeg et al., 2008). This is also the case in many developed countries. For example, a comparison of rates of school active travel in 49 countries found that less than 46% of children engaged in school active travel in most of the developed countries included in the study with the exception of Denmark, Finland and Japan where at least 75% of children engage in school active travel (Aubert et al., 2018). School active travel has also declined substantially when compared with rates forty years ago (McDonald et al., 2011; van der Ploeg et al., 2008). For example, in Australia, the proportion of 5-9 year olds walking to school decreased from 58% in 1971 to 26% in 2003, while the proportion of 10-14 year olds decreased from 44% to 21% over the same period (van der Ploeg et al., 2008).

Programs to promote school active travel have predominantly involved a 'walking school bus', which is structured and involves adult supervision (Heelan et al., 2009; Kong et al., 2009; Mendoza et al., 2009). Other programs have focused on environmental or policy changes to improve the safety and convenience of active school travel (Boarnet et al., 2005; Mammen et al., 2014; Østergaard et al., 2015; Rowland et al., 2003; Staunton et al., 2003; TenBrink et al., 2009). A smaller number of programs have been informational campaigns involving combinations of paid advertising, classroom based activities, parental engagement and/or school-level competitions (Coombes and Jones, 2016; McKee et al., 2007; Merom et al., 2005; Wen et al., 2008; Zaccari and Dirkis, 2003). Broadly speaking, most of these active travel interventions have demonstrated small, short-term increases in active school travel. However, most evaluations of these programs have involved small samples or participants who live within a reasonable walking distance of their school (Coombes and Jones, 2016; Heelan et al., 2009; Kong et al., 2009; McKee et al., 2007; Mendoza et al., 2009; Zaccari and Dirkis, 2003). Others have used uncontrolled pre/post-test study designs, which are unable to rule out changes due to secular trends rather than being directly attributable to the program

(Boarnet et al., 2005; Mammen et al., 2014; Merom et al., 2005; Staunton et al., 2003; TenBrink et al., 2009). This has led to a call for more robust evidence of the impact of active school travel interventions (Chillón et al., 2011).

To encourage primary school children across Victoria (Australia) to walk or cycle to and from school more often, the Victorian Health Promotion Foundation (VicHealth) delivers the annual Walk to School campaign. The four-week campaign engages both local government (councils) and schools to promote active school travel among primary school children (5-12 years) and their carers. The primary aim of this study was to assess the impact of the Walk to School 2015 campaign on school travel behaviour. As a secondary aim, we explored whether socio-demographics and area-level characteristic moderated campaign effects.

METHODS

A longitudinal study design examined within-child changes during and after the campaign (compared with baseline) in children who participated in the campaign compared with children who did not. Three proxy-report surveys were administered to the carers of children attending Victorian primary schools in September (T1, pre-campaign; 0 wks), October (T2, during campaign +2 wks) and November (T3, post campaign +6wks) 2015. Deakin University Human Research Advisory Committee (HEAG-H 126-2015) granted ethical approval.

Intervention

The Walk to School campaign has run annually since 2006 (Schuster et al., 2016a, b). In 2015, the campaign ran for the month of October (spring). Local councils applied for up to AU\$10,000 to engage schools and community groups in the campaign. In their application, councils were required to address how they would deliver: *promotional activities* to encourage primary schools to participate; *engagement activities* to run the campaign as well as support schools to deliver activities (e.g., hosting a breakfast); and *local initiatives* to support ongoing active travel (e.g., installing bike racks at schools).

Schools who participated in the campaign received campaign materials including posters and classroom calendars. Teachers were asked to use these calendars to record school active travel journeys, but were not provided with specific instructions on how to do so. Summary data from these calendars were submitted to VicHealth. Schools, with support from their local council, were encouraged to host their own activities, such as competitions and one-day

promotional events. To support wider participation, a smartphone application and website (<http://www.walktoschool.vic.gov.au/>) were available for any child to track their school journeys.

VicHealth also engaged in wider promotion of the campaign to parents and the broader community through online advertising, marketing, public relations activities and social media. Community partnerships with Cricket Victoria (State-based sports association dedicated to cricket) and the Melbourne Stars Big Bash Team (professional cricket team) were formed.

In 2015, 61 local councils (77%) received funding and 620 primary schools (40%) participated in the campaign. Data from the school calendars, website and smartphone application indicated that approximately 78,628 primary school students participated (~15.5%).

Study Participants

Just prior to campaign launch, Facebook advertisements targeting men and women aged 26-55 years residing in Victoria ran for eight days. To supplement this approach, a list service company (iView) sent an email invitation to approximately 300 registered adults in their database who had children attending a primary school in Victoria. In both cases, advertisements invited carers to complete short surveys about their child's travel behaviour to receive a \$20 gift voucher.

Interested carers were directed to a webpage to register interest. Eligibility was determined by asking the participant to indicate that they had ≥ 1 child in their care who was attending a primary school in Victoria and to name the school. Eligible carers were emailed information about the study and a link to the online survey, which included a check-box to indicate consent. Carers were unable to proceed to the first question without providing this consent.

Measures

The baseline survey (T1) closed immediately prior to the commencement of the campaign. A link to a second survey (T2) was emailed to carers two-weeks into the four-week campaign (i.e. mid-October) and to the third survey (T3) two weeks following the end of the campaign (i.e. mid-November).

The surveys asked respondents about the child in their care who (a) attended the primary school nominated on the registration form and (b) whose birthday was the closest (if >1 child attended the school). Child participation (exposure) in the campaign was carer-reported; children whose carer reported that their child and/or their child's school participated in the campaign were defined as campaign participants.

Sociodemographic information: The carer self-reported their relationship to the child, highest level of education, employment status, country of birth, residential postcode, total family income and whether English was usually spoken at home. Carer education was used as the measure of individual socioeconomic status (SES) (Ford-Gilboe, 1997; Sherar et al., 2011; Timperio et al., 2005) and collapsed into three categories: some secondary school or less (low SES); completed secondary school, technical certificate, or apprenticeship (medium SES); and university/tertiary qualification (high SES). Treatment of the other variables is shown in Table 1.

Area-level indicators including 2011 Socio-Economic Indexes for Areas (SEIFA) disadvantage score (Australian Bureau of Statistics, 2011b) and urbanicity (urban vs rural) (Australian Bureau of Statistics, 2011a) were applied based on residential postcode. To determine urbanicity, the Urban Centres and Localities' structure of the Australian Statistical Geography Standard (ASGS) was used which defines significant urban centres according to population density within 'Statistical Area Level 2' administrative boundaries and represents concentrations of urban development with populations of at least 10,000 people.

Child's characteristics: Carers reported the child's sex, age, school year, school attended, school location (postcode) and the approximate distance from their child's home to school (collapsed into categories shown in Table 1).

Child's travel behaviour: Carers were asked to report all modes of transport their child used in the last five days they attended school (walk/bike, vehicle, school bus, public transport). For each mode, the carer was asked to report how many times the child travelled a) to and b) from school over the past five school days using that mode (for up to ten journeys). At baseline, carers also reported who usually accompanied their child on the journey to school. Responses included: alone, with a brother or sister, with a parent or other adult, with friends, with another person. These data were collapsed into a dichotomous variable: children who usually travelled with a sibling / friend and children who did not usually travel with a sibling / friend.

Data Management & Analysis

Survey data were analysed using STATA. The main outcome was active school travel over the past five school days analysed as both a count variable (range: 0-10 days/week) and as a dichotomous variable (0 journeys/week or ≥ 1 journeys/week). Generalised Linear Models (GLMs) analysed campaign impact on the proportion of children engaging in active school travel (GLM with negative binomial family and log link) and frequency of active school travel (GLM with binomial family and logit link). Cluster-robust standard errors accounted for clustering within schools. Separate GLMs were used for T2 and T3 outcomes, adjusting for T1 values. Potential confounders (child's school year and sex, carer education, household income, language spoken at home, area-level SEIFA, urbanicity, distance to school, method of recruitment) were tested; those associated with participation were included as covariates (carer education, language spoken at home and urbanicity).

To complement these main analyses, we generated a second measure of exposure. That is, we used school participation records provided by VicHealth (as opposed to carer-reported participation). To determine this measure of exposure, school participation data provided by VicHealth (whereby participation was defined as providing VicHealth with classroom calendar data) was matched with the name of the school the child attended as reported by the carer. Again, GLMs were used to analyse campaign impact.

Moderation analyses were conducted to explore whether campaign impact differed by key indicators. Potential moderators included sex of the child, carer education, area-level SES, distance to school, urbanicity, language spoken at home and child accompaniment on the journey to school. For these analyses, GLMs were conducted as described above, however, separate models were tested for each potential moderator and additionally included an exposure-by-moderator product term and the main effect of the moderator. Where the product term was statistically significant, (i.e. there was evidence of moderation), GLMs testing the effect of the exposure on the outcome, stratified by levels of the moderator, were conducted.

RESULTS

Overall, 1114 registrations of interest were received, 813 completed the baseline (T1) survey and 726 completed the T3 survey (89% completion rate). Participation in the campaign was missing for six participants and a further five had missing data for urbanicity. Therefore, inferential analyses were based on 715 children.

There were few socio-demographic differences between participating and non-participating children (Table 1). However, a greater percentage of participating children lived in rural areas compared with non-participating children (31% vs 21%).

[Insert Table 1 here]

Changes in the proportion of children engaging in any active school travel

Changes in the proportion of children engaging in any active school travel in the past five days is shown in Table 2. Participating children had a greater odds of active school travel at both T2 and T3. For example, at T3, participating children had a 60% greater odds of engaging in any school active travel when compared with non-participating children (see Table 2).

[Insert Table 2 here]

Changes in the frequency of active school travel

Changes in the frequency active school travel in the past five days are shown in Table 2. Participating children had a statistically significant higher frequency of engaging in active school travel at both T2 and T3 compared with non-participating children. That is, at T3, participating children engaged in school active travel for 1.4 trips/week more than non-participating children.

Supplementary analyses: school participation

Compared to carer-reported exposure, a slightly smaller percentage (41.7%; n=303) of children were exposed to the campaign as determined by VicHealth school participation records. In terms of the proportion of children engaging in any school active travel, findings were broadly similar to the main analyses except that differences between groups were only statistically significant at T2 (OR 1.66, 95% CI 1.06, 2.60). Changes in the frequency of school active travel, were similar at T2 (OR=1.38, 95% CI 1.12, 1.70) and T3 (OR = 1.38, 94% CI 1.11, 1.73), albeit less pronounced.

Moderators of campaign impact

There was a significant interaction between the sex of the child and parent-defined exposure to the campaign on the odds of any school active travel at T3 ($\chi^2(1)=4.96$, $p=.026$), but no interaction for frequency of school active travel. Stratified analyses showed no effect of

participation on the proportion of boys' engaging in school active travel; however, among girls, parent-defined exposure to the campaign was associated with more than doubled odds of school active travel at T3 (OR=2.79, 95% CI=1.46, 5.33, p=.002). This difference reflected a comparatively greater increase in school active travel among exposed girls (from 43.8% to 52.3%) compared with non-exposed girls (from 33.7% to 33.2%). In contrast, the proportion of boys engaging in school active travel increased over time in both those who were exposed (47.7% to 55.9%) and not exposed (37.6% to 55.9%).

There was also a significant interaction between distance to school and parent-defined campaign exposure on the frequency of school active travel at T2 ($\chi^2(2)=7.15$, p=.028) and T3 ($\chi^2(2)=10.86$, p=.004). Campaign exposure was associated with higher frequency of school active travel at T2 (IRR=1.29, 95% CI=1.09-1.52, p=.003) and T3 (IRR=1.25, 95% CI=1.06-1.48, p=.007) among children who lived less than 1km from their school. Similarly, campaign exposure was associated with higher frequency of school active travel at T2 (IRR=2.54, 95% CI=1.59-4.05, p<.0005) and T3 (IRR=2.45, 95% CI=1.52-3.95, p<.0005) among children who lived 2km or greater from their school. There was no effect of campaign exposure among children who lived 1-2 km from their school.

There were no interactions for carer education, area-level SES, language spoken at home, urbanicity or accompaniment on the journey to school indicating that these characteristics did not moderate campaign impact.

DISCUSSION

The annual Walk to School campaign is a state-wide initiative that encourages primary school children in Victoria (Australia) and their carers to walk or cycle to and from school. The 2015 campaign resulted in small, short-term positive effects, both in the proportion of children engaging in any active school travel (indicating a shift in travel mode for some children) and the frequency of active school travel. While these positive effects were more pronounced during the campaign (T2), they were maintained, to some extent, two weeks post-campaign (T3).

Comparisons of the socio-demographic characteristics of participating and non-participating children indicated that the reach of the campaign generally did not favour any group, although a higher proportion of children in rural areas participated. This implies that large campaigns can have wide reaching uptake, including among typically hard-to-reach groups

including the culturally and linguistically diverse and those from low socioeconomic backgrounds.

Inferential analyses indicated that when campaign exposure used school participation records, as opposed to carer-reported exposure, the increases in school active travel were slightly weaker. To maximise the impact of a campaign like this, it may be important to ensure that carers are aware of their child's involvement. This is not surprising, given that for young children, in particular, a parent or guardian is likely to accompany them on their journey and to be a major influence on their travel behaviour. Indeed a review of school active travel interventions determined that the most effective interventions engaged with parents by providing them with specific materials (Chillón et al., 2011).

It is difficult to directly compare the efficacy of the Walk to School campaign with previous active school travel interventions given heterogeneity in location, program design and evaluation design. However, promotional and educational campaigns most similar to the Walk to School campaign have typically reported comparatively smaller impacts on active school travel (McKee et al., 2007; Wen et al., 2008; Zaccari and Dirkis, 2003). For example, in an Australian school purposively selected as 80% of students lived within 1 km of school, a four week promotion of active travel via newsletters to parents and classroom activities only reduced car trips by 3% (Zaccari and Dirkis, 2003). A two-year multi-component intervention involving classroom activities, resources, parent newsletters and small improvements to the environment in Australian schools showed no differences in student-reported and a 10% net increase in carer-reported active school travel between the intervention and control (Wen et al., 2008). More recently, a pilot evaluation of 'points based' competition ('Beat the Streets') in the UK reported a 10% increase in the prevalence of active school travel, equivalent to one additional active travel journey a week (Coombes and Jones, 2016).

Moderation analyses suggested that the campaign was equally effective regardless of a child's individual or area level socio-economic status, the language the child spoke at home, and whether the child lived in an urban or rural setting. The campaign, however, appeared to positively impact on the proportion of girls who participated in any active school travel more so than boys, although the frequency of school active travel increased among both. This may be due to the fact that, at baseline, fewer girls were engaging in any active school travel, a finding consistent with a study from the US among children in years 3 – 5 which found that

compared with boys, the rates of active school travel were 40% lower among girls (McMillan, 2006).

Finally, distance to school appeared to moderate campaign impact; however, not in the way one might expect. Relative to participating children who lived 1 – 2 km from school, children who lived less than 1 km and greater than 2 km from school, increased the frequency of their past five school days active travel. Given that distance to school is a key correlate of active school travel (Panter et al., 2008; Pont et al., 2009) it is perhaps not surprising that the campaign had a positive impact on children who lived close to school. The reason that the campaign also influenced active school travel among those who lived furthest from school is not clear. Campaign messages encouraged children to ‘walk part of the way’ and this may have resulted in increases in active school travel among those who lived greater distances from school.

Strengths & Limitations

The controlled, longitudinal design of this study is a strength, extending previous work, which has often relied on small, pre-post evaluations. The heterogeneity of the sample and inclusion of children in rural areas also enhances the generalisability of the results.

Notwithstanding these strengths, the nature of the campaign meant that participants were not randomly allocated to intervention or control groups. It is therefore possible that participating and non-participating children and schools differed in their commitment to promoting school active travel. Similarly, carers self-selected to be involved in the study, and as such, their views towards active travel may have been more favourable compared with carers who did not participate in the study. Further limitations include the use of proxy report measures of active travel that may have been affected by recall and social desirability bias and the short follow-up period (2 weeks post-campaign). It is also noteworthy that active school travel tended to increase over time in participating and non-participating children. This may reflect social desirability bias as carers became familiar with the nature of the survey or an increase in active travel associated with seasonal changes during the evaluation period or exposure to campaign messages beyond those formally participating. Finally, the analyses did not consider key psychosocial correlates of school active travel, like attitudes and perceptions of safety, which could have helped to explain campaign impact.

CONCLUSION

In summary, the VicHealth Walk to School 2015 campaign, targeting active school travel among primary school children, had wide reach and produced small, positive changes in the proportion of children engaging in school active travel as well as the frequency of school active travel. These participation effects did not differ by area-level indicators including urban-rural status and socio-economic position; however, increases were more pronounced among girls and among children who lived within 1 km and beyond 2 km of their school. The longer-term impact of campaigns such as this warrants investigation.

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Authors' contributions

SS, JV, JG, JS & AT all contributed to the study design and data collection procedures with feedback from KH and FA. GA led the data analysis with contributions from SS. SS led the interpretation of the analysis in collaboration with GA, JV, JG, JS & AT. SS drafted the manuscript with critical input from JV, JG, GA, JS, JG, AT, KH, FA. All authors approved the final version of the manuscript.

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Ethical approval and consent to participate

Ethical approval was received from the Deakin University Human Ethics Advisory Committee (Health) (Reference number: HEAG-H 126_2015). All participants provided informed consent. Participants were unable to proceed to the first question of the survey without first providing this consent.

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Table 1: Carer and child sociodemographic characteristics by participation in the 2015 Victorian (Australia) Walk to School campaign (n=715)

Characteristic	Participating child N=347 n (%)	Non-participating child N=368 n (%)	χ^2	p
Child's School Year			4.83	.566
Foundation	57 (16.4)	73 (19.8)		
Grade 1	74 (21.3)	75 (20.4)		
Grade 2	48 (13.8)	53 (14.4)		
Grade 3	53 (15.3)	60 (16.3)		
Grade 4	48 (13.8)	45 (12.2)		
Grade 5	34 (9.8)	40 (10.9)		
Grade 6	33 (9.5)	22 (6.0)		
Child's Sex – Male	170 (49.0)	190 (51.6)	0.50	.481
Maternal Education			7.35	.025
Low SES	42 (12.1)	55 (15.0)		
Medium SES	145 (41.8)	118 (32.1)		
High SES	160 (46.1)	195 (53.0)		
Household income			1.92	.382
Low SES (Less than \$1000/week)	93 (27.0)	83 (22.6)		
Medium SES (\$1000-1999/week)	156 (45.4)	178 (48.4)		
High SES (\$2000 or more/week)	95 (27.6)	107 (29.1)		
Language Spoken at Home			4.07	.044
English	302 (87.0)	300 (81.5)		
Other	45 (13.0)	68 (18.5)		
Area Level SEIFA			1.42	.491
Low	110 (31.8)	102 (27.7)		
Medium	116 (33.5)	130 (35.3)		
High	120 (34.7)	136 (37.0)		
Urbanicity			8.65	.003
Urban	240 (69.2)	290 (78.8)		
Rural	107 (30.8)	78 (21.2)		
Distance to school			1.39	.499
Less than 1km	79 (22.8)	71 (19.3)		
1km - less than 2km	79 (22.8)	91 (24.7)		
2km or greater	189 (54.5)	206 (56.0)		

Characteristic	Participating child N=347 n (%)	Non-participating child N=368 n (%)	χ^2	p
Travel companion				
Travelled with sibling / friend	204 (58.8)	200 (54.4)	1.34	0.231
Did not travel with sibling /friend	143 (41.2)	168 (45.7)		

1 **Table 2: Effect of participation in the 2015 VicHealth Walk to School campaign on the proportion of participating and non-participating**
2 **children engaging in at least one active school travel journey, and the frequency of active school travel over the past five school days at T1,**
3 **T2 & T3 (n=715)**

	N	Descriptive results			Effect of campaign participation ^a	
		Baseline (T1) (%)	Mid-campaign (T2) (%)	Post-campaign (T3) (%)	T2 OR (95%CI)	T3 OR (95%CI)
≥1 active trips						
Did not participate (ref)	347	35.7	40.6	40.3	1.0	1.0
Participated	368	45.7	59.9	54.0	2.49 (1.63, 3.79)***	1.62 (1.06, 2.46)*
	N	Baseline (T1) (mean, SD)	Mid-campaign (T2) (mean, SD)	Post-campaign (T3) (mean, SD)	IRR (95%CI)	IRR (95%CI)
Number of active school trips/wk (range 0 – 10 trips)						
Did not participate (ref)	347	2.4 (3.7)	2.6 (3.7)	2.7 (3.7)	1.0	1.0
Participated	368	3.0 (3.9)	3.9 (4.1)	3.8 (4.1)	1.60 (1.29 – 1.91)***	1.45 (1.16, 1.80)*

4 ^aCampaign participation effects on outcomes, accounting for clustering within schools and adjusted for baseline levels of outcomes, carer education, language spoken at
5 home and urbanicity

6 *p < .05, **p < .005, ***p < .0005

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