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Trends in Australian children traveling to school 1971–2003: Burning petrol or carbohydrates?

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Abstract

Objective. To determine how Australian children traveled to and from school between 1971 and 2003.

Methods. The 1971 (n=4284), 1981 (n=4936), 1991 (n=662) and 1999–2003 (n=816) Household Travel Surveys from the New South Wales Government Department of Planning were used to determine the mode of transport kids (5–14 years) took to and from school in the area of Sydney (Australia).

Results. The results showed that the percentage of children aged 5–9 that walked to school was 57.7, 44.5, 35.3 and 25.5 in 1971, 1981, 1991 and 1999–2003, respectively. The percentage of children aged 5–9 that were driven to school by car in the four surveys was 22.8, 37.3, 53.9 and 66.6, respectively. The results for children aged 10–14 were similar, walking decreased from 44.2% to 21.1% and car use increased from 12.2% to 47.8% over the study period. Similar results were found for travel from school and there were no major differences between boys and girls.

Conclusion. Between 1971 and 2003, Australian children's mode of travel to and from school has markedly shifted from active (walking) to inactive (car) modes.

Keywords: Child; Transportation; School; Physical activity; Health; Environment

Introduction

The importance of physically active forms of transport for human and environmental health is well known (Dora, 1999). The rise in childhood obesity has increased the relevance of how children commute to and from school (Anderson and Butcher, 2006). Data from the UK have suggested that the proportion of children actively commuting to school has been decreasing over the years, while the proportion of children that takes the car to school has increased (Black et al., 2001). However, there are no population studies that have estimated changes in prevalence of active and inactive commuting to school over several decades based on comparable data. The objective of this study was to determine how Australian children traveled to and from school between 1971 and 2003 using four representative population surveys.

Methods

Data on the mode of transport for journeys to and from school were extracted from the 1971, 1981, 1991 and the ongoing 1999–2003 Household Travel Surveys of the New South Wales Government Department of Planning (Transport and Population Data Centre, 2006). These surveys randomly selected households in the study area. All usual household residents were asked to complete a 24 h diary that recorded details on all trips made during the designated travel day. An interviewer visited the household before the travel day to explain the survey procedures and collect basic socio-demographic information. The interviewer returned after the travel day to obtain detailed trip information, and any other additional and missing information. Children were interviewed personally or by adult proxy from the same household. Consent from parent or responsible adult was obtained for interviewing the children in the household. The New South Wales Government Household Travel Survey conforms to the requirements of the Privacy Committee of New South Wales. The response rates for the 1971, 1981, 1991 and 1999–2003 surveys were 81.6%, 87.8%, 73.4% and 66.1%, respectively.

The four surveys used comparable methodology for the assessment of traveling to and from school. However, in order to compare surveys, we only used data obtained from children aged 5–14 on weekdays from August until November in Australia's County of Cumberland, which is a large urban area that includes the city of Sydney. Only the trips children made to school in the morning and from school at the end of the school day were examined.

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Statistical analyses

The prevalence of car, walking, bus, train and other modes as the main mode of transport to and from school were calculated for all four surveys. Odds ratios and 95% confidence intervals (95% CI) were estimated using logistic regression to compare the four surveys on the use of car, walking and bus as the main mode of transport to and from school (1971 was the reference year). The duration of the journey to and from school was calculated for the different modes of travel across surveys.

All analyses were performed separately for boys and girls and for children aged 5–9 and 10–14 and were corrected for clustering within households (all using SPSS 14.0). The data were weighted for age, gender, area, day and week, such that the population represented the population in the County of Cumberland and the weekdays from August until November. The original survey weights were used, which are based on Australian Bureau of Statistics census data.

Results

Children aged 5–14 years were included in the analyses (mean age 10 years (3); 51% boys, 49% girls). The majority of children traveled to and from school by car or walking. The prevalence and regression analyses are presented in Table 1. Regression analyses could not be performed for the train and other category data because of insufficient statistical power. Since boys and girls showed mostly similar results, only pooled data are shown. Chi-squared analyses comparing boys and girls within each survey showed after Bonferroni correction that only girls aged 10–14 were more frequently driven from school in 1971 (8.6% and 4.9% for girls and boys, respectively).

Table 1 shows that in both age groups the proportion of children walking and taking the bus to and from school significantly decreased, while the proportion taking the car significantly increased between 1971 and 2003. The use of the train and other transport modes was relatively infrequent and did not show major changes over the study period. Cycling, the other major mode of active commuting besides walking, was not very prevalent (1–2%).

The duration of trips to and from school remained relatively stable. However, the data (not shown) suggested a slight trend toward shorter walk and longer car trips. In all surveys a walk trip to or from school took around 10 min, car trips 5–10 min and bus trips 25–30 min.

Discussion

Between 1971 and 2003 the proportion of children that walk to and from school in Sydney has more than halved while the proportion of children taking the car has more than tripled. These trends were stronger for younger children.

Although these results are limited to the Sydney area, they are the most complete description of the change in commuting behaviors to school for industrial countries to date. The switch from active to inactive commuting to school is probably strongest in car-dependent countries like Australia and the USA. CDC data from the USA showed that in 1999 19% of primary school and secondary school children walked to or from school at least once a week (Centers for Disease Control and

Table 1
Prevalence of walking and being driven to and from school in Australian children age 5–9 and 10–14 between 1971 and 2003

	1971[a] (n=4284)			1981 (n=4936)			1991 (n=662)			1999–2003 (n=816)		
	n	%	Odds ratio	n	%	Odds ratio (95% confidence interval)	n	%	Odds ratio (95% confidence interval)	n	%	Odds ratio (95% confidence interval)
Age 5–9												
Walk to school	1217	57.7	1.00	1047	44.5	0.59 (0.51, 0.68)*	119	35.3	0.40 (0.30, 0.54)*	107	25.6	0.25 (0.18, 0.34)*
Walk from school	1317	62.6	1.00	1133	48.2	0.56 (0.48, 0.65)*	134	39.8	0.39 (0.29, 0.53)*	123	29.4	0.25 (0.19, 0.33)*
Car to school	481	22.8	1.00	878	37.3	2.01 (1.71, 2.37)*	183	53.9	3.96 (2.94, 5.33)*	279	66.6	6.76 (5.05, 9.05)*
Car from school	403	19.1	1.00	748	31.8	1.97 (1.66, 2.34)*	157	46.5	3.67 (2.72, 4.97)*	265	63.4	7.32 (5.49, 9.77)*
Bus to school	388	18.4	1.00	392	16.6	0.89 (0.73, 1.08)	31	9.1	0.44 (0.29, 0.69)*	26	6.2	0.29 (0.17, 0.50)*
Bus from school	360	17.1	1.00	428	18.2	1.08 (0.89, 1.32)	41	12.2	0.67 (0.45, 1.02)	23	5.6	0.29 (0.17, 0.48)*
Train to school	9	0.4		11	0.5		0	0		2	0.5	
Train from school	11	0.5		13	0.5		0	0		2	0.5	
Other to school	14	0.7		27	1.1		6	1.7		5	1.1	
Other from school	14	0.7		30	1.3		5	1.5		5	1.1	
Age 10–14												
Walk to school	961	44.2	1.00	1018	39.4	0.82 (0.72, 0.94)*	107	33.1	0.63 (0.47, 0.84)*	84	21.1	0.34 (0.24, 0.48)*
Walk from school	1074	49.5	1.00	1136	44.1	0.81 (0.71, 0.92)*	120	37.9	0.62 (0.47, 0.82)*	130	32.7	0.50 (0.37, 0.66)*
Car to school	266	12.2	1.00	479	18.6	1.64 (1.36, 1.97)*	106	32.7	3.50 (2.56, 4.78)*	190	47.8	6.59 (4.98, 8.72)*
Car from school	146	6.7	1.00	288	11.1	1.75 (1.39, 2.22)*	77	24.3	4.46 (3.15, 6.30)*	126	31.8	6.48 (4.72, 8.89)*
Bus to school	690	31.7	1.00	808	31.3	0.98 (0.85, 1.13)	73	22.6	0.63 (0.47, 0.85)*	78	19.8	0.53 (0.39, 0.73)*
Bus from school	687	31.7	1.00	855	33.3	1.07 (0.93, 1.23)	87	27.3	0.81 (0.61, 1.08)	99	25.0	0.72 (0.54, 0.95)*
Train to school	179	8.3		173	6.7		29	8.9		34	8.6	
Train from school	188	8.6		196	7.6		28	8.9		33	8.4	
Other to school	79	3.6		103	4.0		9	2.7		11	2.7	
Other from school	76	3.5		100	3.9		5	1.6		9	2.1	

[a] Reference year for regression analyses.
* $p<0.05$.

Prevention, 2002). In countries with less car-focused infrastructures the switch toward inactive commuting might be less extreme. Data from the UK on commuting to and from school in children aged 5–10 showed a decrease from 1975/76 to 1989/94 in walking from 72% to 62% and an increase in car use from 16% to 28% (Black et al., 2001). The decrease in active commuting to school might be less evident in countries that have a bicycle friendly culture. For example, a representative sample of Danish primary school children showed that in 1997/98 24% walked to school, 39% cycled and 25% took the car (Cooper et al., 2005).

The main limitation of this study was that we could not elucidate causal mechanisms for the observed changes in commuting to school from this data set. These trends are likely to be due to a complex combination of changes in the build environment, transportation, policies, social norms and perceptions, and changes at the family level, including car ownership rates and the number of parents that are working.

Another possible limitation of the study could have been selection bias due to differences in response rates. Since the response rates of the surveys were reasonable (66–88%) and the data were weighted to the whole population of the study area this probably only marginally influenced the results. Finally, the use of proxies and self-report measures might have introduced recall bias. However, commuting to school seems a behavior that is easily remembered especially when using a diary, hence it seems likely that recall bias was kept to a minimum.

The observed transition from active to inactive modes of transport to and from school has negative implications for both human and environmental health. Firstly, walking to and from school will add on average 20 min of physical activity to a child's day. That is one third of the time children are recommended to spend daily on physical activity to benefit their health (Department of Health and Ageing, 2004). In light of the obesity epidemic (Lobstein et al., 2004), walking to school seems a feasible opportunity to be physically active on 5 days of the week. Walking to school might be of educational value in establishing walking as a legitimate mode of transport, especially for short trips. It has been suggested that walking to school might also stimulate further physical activities (Alexander et al., 2005). However, the literature shows conflicting results here (Metcalf et al., 2004). Secondly, commuting to school should be regarded in a broader framework. The motorization of short trips has an adverse impact on health and the environment (Dora, 1999). Air pollution and climate change, decreasing petrol and gas reserves, noise, traffic congestion and parking problems near schools and traffic accidents should all be considered in the environmental and public health debate around commuting to school.

Reversing the move toward inactive transport seems difficult but necessary, and would contribute to sustainable transport systems and a healthier energy balance for children. First, environmental, family and personal barriers of active and inactive commuting to and from school need to be further identified and than adequately addressed. An interdisciplinary approach involving policy makers, transport and land use planners and public health professionals with good community engagement is needed to reduce barriers and risks, and encourage parents to let their children walk to school.

Conclusions

This study showed a steady trend toward inactive modes of transport to and from school in Australian children since the early seventies. It is argued that this has several negative implications for both children's and environmental health.

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