The incidence of injuries traveling to and from school by travel mode

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Abstract

Objective. To assess the absolute and relative risks of youth school-related travel using the New Zealand's no fault accident liability scheme and Census at School datasets.

Methods. Injury risk associated with traveling to and from school was assessed by combining census data from the Accident Compensation Commission database, New Zealand's no fault liability accident scheme database and the Census at School survey. Population injury and cost was assessed for incidents during a 2-year period (1 July 2003 to 30 June 2005) and during normal school travel hours (7.30 a.m.–9.00 a.m., 3.00 p.m.–4.30 p.m., weekdays) for youth 5–17 years of age.

Results. Overall, 7573 cases were identified as being school travel-related, representing 1.6% of total, and 11.4% school travel period injuries. Walking (30.7%), cycling (30.3%), and motor vehicles (27.7%) provided the majority of injuries. Risk of injury per million trips was highest for cycling (46.1), walking (10.3), and motor vehicle travel (6.1).

Conclusion. These data provide the first comprehensive examination of absolute risk of travel to and from school and by transport mode, showing that school-related travel is a relatively safe activity contributing to a minority of all injuries sustained by youth.
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Keywords: Transport mode; Risk; School travel; Injury; Youth

Introduction

Declines in school-related walking and cycling rates are evident in many developed countries (Cooper et al., 2005; World Health Organization, 2004), and likely contribute to the decreasing physical activity levels and increasing sedentary behaviors evident amongst youth (Brownson et al., 2005). Safety concerns are a substantial barrier for parents allowing children to engage in active school travel (Roberts et al., 1995). Yet little population data exist reporting the injury risks associated with active commuting in youth, especially when the different modes of transport are considered. The only comprehensive study to report relative risks of injury by school travel mode was commissioned by the Transportation Research Board (Committee on School Transportation Safety, National Research Council, 2002). The report combined nine datasets to produce estimates of risk during normal school travel hours. On a per mile basis, school-related cycling followed by walking showed

the highest fatality and injury rates, and bus travel the lowest. While these data were useful in providing information on absolute and relative risks for school travel, the combination of several databases to understand modal comparisons and other injuries not related to crashes (i.e., interactions with other objects) remains problematic as the findings most likely excluded more minor incidents which still resulted in injuries.

A unique opportunity exists to examine the absolute and relative risks, and costs of injuries sustained in travel to or from school via New Zealand's (NZ) no-fault monopoly accident liability scheme provided by the Accident Compensation Corporation (ACC) (www.acc.co.nz). Records of the nature, cost, time, and scene of all injuries receiving medical attention from all registered health professionals throughout NZ are stored in a national database. When combined with a recent national school census (Census at School, refer www.censusatschool.org.nz/ 2005), relative risk of the school trip by mode can be determined. Therefore, the aims of the present study are to accurately report the absolute and relative risks of youth school-related travel in NZ using the ACC and Census at School (CAS) datasets.

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Methods

Injury surveillance

ACC is a NZ government agency that provides for personal unintentional injury costs including medical treatment, rehabilitation, and ancillary services. People are not penalized or risk-rated for the amount of claims made. Claims are lodged at the initiation of medical treatment, providing injury information (scene, cause, mechanism) and demographics, and then transferred into a central database. Specific to this research, the age of the claimant and the mode of travel at the time of the injury were obtained for all injuries requiring ACC treatment. Costs per injury are available as the medical provider treating the injury charges ACC.

Census at school

NZ school students 5–17 years of age participated in an internet-administered survey, the Census at School survey (CAS) in 2005. Randomly selected (at the classroom level) students (n=32,973) from 721 schools completed the 24-point survey during class time as part of their lessons. All NZ schools have computer and Internet access. The survey provided a nationally representative dataset of school-related travel. The survey asked: 'What was the main way you traveled *to* school today?' and 'How many minutes did it take you to travel *to* school today?' Students selected their answers from predetermined responses (walk, motor, bus, train, bike, or other, and <10, 10–20, 21–30, or >30 minutes (min), respectively). Although not measured in the CAS, it was assumed that modal proportion was similar for *after* school travel, as recent research has revealed similar mode prevalence for school-related travel at these time points (Hinckson et al., 2007). The CAS was not weighted to NZ census counts, and sampling for 5–8 and 16–17 year olds was limited, therefore travel modes may not be representative.

Analysis

Injury risk by travel mode was calculated by risk per trip, risk per time traveled, and by severity (costs). Risk per trip and per million trips were estimated by combining estimates of mode prevalence from the CAS, the number of youth in the 5–17 year age group, and counting usual school days over the 2-year period. Confidence intervals (CIs) (95%) were calculated where appropriate to understand whether drawing inferences about differences in proportions were justified. Because the 95% CIs were narrow and no pair-wise comparisons overlapped, the observed real differences between estimates were almost certain. Upper and lower limit of estimates were also added around the risk per time data on trip duration. As such, the mid-point of each interval was used to estimate average duration of each trip and the width of the band to determine limit of estimates.

Results

The total population of 5–17 year olds on 30 June 2005 was 1,074,770. Over the preceding 2-year period, 638,407 injury

claims were accepted by ACC for this age group. Travel-related injuries comprised 1.6% of all injuries with a known scene, 14.4% of known mechanisms, and 2.0% of the costs associated with injury treatment. Data were examined by scene and during usual school travel hours on school days only. Travel-related injuries (road or street scene), of which the injuries varied substantially in severity including four fatalities (which were excluded from the analyses), comprised 11.4% of known claims and incurred the fifth highest cost ($NZ 1,686,354) during school travel times.

Table 1 shows data for travel-related injuries and transport mode prevalence. The dominant school travel mode was private motor vehicle. Walking, motor vehicle, and cycling accounted for the majority of injuries. Cycling was the most risky activity by trip and exposure risk. Walking was more risky than motor vehicle travel for both trip and exposure risk, and bus and train travel had the lowest risks. When costs were accounted for, the most severe injuries (highest health-care costs) were travel by motor vehicle followed by walking. Further analysis showed that a motor vehicle was involved in 40% of all school travel injuries regardless of modal choice.

Discussion

Our findings revealed that traveling to and from school present little injury risk to school-aged youth in NZ, especially when compared to other injury scenes, causes, and mechanisms for youth (Injury Prevention Research Unit, 2007; Posner et al., 2002). These results concur with previous work that demonstrated low incidence of auto-pedestrian collisions for school-related travel (Posner et al., 2002). However, modal choice does alter injury risk. Corresponding to other research (Committee on School Transportation Safety, National Research Council, 2002), cycling is the most risky travel mode followed by walking. Our results show that approximately 3.0 cycling and 2.8 walking school travel trips each day will result in an injury within NZ. Based on these similarities to previous research, we regard our findings as being generalizable to other developed countries with comparable travel behaviors. Although private motor vehicle is the most dominant travel mode for this group, it is not risk-free, representing similar risk to walking, and is less safe than public transport modes.

Table 1
Overall prevalence of actual mode, ACC claims, and exposure risk by school-related travel mode for July 2003 to June 2005 in New Zealand youth

Mode	Travel prevalence % (±95% confidence interval)	Injury frequency		Number of trips for 1 injury (±95% confidence interval)	Injuries per million trips (±95% confidence interval)	Injuries per million hours (upper–lower limit of estimates)	Average cost per claim (New Zealand $) (25th/75th percentiles)
		n	%				
Walk	26 (±0.47)	2324	31	97,007 (±456)	10.3 (±0.05)	29.0 (20.4–36.5)	502 (34/410)
Private motor vehicle	40 (±0.53)	2095	28	164,330 (±871)	6.1 (±0.03)	13.3 (9.0–16.1)	539 (33/511)
Bus	23 (±0.45)	521	7	386,670 (±1740)	2.6 (±0.01)	4.0 (2.8–5.6)	393 (33/305)
Train	1 (±0.11)	5	0.1	1,822,810 (±2005)	0.6 (±<0.00)	0.6 (0.3–0.9)	147 (33/216)
Cycling	6 (±0.26)	2293	30	21,711 (±56)	46.1 (±0.12)	194.3 (140.6–235.4)	467 (48/312)
Other	3 (±0.18)	335	4	88,805 (±160)	11.3 (±0.02)	32.1 (21.9–42.0)	389 (33/410)
Total	100	7573	10	113,537	8.8		

There are limitations to this study that should be noted. There were a large number of claims with unreported scenes (17.5%) and injuries that occurred during school travel which did not receive treatment were not recorded, and therefore not examined. Also, travel durations were reported in bands in the CAS, only travel to school was assessed in the survey, and travel mode was self-reported.

Although outside the scope of this study, there is potential to further minimize school travel injury rates by increasing walking and cycling infrastructure and enhancing safety at the school gate. These results, however, serve to advocate that active transportation, especially walking and public transportation are relatively low risk activities for youth, and should be encouraged from a policy viewpoint, as a sustainable and safe way to accumulate health-related physical activity.

Acknowledgments

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