A NATIONAL STUDY OF CANADIAN CHILDREN'S SAFETY IN VEHICLES

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Abstract

The leading cause of death of Canadian children remains vehicle crashes despite advances in technology and child seat legislation. Canada has a Road Safety Vision of having the safest roads in the world. The vision has a sub-target of 95% correct and appropriate use of the 4 stages of child restraint use; rear facing, forward facing, booster seats and seat belt use. Correct and appropriate use requires parents to have knowledge of when to use each stage and the ability to correctly install the seat in the vehicle and the child in the seat. The knowledge and ability to correctly use safety seats is paramount to increasing child passenger safety in Canada. Consequently an interprofessional team of researchers conducted a national child seat survey that examined safety seat use and driver knowledge and beliefs in 200 randomly selected intersections across Canada. Intersections were stratified according to population density of young families with children based on Census data. Teams of researchers conducted the survey in all ten provinces and one territory in collaboration with Transport Canada. Observers collected data on child seat use while teams interviewed parents and observed children in restraints in nearby parking lots. Restraint status for vehicle occupants who refused to participate in the parking lot interview was also collected. Parent knowledge and decision making regarding use of car seats was examined. Patterns of use and non-use were identified. Findings indicate significant regional differences in child seat use and a low rate of booster seat use nationally.

Résumé

Malgré les progrès technologiques et la loi exigeant l'utilisation des sièges d'auto pour enfants, la principale cause de mortalité des enfants canadiens demeurent les collisions de véhicules. Un des objectifs de Vision sécurité routière du Canada est d'avoir les routes les plus sûres au monde. Un des sous-objectifs de la Vision est que 95 % des dispositifs de retenue d'enfants soient utilisés de façon correcte et appropriée dans les quatre phases : soit le siège orienté vers l'arrière, le siège orienté vers l'avant, le siège d'appoint et la ceinture de sécurité. Pour ce faire, les parents doit savoir quand passer à chaque phase et être capable d'installer correctement le siège dans le véhicule et de placer l'enfant dans le siège. La connaissance des dispositifs de retenue d'enfants et la capacité de les utiliser correctement sont des critères primordiaux pour accroître la sécurité des enfants à bord des automobiles au Canada. Par conséquent, une équipe interprofessionnelle de chercheurs ont mené un sondage national sur les dispositifs de retenue d'enfants lors duquel ils ont examiné l'emploi des sièges d'auto pour enfants ainsi que les connaissances et les croyances des conducteurs à 200 intersections choisies au hasard partout au Canada. Les intersections ont été stratifiées en fonction de la densité de population de jeunes familles avec enfants selon les données du recensement. Des équipes de chercheurs ont mené le sondage dans les dix provinces et un territoire canadiens en collaboration avec Transports Canada. Des observateurs ont recueilli des données sur l'utilisation des sièges d'enfant, pendant que des équipes posaient des questions aux parents et observaient les enfants dans des dispositifs de retenue dans des stationnements à proximité. L'utilisation des dispositifs de retenue dans les véhicules des occupants qui ont refusé de participer aux entrevues dans les stationnements a également été notée. Les connaissances des parents et leurs décisions concernant l'utilisation des sièges d'auto ont été examinées. Les tendances d'utilisation et de non-utilisation ont été établies. Les résultats indiquent des différences considérables dans l'utilisation des dispositifs de retenue d'enfant entre les différentes régions et un faible taux d'utilisation des sièges d'appoint dans l'ensemble du pays.

LITERATURE REVIEW

Road crashes are the leading cause of death and serious injury for Canadian children under the age of 14 years [9, 14]. In Canada, approximately two children die or are seriously injured every day as a result of road crashes. Road crash injury is not limited to North America; it is a growing global health challenge that claims the lives of 3,200 people every day worldwide and is estimated to result in lifelong disability in over 50 million people annually [23]. Analysis of U.S. crash data reveals that the risk of death can be reduced by as much as 74% and serious injury reduced by as much as 67% with the correct use of child safety restraints [19, 20]. The rate of accurate use of such restraints has been reported as between 6% and 21% in American studies [20]. Correct use requires that the safety seat be appropriate for the child's height, weight, and age (for infants only); be accurately installed and positioned correctly in the vehicle; and be used every time a child is transported in the vehicle, with the child securely fastened.

Issues of Use and Misuse

The primary goal of child safety seats is to protect the central nervous system of children while traveling in vehicles [19]. Restraints in vehicles (seat belts, safety seats) are designed to limit and control the body's rate of deceleration during a crash, thus reducing the forces acting on the body's surface to minimize the differential motion between the skeleton and the internal organs [19]. Rapid deceleration of the body and the impact of the vehicle's structure on body surfaces are both associated with severe injury during collisions. Safety seats are designed to create a tight coupling of the restrained child and the crushing vehicle, and to distribute the remaining load as widely as possible over the child's strongest anatomical structures [19]. A child secured in a correctly used safety seat is 2.7 times more likely to survive a crash without serious injury than an unrestrained child [1, 19]. Injuries associated with misuse of safety seats or the premature use of seat belts for young children include laceration or rupture of abdominal organs (liver, spleen, bladder), spinal cord damage, and head injury [19]. Canadian and U.S. studies have found that most parents do not know that a seat belt offers less than optimal protection for a school-aged child [6, 13, 14, 18, 21, 22]. One study found that parents believed booster seats were unsafe because they were not anchored to the vehicle in the same way as child safety seats [15]. Other studies have found that parents prematurely transition their children to seat belts, completely unaware of the risks or believing they have made the right choice [14,15]. Anecdotal evidence suggests there may be some parents who knowingly choose not to use child seats due to their children's preference and/or due to the influence of peers. However, there is little empirical research examining this issue.

Installation of safety seats in vehicles is a complex task that poses a particular challenge for parents. A study of child seat clinics conducted throughout the province of Ontario found that four out of five safety seats were installed or used incorrectly by parents [12]. Common types of misuse include safety seat straps fastened too loosely to the vehicle, incorrect use of tether straps, incorrect use of locking clips or latches, harness straps fastened too loosely over the child, and straps incorrectly positioned over the child [10,11]. Product manuals may also contribute to misuse, as their presentation and vocabulary often exceed parents' comprehension levels [2, 5, 7, 20]. A recent U.S. study of 107 manuals from 11 different manufacturers found that a grade 10 reading level was required, on average, to fully comprehend the instructions [20].

Non-use is another significant issue for child safety in vehicles. Between 1998 and 2002 there

were 402 child fatalities in vehicles in Canada. In the majority of these cases (66% for infants, 50% for toddlers, 97% for school-aged children), the child was either unrestrained or fastened in a seat belt [4]. Non-use of safety seats or seat belts for children is estimated at 13% in Canada and 11.8% in the United States [4]. In one U.S. study, the rationale used by parents for choosing not to use a child safety seat included the child's fussiness and discomfort, the inconvenience of using the device, and needing the device for a younger child [5].

Canada has a Road Safety Vision of having the safest roads in the world. The vision has a sub-target of 95% correct and appropriate use of the 4 stages of child restraint use; rear facing, forward facing, booster seats and seat belt use. Correct and appropriate use requires parents to have knowledge of when to use each stage and the ability to correctly install the seat in the vehicle and the child in the seat. The knowledge and ability are paramount to increasing child passenger safety in Canada. In order to evaluate the progress of the legislative and policy framework of the national Road Safety Vision strategy, a national survey of child occupant safety was developed and implemented in the summer of 2006. Previous national surveys (1997) [18] were limited to intersection observation methods across Canada. This approach was augmented to include a systematic roadside observation to include a detailed observation and interviews of Canadian drivers with child occupants in the nearby parking lot to the designated intersection. The purpose of this national survey was to document child occupant safety restraint use; b) describe driver use of safety restraints; c) driver knowledge of safety system use for children; and d) detailed inspection of children's use of safety restraints relative to their height and weight.

METHODOLODY

1. Design

A survey design utilizing both observational and interview data collection methods was conducted in randomly selected sites across Canada. A survey using a "drive by" observation of child and driver restraint status was conducted at 187 randomly selected intersections. Second, vehicles that entered the nearest retail parking lot to the intersection being observed were approached to participate in a detailed inspection and interviews to document child restraint use in vehicles and driver knowledge and awareness of child occupant safety in vehicles.

1.1 Sampling Design

The sampling strategy was based on the sampling design for the National Seat Belt Survey in 2001 [3]. However, the sampling design for this survey used the population density of children rather than the density of the total population of Canada. The stages of sampling included the random selection of the following: 200 intersections across Canada, days of the week, and time of day data collection would be completed. The most recent data available for the population of children was based on 2004 census data. The survey frame included drivers and all child occupants in private,light duty vehicles including automobiles, minivans, pick-up trucks and sport utility vehicles with Canadian license plates traveling on Canadian roads during the months of May through October of 2006.

The child restraint survey, unlike the National Seat Belt Survey, was stratified only by Province and Region in order to keep the number of sites under 200. The number of sites was identified

based on the representativeness to the general population and limited by the budget for the study. Only urban census subdivisions (CSD's) were used for the intersection sampling due to the relatively low volume of traffic on rural roads and the difficulty in reaching some of the more remote settings. Intersections were sampled from Transport Canada's Canadian Highway Information System which is a GIS database that contains all road segments in the country. To ensure sufficient traffic volume and safety of data collection teams, only intersections which had a controlled stop (using stop sign or traffic lights) and only intersections with the highest traffic volumes were included in the survey. The distribution of intersections among the strata mimic the distribution of the population in each strata.

There are six urban [3] population strata which were used for this survey. The largest [3] population strata was referred to as U1 which included all metropolitan areas having a population of over 500,000, the smallest [3] population strata was U6 which included populations of 10,000 to 50,000 people. The intersections were randomly selected from these six [3] population strata. The survey frame included CSDs in strata U1-U6 only and such that their overall population density be greater than 5 and that the children density be also greater than 5.

The first sampling stage selected intersection sites with equal probability from each stratum in two replicates. Strata with larger [3] children populations had more sites so that for each [3] children population of 75,000 two additional sites were drawn. A systematic sampling scheme for the list of controlled intersections, ordered by longitude and latitude, was used for the larger strata to ensure the entire geographical area of the strata was covered in the sample. This sampling strategy was used to avoid the possibility of selecting intersections all in the same area of the stratum which is a potential outcome of simple random sampling.

The second stage of the sampling selected day of the week, and time of day the intersections would be observed. The day of the week was selected to avoid scheduling conflicts in the survey process. However, due to the requirement to have consent from the nearest retail parking lots to conduct the detailed inspections and interviews, the days of the week identified as preferred by the retail store manager were substituted for the randomly identified day of the week. Wherever possible, the selected day of the week was the day data collection was completed. The time of day was selected from available daylight hours according to the distribution of trip starting times taken from the Canadian Vehicle Safety (CVS) data. This approach was designed to ensure that more observations were taken at peak traffic times. The survey was commenced in May and was completed in October. During pilot testing it was identified by the teams that days of the week selected that were also school days and the times that were during school hours proved very problematic given that few if any vehicles with child occupants were observed. Thus, during the school months of May, June, September, and October, the times of the day used for data collection ranged from 2pm to 6pm to ensure that child occupants in vehicles could be observed.

1.2 Pre-assessment of Intersection Suitability

Once the intersections were identified in the sampling procedure, each was assessed for feasibility and suitability for the data collection process. A suitable roadside site was considered to be one with an intersection controlled by traffic lights from which the traffic moved from the intersection past the designated parking lot. The observer was also able to safely stand to monitor and document findings on the 'roadside data collection form' with adequate time to complete the data collection forms, while vehicles were stopped at the intersection. The traffic volume was measured by counting the number of vehicles with child passengers passing

through the intersection over a 2 hour period. There were 13 intersections dropped from the study, based on the following rationale:

1. Random site duplication – location of two intersections were so close to each other it was felt to result in sampling the same population twice (2 sites)

2. Isolated sites in what appeared to be very rural settings which had such low traffic volumes that it was considered not cost effective to mobilize a survey team to the area. For example, one intersection was located on a road used strictly by garbage trucks going to a landfill site. After assessment over the sampled 2 hour timeframe, not one private vehicle has been observed at the intersection. These two sites were relocated to the nearest retail parking lot to the intersection sampled (2 sites)

3. Site did not meet the safety requirements to allow for safe and effective observation of vehicles. For example, one of these sites was on a divided highway with no traffic lights and vehicles traveled in excess of 80 km/hr through the selected intersection (2 sites).

Once the intersections were assessed for the necessary criteria, the nearest retail parking lot was selected and assessed based on the following criteria. First, retail store managers were approached to seek permission to conduct the study in their parking lot at the scheduled time and day. The retail manager rate of refusal varied widely and the process of obtaining parking lot permission required significant time. In the case where permission to conduct the parking lot component of the survey could not be obtained from a retailer, only the roadside observation data was collected for the specific site.

For every retail parking lot site, sites required evidence of insurance from the University of Windsor where the lead researcher for the survey data collection held faculty status. Once permission from the retailer was obtained and insurance coverage for the data collection team was arranged, the parking lot site was assessed for the following attributes: an appropriate parking lot (walking distance from the intersection) that consisted of an entrance which was observed without difficulty, a sidewalk area protected from traffic so that a team member could safely approach vehicles to seek consent for participation in the survey. It was imperative that the traffic flow into the parking lot was not negatively affected by the survey. Sites were observed for adequate space available to set up three observation stations which needed at least two parking spaces wide and two parking spaces deep for the safety of both the vehicle occupants and the data collection team members. The minimum volume of traffic with child passengers entering the parking lot required was a minimum of 50 vehicles over a 2 hour period. The parking lot site was also required to be located within walking distance of a child restraint vendor so families with inadequate child seat restraints could be directed on where to purchase the correct seat. This direction was provided to families who asked for information on child seats and/or families whose child was so unsafe (unrestrained) in the vehicle that it was felt too high risk for the child to continue traveling without direction on keeping the child safe. The parking lot sample included all drivers who were able to speak English and who had child passengers between the ages of 0 to 14 years.

2. Data Collection Procedure

The observational study yielded three separate samples (a parking lot sample, a roadside sample, non participant sample). At the roadside two observers stood at a safe location (i.e., grass, median, sidewalk) close to the selected intersection. One observer waited for each vehicle to come to a stop and observed the restraint status of each of the occupants as well as

the approximate age of the children in the vehicle. The observer began completing the roadside site observation form for the 2nd vehicle stopped at a red light. Once the data was recorded and if time permitted the observers proceeded to the next vehicle). The observations continued until the light changed to green. The observer resumed data collection at the next red light cycle and continued through out the 3 hours of surveying. The second observer counted the number of vehicles in total passing through the intersection in order to examine traffic volume for each selected site. When the weather changed to the point where observations were no longer possible (i.e. rain, extreme cold, or high winds), the survey was immediately concluded and rescheduled for another day. This was required on only four occasions.

The Parking Lot Survey was conducted at the entrance to the parking lot by one team member (referred to as the vehicle interceptor). The vehicle interceptor greeted all vehicles with child passengers (14 years and under) entering the parking lot and asked whether they would be willing to participate in the parking lot survey. While seeking the driver's willingness to participate the interceptor also observed the number of child occupants and their restraint status. The interceptor position introduced him/herself to the driver and explained the purpose of the study, invited the driver to participate and for those drivers who agreed, then directed them to the observation area. If the driver declined to be apart of the survey, the observer completed the non-participant survey form for the vehicle to identify gender of driver, belted status of driver, number /type/ restraint status of occupants. This data was collected by the interceptor only for those drivers who declined to participate in the parking lot survey to ensure there would be no duplication of data entry on child occupant status.

The Parking Lot Survey was a detailed inspection of child seat restraint use and included a brief interview with the driver. Following the pilot testing of the survey protocol it was determined that a two member team could move through the parking lot data collection rapidly to minimize the time required of the driver to complete the data collection. One of the team members greeted the driver in the observation station and obtained written consent for participation and ensure a copy of the consent was given to the driver. The second member took down the first ten digits of the vehicle identification number (VIN) and recorded the seating position and restraint use of each of the child occupants 14 years of age or under. Height and weight measurements were completed for each child occupant who was willing to participate in this component of the survey. Parents were asked to remove the child from the vehicle and observe while the height and weight was measured. The data collection time to complete all the entries varied between 10 and 20 minutes depending on how many occupants were in the vehicle and how many questions parents asked observers. All data was recorded on a paper copy of the observation survey instrument. When the survey was completed the team provided a sticker for each child who had participated and the driver was provided with Transport Canada Child Safety handouts that corresponded to the car seat their child was using or should have been in. In all cases the data was obtained from the driver or adult occupant. The survey was administered by a survey team of 8 pre-trained university students / adults.

Through teleconference, video taping, PowerPoint presentations, and email communication team leaders and their data collection team members received 4 hours of paid education and training prior to commencing the survey. Telephone communication was maintained between team leaders and the principal investigator throughout the data collection phase of the study. All decisions regarding changes or unexpected events that occurred during data collection were made by the principal investigator to ensure consistency for everyone of the data collection sites.

3. Instrument

The instruments used for the national child seat survey were very similar to previous survey instruments used in the 1997 survey. The roadside intersection observation survey tool was used in the same format it had been developed for previous surveys. The instrument developed specifically for the parking lot survey was developed in collaboration with Transport Canada and the lead investigators. The format and content of the survey tool closely resembled a child seat inspection form used in child seat clinics. In addition, the demographic data that describes the seating position and the age, height and weight of each child occupant had been used for previous National Surveys by Transport Canada. The interview instrument is a subset of questions for the Survey instrument used in the Intervention Study recently conducted by Dr. Anne W. Snowdon at the University of Windsor. The interview questions focused on drivers' knowledge and awareness of when to transition children into the next child seat, a booster seat and a seat belt. Drivers also reported on their patterns of where children typically sit in the vehicle. The combination of both observation and interview strategies will provide data on exactly how families are using safety seats for children across Canada, and what knowledge they have of accurate use of safety systems for children travelling in vehicles. The combination of observation of use/misuse and examination of parent knowledge will provide data linking knowledge and use of safety systems, for the first time in Canada, at a National level. This study will examine the following questions: a) What are the patterns and rates of use and misuse of safety seats for child occupants travelling in vehicles in Canada? b) What are drivers' knowledge and perceptions of correct use of safety systems for children travelling in vehicles across Canada?

RESULTS

Road Safety Vision 2010 has a minimum target of seat belt use rates of 95% and "proper" use of child restraints by motor vehicle occupants (National Occupant Restraint Program, 2010). In this study, a total of 2432 child occupants were observed in vehicles in 187 sites across Canada. The highest number of children (30%) was observed in Ontario which had the most number of sites surveyed. There were fewer but consistent distribution of children observed in BC, Alberta, New Brunswick, and Nova Scotia which contributed approximately 10-12% each of the sample.

The national mean and median ages for children in the sample were, respectively, 73.2 and 67 months (6 and 5 ½ years). Age distributions were roughly similar in all provinces and have approximately the same median as the national median (Figure 1). The middle bar represents the median age in months in each province, the exception was PEI which has slightly higher median age.

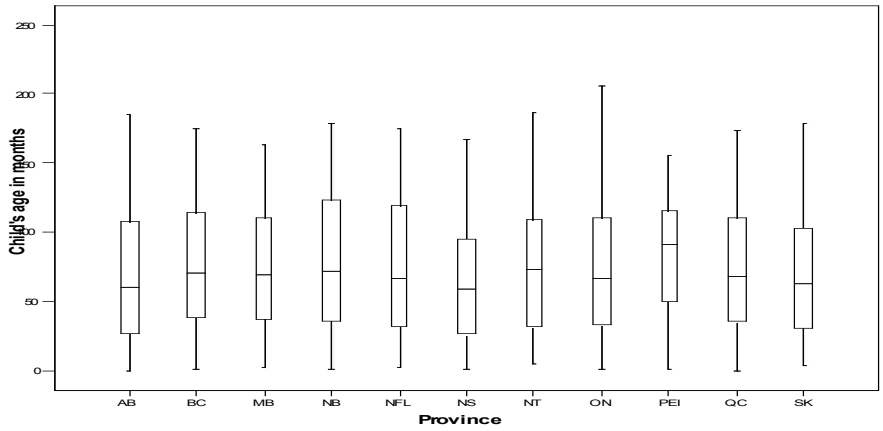

Figure 1 - Median age (months) of Child Occupants by province

For 90% of the child occupants in the study (n=2082) the drivers were either parents or foster parents, 6% (n=128) of drivers were grandparents.

Table 1 - Child – Driver relationship

Relationship	Frequency	Percent
Parent / Foster	2082	90.4
Grandparent	128	5.6
Other family	47	2.0
Other	47	2.0
Total	2304	100.0

Seat Belt Use

One of the primary targets of Road Safety Vision 2010 is 95% rate of seat belt use of all adult occupants. Seat belt use of the driver was observed in this study in both the roadside observation whereby drivers were observed as they passed the intersection. Second, driver's seat belt status was also recorded in both the parking lot survey and the non-participant forms for vehicles entering the parking lots near to the intersections being studied. The rates of seat belt use varied slightly. The roadside observation indicated a 91.5% (n=9057) rate of seat belt use with 4.7% (n=465) of drivers not clearly observed, likely due to darkened windows in vehicles. Drivers who were observed to be unrestrained were 3.8% (n=376). In the parking lot survey, seat belt use rates were higher, 98.1% (n=1622) of drivers were using seatbelts.

Proper Use of Safety Seats for Children

The target of proper use of safety seats for children in the Road Safety Vision 2010 was examined relative to child's location in the vehicle, and appropriate child seat based on the child's age and weight. The majority of child occupants in this study were seated in rear seats in vehicles (Table 2). In addition, 88.5% (n=11943) of children were observed to be in a restraint

system of some type, whereas in the parking lot observation, many more children (99.1% n=2432) were restrained and only 21 children (.9%) were unrestrained.

Table 2 - Location of Child seated in vehicles at roadside observation

Location of Child	Frequency	Percent
Front	2560	22.9
Back	8635	77.1
Total	11195	100.0

The rates of appropriate use of child seats were examined based on the guidelines on the Transport Canada website, "Car Time 1-2-3". These guidelines suggest that children under one year of age are safer in rear facing seats and children that are at least 40 lbs. are safe in a booster seat rather than a seat belt. Table 3 identifies the child seats observed at the roadside intersections. Infants were observed in correct safety seats in only 63.3% of cases, for toddlers correct use was observed more often at 67.3%. The proper use of restraints for school aged children was very low at only 28.0% (assumes forward facing seats for this age group were correct). However, the rate of seat belt use for older children exceeded the road safety vision 2010 target at 98.9%. These rates of correct use are based on assumptions of minimum weight requirements for children based on age which may limit the accuracy of the correct use rates. More detailed analyses of height and weight observations relative to correct use will be available in future publications.

Table 3 - Child Seat Use by Age (Roadside Observation)

	Rear-facing infant seat	Forward-facing infant seat	Booster seat	Seat belt only
Infant (< 1 year) n=926	586* (63.3%)	339 (36.6)	1 (0.1%)	0 (0.0%)
Toddler (1-3 years) n=3101	33 (1.1%)	2087(67.3%)*	546 (17.6%)	435 (14.0%)
School (4-8) n=4873	1 (0.0%)	275 (5.7%)*	1088* (22.3%)	3509 (72.0%)
Older (9-14) n=2776	0 (0.0%)	11(0.4%)	19 (0.7%)	2746* (98.9%)

* indicates correct use based on Transport Canada Car Time 1-2-3

The parking lot data (Table 4) revealed a more encouraging rate of correct use of safety seats for child occupants which may suggest that parents who agree to participate in child seat surveys are more aware of the importance of child seats for their children. Infant use of rear facing seats was 77.4% in the parking lot survey, the use of forward facing seats for toddlers was also higher at 74.0% and the rate of booster seat use in school aged children was 51.3%. Parents who agreed to participate in the parking lot survey were likely a sub-population of Canadian families which may represent the "best case scenario". Even in this population there remains significant misuse of child seats with 36.8% of school aged children using seat belts and over 22% of infants using forward facing seats before the age of 12 months.

Table 4 - Child Seat Use by Age (Parking Lot Observation)

	Rear-facing infant seat	Forward-facing infant seat	Booster seat	Seat belt only
Infant (< 1 year) n=234	181(77.4%)*	52(22.2%)	1(.4%)	0 (0.0%)
Toddler (1-3 yrs) n=649	49(7.6%)*	480(74.0%)*	117(18.0%)	3(.5%)
School (4-8) n=874	6(.7%)	98(11.2%)*	448(51.3%)*	322(36.8)
Older (9-14) n=638	0	1(.2%)	16(2.5)	621(97.3%)*

***** indicates correct use based on Transport Canada Car Time 1-2-3

Overall Correct Use Rates

When all the age groups were aggregated and rates of correct use calculated , the overall rate of correct or appropriate use of child safety restraints for the roadside sample was 58.4% (n=6815) of the total sample of 11676 child occupants observed. For infants, correct use was 63.3%, for toddlers (1-3 yrs) correct use was 68.4%, and for school aged children, aged 4 to 8 yrs., only 28.0% of children were correctly seated in booster seats.

The Parking lot sample demonstrated much higher rates of correct use. The overall rate of correct use in this sample was 78.4% (n=1877) out of the total 2395 child occupants, which may represent a sector of the population who are not only aware of child seat safety in vehicles but who seek out opportunities to learn more about their child's safety through participation in safety research. Infants were correctly seated in 77.4% of survey cases. Toddlers were correctly seated most often at 81.6%, and school aged children were correctly seated least often at 62.5%. The older children (9 years and older) were seated correctly 97.3% of the time. Thus, for families who seek out safety seat learning opportunities, their use of safety seats for their children is substantially higher than the general population traveling through intersections, however their rates of correct seat use remain far below the target of 95% for Road Safety Vision 2010.

DISCUSSION

This national survey of drivers and child occupants documents the status of safety restraint for children and drivers traveling in vehicles in Canada. The rate of seat belt use is approaching the Road Safety Vision 2010 target of 95%, the rate of older children (9 years and over) exceeds this target at 98.6% for the roadside observation. The children at highest risk for injury and death in vehicle collisions remains the school aged child (aged 4 to 8 years) who were found to be using booster seats in only 28% of vehicles observed at intersections. Despite Ontario and Quebec having booster seat legislation there remains much more work to be done in Canada to ensure school aged children (4 to 8 yrs.) are safely seated in booster seats. In addition, there continues to be a consistent rate of children (11.5%) who are using no restraints of any kind in vehicles and 22.9% of children who continue to sit in the front seat. Non-use and front seat use both need to be specifically targeted in road safety education and awareness campaigns. Legislation in combination with a national education and awareness strategy may support families to ensure their school aged children are adequately protected in a booster seat while traveling in vehicles. Education programs that teach families about the importance of child seat use in vehicles have demonstrated increases in parent knowledge and use of safety systems [8, 16, 17]. Further, testing and development of intervention programs at the national level to support children's safety in vehicles is urgently needed in order to meet the Road Safety Vision 2010 of having the safest roads in the world. A national education and awareness strategy that provides families with a consistent source of information that is supported and implemented across sectors, including the health, education and policymakers in government agencies may offer a comprehensive and achievable strategy to reach the goals of the Road Safety Vision 2010.

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