

Résumé

La connaissance parentale des harnais d'auto pour enfants et de leur utilisation

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Les traumatismes liés aux accidents de route constituent au Canada la principale cause de décès et de blessures chez les enfants de moins de 14 ans, malgré l'imposition de l'utilisation de dispositifs de retenue dans les véhicules. Un sondage a été mené pour examiner le taux de connaissances et les perceptions de la population parentale quant à l'utilisation de harnais d'auto pour enfants dans deux communautés de la province d'Ontario. Des parents de poupons et d'enfants âgés jusqu'à 9 ans ont été recrutés dans trois commissions scolaires urbaines et rurales, dans des garderies et dans des hôpitaux. Un total de 1 263 parents ont donné de l'information sur l'utilisation de harnais d'auto pour 2 199 enfants. L'analyse des données a révélé que seulement 68 % des enfants étaient assis dans des sièges appropriés à leur poids. Notamment, au fur et à mesure que l'enfant grandissait, le taux de non-utilisation de siège sécuritaire augmentait de façon importante en raison d'un taux de transition précoce vers des sièges inadéquats pour la grandeur et le poids de l'enfant. Les résultats ont également révélé que les parents avaient des connaissances limitées concernant l'utilisation adéquate des sièges de sécurité pour enfant et qu'ils recourraient fréquemment à des sources d'information non professionnelles pour obtenir des renseignements sur la sécurité dans un véhicule. Les auteures recommandent au personnel infirmier de développer une stratégie globale et systématique visant à faire comprendre aux familles les façons d'asseoir correctement un enfant dans un véhicule en utilisant un siège de sécurité approprié à la grandeur, le poids et l'âge de l'enfant.

Parents' Knowledge about and Use of Child Safety Systems

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Road crashes are the leading cause of death and injury in children under 14 years of age in Canada, despite mandatory use of vehicle restraints. A survey design was used to examine parental knowledge and perceptions of the use of safety systems for children in 2 communities in the province of Ontario. Parents of children aged newborn to 9 years were recruited from 3 urban/rural school boards and from daycare centres and hospitals. A total of 1,263 parents reported on 2,199 children's use of safety systems. Data analysis revealed that only 68% of children used correct seats for their weight and that as the child advanced in age the rate of misuse increased significantly due to high rates of premature transitioning into safety seats inappropriate for the child's height and weight. The results also revealed that parents had limited knowledge concerning the correct use of safety seats and frequently used non-professional sources of information for vehicle safety information. The authors recommend that nurses develop a comprehensive and systematic strategy to ensure that families understand how to secure children in vehicles using the correct safety seat for the child's height, weight, and age.

Keywords: child safety, education program, intervention, car seat safety

Literature Review

Road crashes are the leading cause of death and serious injury for Canadian children under the age of 14 years (Howard, Snowdon, & McArthur, 2004; Safe Kids Canada, 2004). In Canada, approximately two children die or are seriously injured every day as a result of road crashes. In the United States, six children die and 673 are seriously injured every day due to road crashes (National Highway Traffic Safety Administration, 2004). 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 life-long disability in over 50 million people annually (World Health Organization, 2004). Analysis of US crash data reveals that the risk of death can be reduced by as much as 74% and serious injury by as much as 67% with the correct use of child safety restraints (Weber, 2000; Wegner & Girasek, 2003). The rate of accurate use of such restraints has been reported as between 6% and 21% in American studies (Wegner &

Girasek). Correct use requires that the safety seat be appropriate for the child's height, weight, and age; be accurately installed and positioned in the vehicle; and be used every time a child is transported in the vehicle, with the child securely fastened into it.

Issues of Use and Misuse

The primary goal of child safety seats is to protect the central nervous system of children while travelling in vehicles (Weber, 2000). 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 (Weber). 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 (Weber). 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 (Berg, Cook, Vernon, & Dean., 2000; Weber). Injuries associated with misuse of safety seats or premature use of seat belts in young children include laceration or rupture of abdominal organs (liver, spleen, bladder), spinal cord damage, and head injury (Weber).

One of the most common types of misuse is premature transition from child safety seats to seat belts, which often results in disabling or fatal injury (Berg et al., 2000). A US study found that children between 2 and 5 years of age who used seat belts were 3.5 times more likely to sustain significant injuries than children who used safety seats, and 4 times more likely to sustain significant head and abdominal injuries (Winston, Durbin, Kallan, & Moll, 2000). In Canada, fewer than 28% of children aged 4 to 9 years use booster seats (Safe Kids Canada, 2004; Transport Canada, 1997); thus it is estimated that 1.8 million children in Canada are at risk of serious injury due to the prevalence of premature seat belt use.

Installation of safety seats in vehicles is a complex task that poses a particular challenge for parents. A study of car-seat clinics conducted throughout the province of Ontario found that four out of five safety seats were installed or used incorrectly by parents (Ministry of Transportation of Ontario, 2005). 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 (Kohn, Chausmer, & Flood, 2000; Lane, Liu, & Newlin, 2002).

Product manuals may also contribute to misuse, as their presentation and vocabulary often exceed parents' comprehension levels (Block, Hanson, & Keane, 1998; Decina & Knoebel, 1997; Gaines, Layne, & DeForest, 1996; Wegner & Girasek, 2003). A recent US study of 107 manuals from 11 different manufacturers found that a grade 10 reading level was required, on average, to fully comprehend the instructions (Wegner & Girasek).

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 (Chouinard & Hurley, 2005). Non-use of safety seats or seat belts for children is estimated at 13% in Canada and 11.8% in the United States (Chouinard & Hurley). In one US 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 (Decina & Knoebel, 1997).

Growth and Development

Rapid patterns of child growth and development also pose a challenge to parents and caregivers with regard to accurate and effective use of safety devices. Because of changes in children's height, weight, and cognitive development, parents must learn to instal and use a series of different devices. For example, infants quadruple their weight in the first 2 years of life and then gain steadily at the rate of four to six pounds per year until adolescence (Wong, 1999). Given the number and variety of safety seats on the market, parents may have difficulty deciding when to use which type of safety seat for each stage in their child's growth and development.

The risks associated with premature transition to seat belts in young children are well documented (Safe Kids Canada, 2004; Winston et al., 2000). Canadian and US studies have found that most parents do not know that a seat belt offers less than optimal protection for a school-aged child (Rivara et al., 2001; Safe Kids Canada). 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 (Simpson, Wren, Chalmers, & Stephenson, 2003). 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 (Safe Kids Canada; Simpson et al., 2003).

Parents' knowledge and perceptions about safety seat use are not well documented in Canada. In order to develop intervention programs for

Canadian families to improve their children's safety in vehicles, we need greater insight into what parents know about vehicle safety systems and how they use them. The purpose of this study was to examine parents' knowledge about and use of safety systems for their children. The research questions were: *What are the patterns of safety seat use for children (aged 0 to 12 years)? How does knowledge influence parents' decisions to use safety seats for their children? What sources of information do parents access regarding vehicle safety for children?*

Theoretical Context

The revised Health Promotion Model (HPM) was the theoretical basis for the study (Pender, Murtaugh, & Parsons, 2002). Although this model offers a theoretical context, it does not account for the unique way in which parents interact with and on behalf of their children to achieve health. One assumption of this study was that the choice of a vehicle restraint for a child requires the dynamic and active involvement of an adult, which in turn is influenced by multiple factors. The revised HPM framework identifies a link between individual characteristics and experiences that affect one's behaviour-specific cognition and lead to a behavioural outcome, described as a health-promoting behaviour. In this study, the health-promoting behaviour of interest was parents' use of safety seats for their children.

Method

Design

Survey methodology was used to examine parents' knowledge about and use of safety seats for their children. This was the first phase in a program of research to develop intervention strategies to support children's safety while travelling in vehicles. This survey phase was intended to provide evidence to support the development of intervention programs that promote children's safety in vehicles.

Sample

The study was conducted in a large urban area in Southwestern Ontario and in a smaller urban and rural area in Northern Ontario. Ethics approval was obtained from the University of Windsor Research Ethics Review Board, Nipissing University Ethics Board in North Bay, and the ethics boards of three participating community hospitals. Permission to access schoolchildren was granted by the directors of the school board once ethics approval had been obtained from the universities.

In Southwestern Ontario, families of children aged 0 to 9 years were accessed from an entire school board and its daycare programs (surveys placed in children's backpacks for Junior Kindergarten [JK] to grade 5)

and from the obstetrical and pediatric units of two local hospitals. In Northern Ontario, two school boards (JK to grade 5) and the obstetrical unit of the local hospital were accessed using the same sampling strategy. In school settings, surveys and completed consent forms were returned to the researchers in self-addressed stamped envelopes or were collected in classrooms. In hospital settings, research assistants approached parents to obtain consent and then administered the survey to the parent, to increase the rate of response and to ease the burden of survey completion. In total, 10,600 surveys were circulated; 1,263 were returned, reporting on 2,199 children, which represents a response rate of 11.9%. The demographics of the sample are described in Table 1.

This convenience sample is not representative of families in Ontario since 90% were married (Ontario families = 75.2% married), 73.8% were educated at the postsecondary level (Ontario = 54.9% educated at this level), and 85.5% identified as Caucasian (Ontario visible minority population = 19.0%) (Statistics Canada, 2001).

Instrument

The survey was designed to examine parents' use of child restraint systems (safety seats or seat belts), parents' knowledge and decision-making relative to safety seat use, and parents' sources of information on safety seats. The questions were developed based on instruments used in car-seat clinics and on previous research identifying common patterns of use and misuse. The questions were grouped according to type of safety seat commonly used (rear-facing, forward-facing, booster, seat belt); use of the seat, installation of the seat, and location of the seat in the vehicle; and age, height, and weight of the child using the seat (the questions were designed to elicit responses for up to three children in a family). In this study, "correct use" was based on best practice guidelines (Safe Kids Canada, 2004), defined as correct seat for the height and weight of the child (i.e., rear-facing infant seat = < 12 months and < 20 lbs.; forward-facing seat [preschool] = 20–39 lbs.; booster seat = 40–79 lbs.; seat belt = > 80 lbs.), correct location of seat in the vehicle, and correct fit of the child in the seat. Patterns of use of safety seats for up to three children were examined relative to parents' decision-making on choice of safety seat and on transitioning the child to the next seat for his or her height and weight. The questions employed a variety of strategies to elicit clear and accurate information. Parents were asked to rate the importance of their decision-making rationale on a five-point Likert scale. Pictures of various styles of safety seat were included so that parents could readily identify and more accurately report the seats they were currently using. Short-answer and fill-in-the-blank questions were used so that parents could add more description to the data.

Table 1 Demographics of Sample

Variable	S.W. Ontario % (N)	N. Ontario % (N)
Age (years)		
< 18	.3 (6)	1 (4)
18–25	5.3 (93)	11 (46)
26–30	19.2 (340)	17.2 (72)
31–35	39.9 (707)	32.2 (135)
36–40	26.6 (471)	25.8 (108)
41–45	6.9 (123)	9.8 (41)
> 45	1.8 (31)	3.1 (13)
Sex		
Female	90.5 (1,518)	87.5 (357)
Male	9.5 (159)	12.5 (51)
Marital Status		
Married/common-law	87.8 (1,556)	75.4 (316)
Race		
Caucasian	86.2 (1,495)	82.8 (342)
Native Canadian	5.7 (99)	13.1 (54)
Other	8.1 (141)	4.1 (17)
Region		
Urban	72.8 (1,163)	65.5 (260)
Rural	27.2 (434)	34.5 (137)
Education		
High school	25.6 (450)	28.9 (121)
College	33.6 (592)	43.2 (181)
University	29.4 (518)	21.5 (90)
Postgraduate	11.4 (200)	6.4 (27)
Income		
< \$25,000	7.8 (129)	21.3 (87)
\$25,000–35,000	11.7 (194)	22.7 (93)
\$36,000–45,000	11.8 (195)	14.7 (60)
\$46,000–60,000	18 (298)	16.9 (69)
\$61,000–80,000	21.8 (361)	12.2 (50)
> \$80,000	28.9 (479)	12.2 (50)
Mean years of driving experience	16.57	15.93

Content validity was supported in a series of pilot tests of the instrument. Initially, the survey was administered to 120 undergraduate nursing students. They were asked to identify questions that were difficult to answer or to understand, and unclear or redundant questions were then deleted. The survey was next administered to a different class of 100 undergraduate nursing students. On the basis of the second pilot test, the survey was administered to a group of 25 parents of children under 9 years of age in the community who had been identified by the research team. The number of questions in the survey ranged from 56 to 65, depending on the number of children for which each participant responded.

Data were entered into the SPSS statistical program and the initial phases of the analysis focused on descriptive statistics to indicate the demographic characteristics of the sample. The two communities were compared using *t* tests and chi square to examine differences in demographics (income, education, age) and correct use of safety systems. There were no significant differences between the two samples for correct use of safety systems. However, when the samples were compared according to age group and correct use, significant differences were found (Table 2). In addition, there were no significant differences in the two samples with regard to the parents' ages ($t = 0.354$, $df = 562$, $\alpha = .723$) or years of driving experience ($t = 1.775$, $df = 546$, $\alpha = 0.076$) but there were significant differences in education levels ($\chi^2 = 36.313$, $df = 4$, $\alpha < 0.001$) and income levels ($\chi^2 = 138.943$, $df = 5$, $\alpha < 0.001$). Over half of the parents in Northern Ontario (58.7%) reported a family income of *under* \$45,000, but well over half of the parents (68.7%) in Southwestern Ontario reported a family income of *over* \$45,000. Education levels differed less: 31.9% of parents in Northern Ontario were university-educated, compared to 40.8% in Southwestern Ontario.

Results

The data provide a wide range of insights into parents' knowledge about and use of child safety seats.

Correct Use of Safety Seats

Overall, 74.3% ($n = 1,586$) of children in the study were seated in the correct safety seat for their height and weight and their age. The rate of correct use varied with the age of the child and the geographic location of the family (Table 3). Infants in Northern Ontario were correctly seated (87.5%, $n = 56$) much more often than those in Southwestern Ontario (76.1%, $n = 175$). Preschool children (20–39 lbs.) were correctly seated more often in Southwestern (76.7%) than in Northern Ontario

Table 2 Chi-Square Results for Correct Use of Safety Seats

Seat	S.W. Ontario		N. Ontario		Chi-Square	Degrees of Freedom	Significance
	Correct	Incorrect	Correct	Incorrect			
Rear-facing	231	0	4	61	273.05	1	< 0.001*
Forward-facing	699	166	0	177	434.51	1	< 0.001*
Booster seat	502	119	0	156	356.3	1	< 0.001*
Seat belts only	50	0	15	1	3.173	1	0.242

* Significant at 0.0.

Table 3 Correct Use of Safety Seats

	Rear-Facing		Forward-Facing		Booster	Seat Belt Only	Correct Use (%)	
	S.W. Ont.	N. Ont.	S.W. Ont.	N. Ont.	S.W. Ont.	N. Ont.	S.W. Ont.	N. Ont.
Infants ≤12 months								
0–20 lbs	169	54	19	1	0	0	0	89
21–39 lbs	6	2	35	7	1	0	0	14
Infants ≥13 months								
0–20 lbs	0	1	5	2	0	0	0	67
Toddlers x = 3 years	0	1	543	92	150	42	1	78
21–39 lbs	0	0	52	8	492	118	177	53
School-aged x = 6 years	0	0						
40–79 lbs	0	0						
School-aged x = 8 yrs	0	0	0	0	2	2	60	18
80+ lbs	0	0	0	0	2	2	100	100

* Correct use appears in bold italics.

(66.2%). In the school-aged population, use of booster seats was 70.1% in Southwestern and 66.7% in Northern Ontario. Thus, the Northern community had a very high rate of correct use for infants but a lower rate of correct use in all of the other age groups with the exception of the children over 80 pounds using seat belts.

Transition of Children in Safety Seats

Parents were asked the age at which they transitioned their child to the current safety seat and the factors on which they based this decision. Figure 1 illustrates the rate at which parents transitioned their infant from a rear-facing to a forward-facing seat. Premature transition of infants began at 4 months, and by 9 to 12 months the majority of infants (78%) were in a forward-facing seat. Parents identified the child's "fit" in the safety seat and the child's weight as the most important factors in the decision to transition to a forward-facing seat; age was not a factor in the decision.

The second clearly apparent transition was that from a safety seat to a seat belt. Figure 2 illustrates parents' timing of this transition. Families reported using seat belts when their children were as young as 3 years, after which age the use of seat belts increased rapidly, with half of all children in the study using seat belts by the age of 7. Correct use of seat belts requires that the occupant be at least 80 pounds and 57 inches tall (Safe Kids Canada, 2004). Although age is not the main criterion, most booster seat laws in Ontario and Quebec identify 8 years as the minimum age for seat belts (Safe Kids Canada).

Figure 1 Use of Rear-Facing Safety Seats in Infants Up to 12 Months (n = 296)

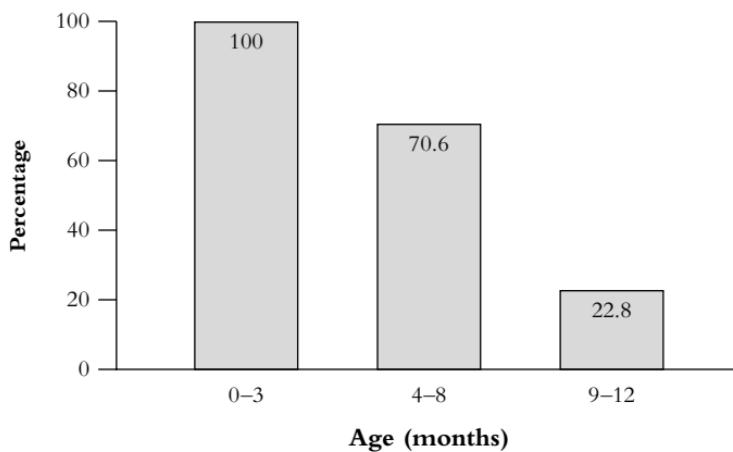
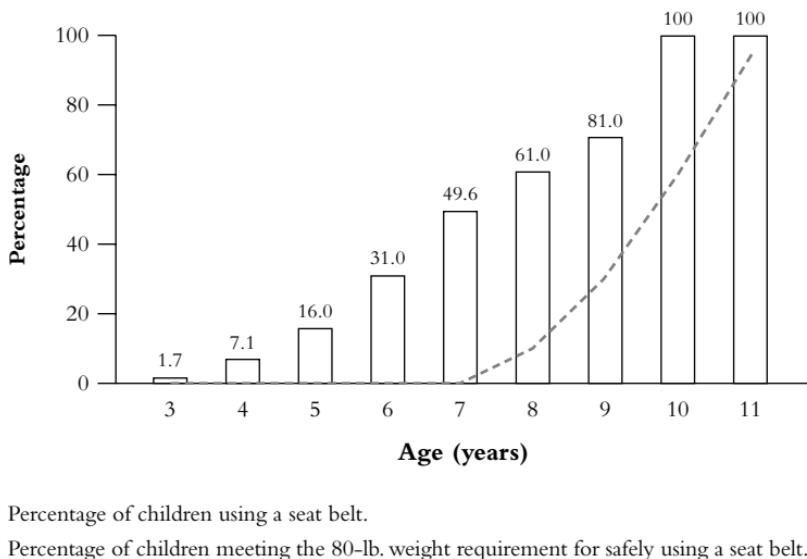


Figure 2 Premature Use of Seat Belts in Children Aged 3 to 11



Parental Knowledge

Parents were asked to rate the importance of a number of factors in the decision to purchase a safety seat for their child or to transition their child from one safety seat to another. It was assumed that parents' knowledge influenced their decisions regarding safety seats. A Likert scale was used for this purpose. The most important factor in choosing a new safety seat was the "fit" of the child in the seat (mean rating = 4.27), followed by the child's weight (mean rating = 4.24). Age was not considered important (mean rating = 2.73), nor was the child's resistance (mean rating = 2.70).

Patterns of Safety Seat Use in Families

In the majority of families, both parents worked and therefore required others to transport their child in a vehicle as part of the family routine. The survey included items on strategies used by parents to ensure their child's safety in vehicles other than their own. Most parents (77%, $n = 670$) reported transferring the child's own safety seat to the other vehicle and routinely instructing the other driver regarding its use for their child. The most common group of other drivers transporting the child were grandparents (84%, $n = 778$), followed by "other family members" (41%).

Location of Safety Seat in the Vehicle

Regarding placement of the child in the vehicle, the majority of children (96%, $n = 1,179$) were correctly placed in the rear seat. There was little variation in parents' use of rear seating for their children when it was examined according to the age of the child.

Challenges of Safety Seat Installation

The majority of parents (86%, $n = 1,069$) reported "little or no difficulty" (scored on a 5-point Likert scale) with installing the safety seat in their vehicle. However, the study did not observe for accuracy regarding installation of the seat. Seventy-eight percent ($n = 947$) of the parents reported that the instruction manual packaged with the safety seat was clear and easy to follow, 17% ($n = 201$) reported that it was moderately easy to follow, while 5% ($n = 63$) reported that it was unclear and not easy to follow.

Safety Seat Purchase

Ninety-six percent of parents stated they had purchased a new safety seat. The factors influencing parents' choice of safety seat were ease of use (74%, $n = 911$), affordability (37%, $n = 450$), and aesthetics (22%, $n = 269$).

Sources of Information

Parents were asked to describe the sources of information they routinely accessed to support use of safety seats for their children. Sixty-five percent ($n = 787$) indicated that finding information was "easy," 23% ($n = 272$) that it was moderately easy, and 12% ($n = 137$) that it was not easy. The majority of parents used pamphlets and magazines as their primary source of information ($n = 766$, 63%), followed by friends and family ($n = 382$, 32%). Health-care professionals and car-seat clinics were not common sources of information.

Discussion

The rate of correct use of child safety seats found in this study (74%) is generally consistent with rates found in Canadian national surveys (Chouinard & Hurley, 2005). The most surprising finding was a very high rate of reported use of booster seats for school-aged children (70.1% in Southwestern Ontario, 66.7% in Northern Ontario). Although an entire school board was sampled in Southwestern Ontario (JK to grade 5), it is possible that parents who were knowledgeable about safety seat use self-selected more than parents who were less knowledgeable and that a random sampling approach would have yielded different results.

A study of booster seat use that was conducted in the same Southwestern Ontario community 1 year earlier and that accessed children through after-school “latchkey” programs in the same school board region found that only 40% ($n = 105$) of children used booster seats. The present findings need to be validated with more rigorous sampling approaches.

Another compelling finding was the pattern of premature transition of children to seat belts or to other safety seats. The majority of research to date has relied solely on a cross-sectional sampling approach as well as observation and self-report (Chouinard & Hurley, 2005; Safe Kids Canada, 2004; Simpson et al., 2003). The retrospective approach used in the present study elicited valuable insights into how and when parents make decisions regarding safety seat transition. Many of the parents mistakenly believed that “fit” and weight are the most important factors in safety seat transitioning; they were unaware that, for infants, age is a critical marker for transitioning. Parental knowledge about the correct age and the correct height and weight at which to transition children has been reported as very limited due to confusion about these factors; however, work in this area has focused primarily on the US booster seat population (Rivara et al., 2001) rather than on the premature transitioning of infants. An American roadside survey found that only 54% of infants under 1 year of age were properly restrained (Staunton et al., 2005). Public awareness through prenatal classes and education of new parents has been successful in supporting the use of rear-facing safety seats for newborn babies. However, parents need more detailed information on how and when to transition children beyond the newborn period.

Similarly, premature seat belt use was evident in the present study, with half of the children using seat belts at age 7 (Figure 2). This finding is consistent with the results of US studies, which report that 40% to 80% of 5 to 8-year-old children use seat belts (Staunton et al., 2005; Winston et al., 2000). In one of the studies, police roadblocks were used to ensure obligatory participation in the observation, which reported only 1% of children using the correct safety seat (Staunton et al.). This use of roadblocks may lead to a more reliable estimate of safety seat use than the voluntary participation used in most observational research. The most recent Transport Canada survey (1997) used “drive by” observation of safety seat use at intersections; the accuracy of these national data may therefore be limited. More rigorous methods for observing actual safety seat use in Canadian families are clearly needed. In the United States, premature use of seat belts for children has been widely studied (Ebel, Koepsell, Bennett, & Rivara, 2003; Rivara et al., 2001; Winston & Durbin, 1999; Winston et al., 2000), with seat belt use found to begin at age 2 and to be very common by age 5. In the present study, similarly,

seat belt use began as young as age 3 and increased dramatically as the children approached the age of 6.

Another important finding of the present study was the sources of information used by parents to support the proper use of child safety seats. Parents reported relying heavily on "instructions on the box" and family and friends, rather than physicians, nurses, or safety seat experts. Lack of access to consistent and accurate information may be a major contributing factor in the misuse of safety seats in Canadian families. It may also reflect the lack of school-based education for children and lack of vehicle safety information for parents, whose reliance on friends, neighbours, and family members contributes to the perpetuation of misinformation throughout communities. In a recent study, only 16% of parents reported ever being asked about child seat safety by their primary care provider (family physician, pediatrician, nurse practitioner) (Lemoine, Lemoine, & Cyr, 2006). Thus, car seat safety may not be viewed as a primary care issue, despite the fact that riding in a vehicle is the most dangerous activity a child can engage in (McKay, 2003). Why do health professionals not raise the issue of car seat safety with families? If they have not received training or education in effective use of child safety seats, they may not be aware of children's risk of injury. Educational programs might consider addressing injury prevention more directly, so that professionals can adequately counsel families and help to prevent the spread of misinformation.

This study also found that the drivers (other than parents) to most frequently transport children in vehicles were grandparents. This finding raises a number of issues. Grandparents are not likely to have had experience with safety seats for their own children, since even seat belts were not made mandatory by law until 1977 in Canada. There are no published studies of grandparents' knowledge and use of safety systems for children travelling in vehicles. Future research could examine grandparents' knowledge and use of child safety systems and consider tailored intervention programs that reflect the learning needs of older adults who routinely provide care for children in vehicles. This particular area of research will become increasingly important as Canada's population ages and grandparents assume more active roles in transporting children.

There are two limitations to the study. The preponderance of Caucasian respondents is not representative of the diversity of Canadian urban populations; while the Northern Ontario site contributed some aboriginal participants, these were too few in number to allow for a strong comparative analysis. In addition, the use of self-report surveys may have resulted in a selection bias on the part of parents, which could mean that the findings represent a "best case scenario" regarding correct use of safety seats in Canadian families.

Implications for Nursing Practice

Nurses clearly have an extraordinary opportunity to take a leadership role, nationally and internationally, in championing injury-prevention initiatives for children travelling in vehicles. Every year in Canada, the equivalent of three classrooms full of elementary schoolchildren never reach grade 5 due to fatalities in vehicles (Safe Kids Canada, 2004). The development of a comprehensive strategy to prevent death and serious injury in Canadian families is long overdue. Such a strategy would engage nurses in community agencies, ambulatory care, obstetrics, and pediatrics to ensure that parents and children have the knowledge and skills necessary to travel safely in vehicles. Just as height, weight, and allergy and immunization status are assessed throughout childhood using a standardized approach, so too should safety seat use be screened and assessed. Nurse practitioners, nurses in school health programs, pediatric nurses, and emergency room nurses should be conducting routine safety seat assessment for all children and providing consistent, accurate information to families on a routine basis.

Interdisciplinary and cross-sector partnerships are needed in order to achieve the 70% reduction in fatalities and 67% reduction in serious injuries among Canadian children reported as achievable in the current research (National Highway Traffic Safety Administration, 2004). Partnerships with school boards, police/fire services, and educators would be a unique and critically important means for nurses to influence in-class health and safety education in primary schools. Teachers and parent councils could partner with nurses to facilitate the implementation of programs that teach children and parents about the correct use of safety seats, as schoolchildren experience higher rates of death and serious injury than any other age group (Chouinard & Hurley, 2005). Such cross-sector partnerships would be an ideal opportunity for nurses to build on community education programs for families with infants and toddlers and extend safety education into schools, to ensure that all children travel safely in vehicles. Cross-sector strategic partnerships may also position nurses to more directly influence policy, such as federal booster seat legislation.

There is no question that vehicle safety programs, in order to provide a comprehensive, national approach to education that supports effective use of safety seats in Canadian families, need the involvement of professionals from education, health, police services, and even the private sector (i.e., the auto industry). Nursing is the ideal discipline, with its wealth of knowledge and experience in health promotion, to conquer road crashes as the leading cause of death among Canadian children. Theoretical development of injury prevention research for children travelling in

vehicles has not been addressed in the health literature. The present findings may represent a first step in identifying some of the conceptual underpinnings of injury prevention in this important area of health promotion research in Canada.

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