The Health Index
MIDDLESEX-LONDON HEALTH UNIT
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BOOSTER SEAT USE

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KEY POINTS

- In 2004, 51.5% of four to seven year olds in London-Middlesex were restrained by riding in a booster seat.
- The percentage of children riding in booster seats was highest for five year olds at 64.7% and dropped to 41.5% for seven year olds.
- Respondents' beliefs about their abilities to prevent childhood injuries play an important role in predicting booster seat use.

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BACKGROUND

On September 1, 2005 a new law came into effect in Ontario to enhance the safety of children and youth on Ontario's roads. The legislation highlights the benefits of child restraints in reducing the risk of death and injury related to car accidents. It requires that children weighing between 18 and 36 kilograms (40-80 pounds), with a standing height of less than 145 centimetres (4 feet, 9 inches) or less than eight years of age must be properly restrained in a booster seat when riding in a motor vehicle. A child can start using only a seat belt once any of the above three criteria are exceeded. The Middlesex-London Health Unit (MLHU) collected information on the use of booster seats prior to the implementation of the law but after the legislation was first introduced on May 4, 2004.

Motor vehicle collisions remain the leading cause of death and serious injury for children in Canada[1,2] and in other countries[3,4]. The risk of death or injury can be significantly reduced when children travel in a properly installed child car seat that is appropriate for their size and age[1]. Safety experts recommend that pre-school to primary-grade aged children should be placed in booster seats until they are big enough to use a seat belt [5,6,7]. These parameters match the new legislation and encompass most children aged four to seven; most eight-year-old children exceed the height and weight criterion for booster seat use.

Ontario's Infant and Toddler Safety Association recommends that a booster seat should be used until all of the following requirements are met:

- the child is at least nine years-of-age,
- the child has a sitting height of 74 centimetres (29 inches) or is at least 145 centimetres (4 feet, 9 inches) tall,
- the child can sit all the way back against the seat back with knees bent comfortably at the edge of the seat,

- the lap belt rests across the upper thighs, the shoulder belt is centered on the shoulder and chest, and
- the child can stay seated like this for the whole trip[8].

It is well recognized that using a booster seat is an effective injury prevention strategy[1,6,7]. Although research recommending that children should use booster seats until they weigh at least 36 kilograms (80 pounds) has been around for more than a decade, there is plenty of evidence that many children are prematurely moved into adult seat belts that do not fit them properly[9,10]. A Safe Kids Canada survey found that in 2004, only about 28 percent of parents of children age four to nine indicated that they used booster seats[1]. Children in seat belts alone are 3.5 times more likely to incur a significant injury and 4.2 times more likely to have significant head injury when involved in a motor vehicle crash, compared to children of the same age in booster seats[6]. The premature use of seat belts can cause life-threatening spinal cord injuries or serious injuries to vital organs, the so-called "seat belt syndrome"[1].

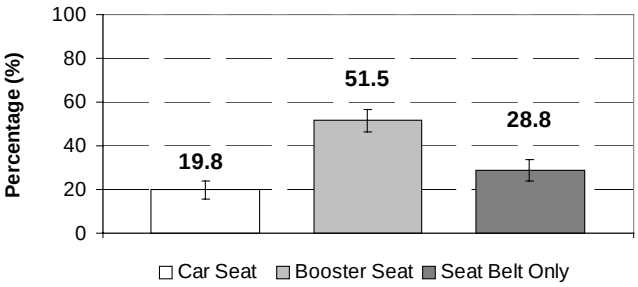
There are numerous organizations whose mandate is to promote child safety. Historically public health has played a strong role in promoting child safety. All public health units in Ontario are required to implement Ontario Ministry of Health and Long-Term Care's (MOHLTC) Mandatory Health Programs and Service Guidelines[11]. One of these guidelines calls for the reduction in the rate of injuries caused by cycling crashes and motorized vehicle crashes that lead to hospitalization or death by 20 percent by the year 2010.

This Health Index describes the percentage of children between the ages of four and seven who usually travel in a booster seat in the City of London and Middlesex County, as well as discusses factors predictive of proper child restraint. The Parent Survey-2004, a health survey supported by the Middlesex-London Health Unit, asked adults in Middlesex-London how children in their household usually travel in a car. The booster seat module was designed to assess readiness for the new Ontario booster seat law and to provide a baseline for future local goal setting. The data on booster seat use were collected for eight months, from May to December 2004. Further information is provided in the Methods section.

TYPE OF CHILD RESTRAINT USED

According to the Parent Survey-2004, 51.5% (±5.3%) of respondents in London and Middlesex County indicated that they usually use a booster seat when travelling in a car with a child between the ages of four and seven (see Figure 1). In other words, half of the children were restrained by the recommended child restraint device appropriate for their age. Figure 1 indicates that almost one third (28.8% ±4.8%) of restraint misuse was attributable to premature graduation to an adult seat belt. Another 19.8% (±4.2%) of children were reported to be still using car seats with a harness, despite exceeding recommended age limits.

Figure 1: Type of Child Restraint System Used
Middlesex-London Health Unit Area (2004) Children Ages 4-7



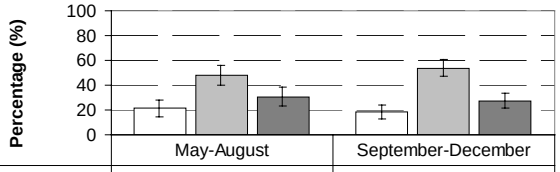
Source: Parent Survey-2004

PERIOD

The Parent Survey-2004 began collecting the booster seat data at the same time Ontario introduced the new booster seat legislation but prior to when the law came into effect. Since the data were collected in a series of "waves" on a monthly basis, the data structure allowed for the analysis of booster seat use over time. As indicated in Figure 2, in the first four months after the introduction of the booster seat legislation (May-August), 47.9% (±8.2%) of the four to seven year olds were reported to ride in booster seats. Over the next four months

(September-December), the overall percentage of booster seat users increased by six percent to 54.0% (±6.9%). Primarily due to the small sample size, there was no statistically significant difference in the rate of booster seat use between the two time periods (p>0.05). However, the increasing use of booster seats may suggest a positive trend towards proper child restraint.

Figure 2: Type of Child Restraint System Used by Period
Middlesex-London Health Unit Area (2004) Children Ages 4-7



	May-August	September-December
Car Seat	21.5	18.5
Booster Seat	47.9	54.0
Seat Belt Only	30.6	27.5

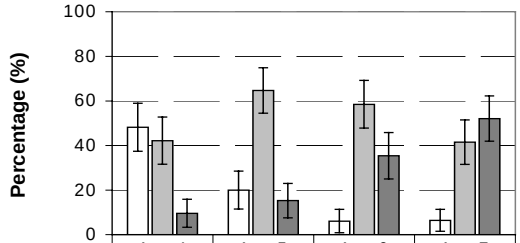
Car Seat **Booster Seat** **Seat Belt Only**

Source: Parent Survey-2004

CHILD AGE

There were substantial and statistically significant differences in the type of child restraint system used by child age. The results presented in Figure 3 indicate that booster seat use was highest among five-year-olds (64.7% ±10.2%). Then, it declined up to the age of seven (41.5% ±10.0%), as some of the children were prematurely graduated to adult seat belts. Among the four year olds, 42.2% (±10.6%) of children were reported to use a booster seat when travelling in a car while an additional 48.2% (±10.7%) used a car seat with a harness strap. Depending on their weight and height, some children aged four may be considered to be correctly restrained if they use a car seat. Figure 3 shows that among children aged four to seven, the percentage of children using only a seat belt increases with the child's age and it was reported to be as high as 52.1% (±10.1%) for seven year olds. Depending on their weight and height, some children aged seven may be considered to be correctly restrained if they use a seat belt.

Figure 3: Type of Child Restraint System Used by Child Age
Middlesex-London Health Unit Area (2004) Children Ages 4-7



	Age 4	Age 5	Age 6	Age 7
Car Seat	48.2	20.0	6.1	6.4
Booster Seat	42.2	64.7	58.5	41.5
Seat Belt Only	9.6	15.3	35.4	52.1

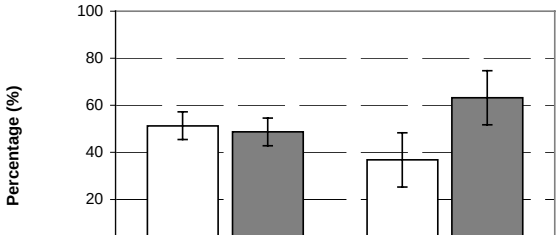
Car Seat **Booster Seat** **Seat Belt Only**

Source: Parent Survey-2004

INJURY PREVENTION BELIEFS

Figure 4 illustrates the use of booster seats by respondents' perception of their ability to prevent childhood injury. It shows that among respondents who believed that injuries to children are completely preventable, a significantly larger proportion of children were riding in booster seats (63.2% ±11.2%) than in car seats or seat belts (36.8% ±11.2%). Among respondents who indicated that injuries to children are somewhat or very preventable, there was no statistically significant difference between the proportion of children who were using booster seats (48.4% ±5.3%) and the proportion of children using car seats or seat belts (51.6% ±5.3%).

Figure 4: Booster Seat Use by Injury Prevention Beliefs
Middlesex-London Health Unit Area (2004) Children Ages 4-7



	Somewhat/Very Preventable	Completely Preventable
Car Seat/Seat Belt	51.3	36.8
Booster Seat	48.7	63.2

Car Seat/Seat Belt **Booster Seat**

Source: Parent Survey-2004

NON-SIGNIFICANT PREDICTORS

Data from the Parent Survey-2004 indicate that booster seat use remained relatively steady when various socio-economic factors were considered including household income and respondent's level of educational attainment. Similarly, booster seat use was found to be unrelated to respondent's age. Finally, there were no significant differences in booster seat use between respondents living in the City of London (50.5% ±5.9%) and those residing in the Middlesex County (55.1% ±11.7%).

SUMMARY AND IMPLICATIONS

One of the key results reported in this Health Index is that booster seat use decreases considerably with child's age. Although the majority of five and six year olds were reported to ride in booster seats, there were substantially less seven year olds reported to use booster seats.

Past studies indicate that increasing use of booster seats among older children may constitute a significant challenge[12]. For instance, parents of older children may be confident that their children are safely restrained with adult seat belts[13]. Thus an important step in reducing the risk of childhood injuries due to motor vehicle crashes involves encouraging parents of older children to adhere to the best practice in the area of child restraint system use. In particular, booster seat campaigns should clearly state weight, height, and age requirements as many parents tend to transfer their older children to adult seat belts prematurely. There is also some evidence that many older children mistakenly believe that booster seats are only for younger children[12]. Hence, it is important for public health advocates to consider child attitudes towards booster seats in their information campaigns.

This Health Index highlights the need for the ongoing public information campaigns regarding child injury awareness. The results reported in this study suggest that adults' incorrect beliefs about their ability to prevent childhood injury pose an important barrier to booster seat use. Respondents who indicated that injuries to children are somewhat or very preventable were no more likely to use booster seats than other child restraint devices. Respondents who indicated that injuries to children are completely preventable on the other hand were more likely to use booster seats than car seats or seat belts. An education campaign on adults' attitudes toward child injury prevention may play an important role in increasing booster seat use, and possibly an overall increase in child safety.

At the time when the Parent Survey-2004 data were collected (May-December, 2004), Ontario's law required that only children up to four years of age be restrained in a child safety seat while children over 18 kilograms (40 pounds) were allowed to wear an adult seat belt. Previous studies indicate that parents rely on the law as a guideline on how to properly restrain their children[14,15]. In one study, for instance, parents pointed to the implementation of the booster seat law as the strongest incentive for booster seat use [11]. The new law that came into effect on September 1, 2005 and the accompanying regulations are expected to constitute a critical step towards the goal of keeping children safer while travelling in motor vehicles. In particular, it is expected that the widespread media attention about booster seats that was launched before the enactment of the law in September 2005, has already affected the overall rate in booster seat usage. Analysis of the RRFSS 2005 booster seat data and the Parent Survey 2006 booster seat data both collected by MLHU should be conducted to further monitor the impact of the legislation.

METHODS

Data

The results presented in this Health Index are based on the Parent Survey-2004. The purpose of this survey was to monitor public awareness of a range of issues specific to parenting. Data were collected for the Middlesex-London Health Unit by the Institute of Social Research, York University. Data on booster seat use were collected from May 8,

2004 to December 5, 2004 in a series of "waves" of monthly telephone surveys of adults aged 18 and older who indicated that they take care of a child between the ages of four and eleven. Households were selected randomly from a list of households with telephones in the City of London and Middlesex County. As booster seat use may be unique to a specific child, respondents who identified that there is more than one child between the ages of four and eleven in the household were asked to identify the child that had the most recent birthday. The booster seat module was then asked in relationship to that randomly identified "index" child. A total of 706 respondents were administered the booster seat module.

For the purposes of this study, only those respondents who answered the booster seat question in relationship to a child between four and seven years of age were selected. For the Parent Survey-2004 there were 355 respondents who indicated that at least one of the residents in their households was a child between the ages of four and seven years. Respondents were excluded from the analysis if they did not provide a valid response to the booster seat question or if they answered "don't know" to that question. A final sample of 346 from the Parent Survey-2004 were used in the analysis of the booster seat module. Respondents were asked the following multiple choice question on the type of child restraint they use: "Which of the following best describes how your child usually travels in a car or other vehicle: (1) with no seat belt and not in a car seat, (2) with a seat belt only, (3) with a booster seat and seat belt, or (4) in a car seat with harness straps?" Readers are referred to the RRFSS website at www.rrfss.ca for a full itemization of the questions in the booster seat module.

Analysis

Results are analyzed using standards outlined by RRFSS Manual of Operations. Statistically significant differences in proportions of booster seat use are reported when $p<0.05$. Bar charts with error bars illustrating 95% confidence intervals were also provided. No household weights were applied.

The following predictors of booster seat use were employed in this Heath Index:

- *Period* – the data on booster seat use were collected from May 2004 to December 2004 in a series of "waves" of monthly telephone surveys. The whole period of data collection was divided into two phases: (1) "May-August 2004" and "September-December 2004".
- *Child's age* – it was measured on a continuous scale in one-year intervals. Only children 4-7 years old were included in the final analysis.
- *Respondent's age* – respondents were divided into two age cohorts: (1) 'Younger respondents' – respondents aged of 18.0 and older and less than 35.0 (39.0%); and (2) 'Older respondents' – respondents aged of 35.0 and older (61.0%).
- *Respondent's educational attainment* – respondents were divided into two groups based on the highest level of education they obtained: (1) 'Less than collage/university' (35.9%) and (2) 'College/university degree' (64.1%). The data collection for this variable began in July 2004 and therefore approximately one third of the sample was excluded for the specific analysis using this variable.
- *Household income* – respondents were categorized into three groups based on their household income before taxes for the annual year prior to the survey: (1) 'Low income' - $39,999 or less (23.7%); (2) "Mid-income" - from $40,000 to $79,999 (31.2%); and (3) 'High income' - $80,000 and above (32.7). Respondents who did not provide response to this question were treated as a separate category: (4) 'Missing' (12.4%).
- *Injury prevention beliefs* – perception of the ability to prevent childhood injuries was assessed by the question: "Generally would you say injuries to children are: (1) somewhat preventable (25.5%), (2) very preventable (54.8%), and (3) completely preventable (19.7%)."
- *Geography* – region was divided into two areas: (1) the City of London and (2) the County of Middlesex. The City of London residents include all those respondents who identified that they live in London

(80.0%). All other respondents were included in the Middlesex County category (20.0%).

REFERENCES

1. Safe Kids Canada. 2004. *Booster Seat Use in Canada: A National Challenge.* Toronto: Safe Kids Canada.

2. Canadian Institute of Child Health. 2000. *The Health of Canada's Children: A CICH Profile.* Ottawa: Canadian Institute of Child Health.

3. Centers for Disease Control. 2000. *Working to Prevent and Control Injury in the United State: Fact Book for the Year 2000.* Atlanta, GA: US Department of Health and Human Services.

4. United Nations Children's Fund. 2001. *A League Table of Child Deaths by Injury in Rich Nations.* Florence, Italy: United Nations Children's Fund.

5. American Academy of Paediatrics. 2005. *Car Safety Seats: A Guide for Families*. URL: http://www.aap.org/family/carseatguide.htm. Accessed: February 7, 2006.

6. Winston, F.K, D.R. Durbin, M.J. Kallan, and E.K. Moll . 2000. "The danger of premature graduation to seat belts for young children." *Pediatrics* (105):1179–83.

7. National Highway Traffic Safety Administration. 2005. *Best Practices for Promoting Booster Seat Use.* [URL] http://nhtsa.dot.gov/CPS/promote/index.htm. Accessed: February 7, 2006.

8. Infant and Toddler Safety Association. 2005. *Booster Seats: Frequently Asked Questions.* [URL] http://nbdhu.on.ca/en/Clinics/car_seat_clinic_files/boosterFAQ4.pdf. Accessed: February 7, 2006.

9. Transport Canada. 1998. *Child Restraint Use in Canada: 1997 Survey Data.* [URL] http://www.tc.gc.ca/roadsafety/tp2436/cl9804/menu_e.htm. Accessed: February 7, 2006.

10. Ramsey, A., E. Simpson, and F.P. Rivera. 2000. "Booster seat use and reasons for nonuse." *Pediatrics* (106): e20-e24.

11. Ontario Ministry of Health and Long Term Care. 1997. *Mandatory Health Programs and Service Guidelines*. [URL] http://www.health.gov.on.ca/english/providers/pub/pubhealth/manprog/mhp.pdf. Accessed: February 7, 2006.

12. Ebel, B.E., T.D. Koepsell, E.E. Bennett, and F.P. Rivara. 2003. "Too small for a seatbelt: Predictors of booster seat use by child passengers." *Pediatrics* (111): 323-327.

13. Apsler, R., S.W. Formica, A.F. Rosenthal, and K. Robinson. 2003. "Increases in booster seat use among children of low income families and variation with age." *Injury Prevention* (9): 322-5.

14. Lee, J.W., K. Fitzgerald, and B.E. Ebel. 2003. "Lessons for increasing awareness and use of booster seats in a Latino community." *Injury Prevention* (9): 268-9.

15. Simpson, E.M., E.K. Moll, N. Kassam-Adams, G.J. Miller, and F.K. Winston. 2002. “Barriers to booster seat use and strategies to increase their use.” *Pediatrics* (110):729-736.

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