Vehicle restraint of the young child.

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VEHICLE RESTRAINT OF THE YOUNG CHILD

by

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ABSTRACT

Outcomes of childhood trauma related to motor vehicle crashes (MVCs) have remained unchanged over the past 30 years. In addition, trauma related injuries are responsible for 50% of all childhood deaths (Block, Hanson, & Keane, 1998; Patterson, 1999). Child vehicle restraint studies indicate that children 4 to 9 years of age may be at greater risk of MVC injury than other age groups. Booster seat research is largely lacking, and most children do not meet the physical guidelines for seat belt use until 9 or 10 years of age (Weber, 2000). The purpose of this study was to examine vehicle restraint use for children 18-36 kg and the factors that influence the parents’ selection of a vehicle restraint device for their child.

Survey research was used to explore an extensive range of parental perceptions and behaviours regarding vehicle restraint using a self-administered questionnaire. Questionnaires were delivered to parents in the school bags of children in junior kindergarten to grade three inclusive who attended one of 13 latch key programs in southwestern Ontario. Results indicated that 60% of the 105 children utilized a seat belt with only 5% meeting the physical requirements to do so. Booster seat use was demonstrated by 29% largely for children under the age of 6 and less than 22.8 kg. Parents appeared to lack knowledge regarding effective use of seat belts. The findings from this study are discussed relevant to their implications for nursing practice and the potential to influence legislative change and partnerships with industry.
DEDICATION

To my husband Bryon whose love, patience, and support of this endeavor has provided me with the opportunity and the encouragement to succeed.

And to my daughters Renee and Claire who inspired this project and remain a daily reminder of the precious cargo parents are entrusted to protect.
ACKNOWLEDGEMENTS

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NOMENCLATURE

child restraint device (CRD): car seat, child vehicle occupant device legally required in Canada for children up to 18 kg or 40 lb.

cranium: the skeleton of the head

head injury: traumatic injury to the head resulting from trauma which may involve injury to the skull and/or the brain

iliac: pertaining to the anterior aspect of the ilium bone in the pelvis

ilium: the lateral, flaring portion of the hip bone

intra-abdominal: within the abdomen

intracranial: within the cranium

orthopedic: pertaining to the correction of deformities of the musculoskeletal system

torso: the body, exclusive of the head and limbs

thorax: the part of the body between the neck and abdomen; the chest. The walls of the thorax are formed by the twelve (12) pairs of ribs, attached to the sides of the spine and curving toward the front.

From the Encyclopedia and Dictionary of Medicine, Nursing, and Allied Health (1983).
CHAPTER 1

Introduction

Statement of the Problem

A new century has arrived, and North Americans have access to a wealth of knowledge daily. Research reports little progress towards the reduction of trauma to children in motor vehicle crashes (MVCs) despite the vast amounts of information available regarding healthy living choices and disease and injury prevention (Patterson, 1999). Outcomes of childhood trauma related to MVCs have remained unchanged over the past thirty years and trauma related injuries are responsible for 50% of all childhood deaths (Block, Hanson, & Keane, 1998; Patterson, 1999). The cost to families and to society is immeasurable.

Vehicle restraints are mandatory by law in Canada, and Ontario was the first province to require seat belt use in 1976 (Transport Canada, 1995). Infant carriers and child restraint devices (CRDs), better known as car seats, for children up to 18 kilograms (kg) are standard and required by law. However, children over 18 kg (40 pounds) (lb) may be legally secured by the pelvic restraint of the seat belt assembly (Ontario Provincial Offences, 1999). The purpose of any vehicle restraint system is to couple the occupant with the crashing automobile limiting the force of deceleration upon the body (Weber, 2000). The primary goal of occupant protection devices is the prevention of injury to the central nervous system (Weber, 2000). A child’s physical frame lacks the skeletal maturity, height and weight to adequately benefit from a shoulder and/or lap belt restraint device designed to secure persons over 36 kg (80 lb) in the event of a crash (Weber, 2000). Research
supporting the use of booster seats to prevent trauma in children 18 to 36 kg is limited. The absence of evidence impedes any suggestions or efforts towards the legal mandate requiring the use of booster seats to protect this young and vulnerable population.

This study examined vehicle restraint use for children 18 to 36 kg. It will begin with a review of the research related to vehicle restraint devices for children as well as the relevant growth and development and crash injury literature. The study procedure is described followed by the results of the study. Issues stemming from the outcomes are discussed and conclude with nursing interventions and suggestions for future research relevant to the issues.

*Purpose of the Study*

Trauma is the leading cause of mortality and morbidity in children (Block et al., 1998). Ontario laws do not mandate special restraint devices for the child over 18 kg creating a vulnerable population of young children secured in adult vehicle restraints (Ontario Provincial Offences, 1999). The choice of how to restrain and prevent possible injury to any child is the primary responsibility of the parent or caregiver of the child. Research questions are: i) What vehicle restraint systems do parents/caregivers describe they use for children 18 to 36 kg? and ii) What factors influence the parent’s/caregiver’s use of a vehicle restraint device for the child 18 to 36 kg? Current research suggests several variables that may potentially play a role in the restraint selection and these are discussed more extensively in the literature review.
CHAPTER 2

Review of the Literature

Utilization of Vehicle Restraints in Canada

Transport Canada (1998) survey data indicated that well over 80% of children ages 3 to 9 years were restrained in vehicles. These statistics are slightly lower than the impressive 1999 national average of 90% vehicle restraint use for all drivers and occupants (Transport Canada, 2000). Table 1 displays the findings of a national 1997 survey depicting child restraint use in Canada (Transport Canada, 1998). It is important to note that the survey data addressed the chronological age of the child only and did not address height or weight (Transport Canada, 1998). Growth and development guidelines suggested that the majority of 3 to 9 year olds would be 18 to 36 kg (see Appendix A) (Wong, 1995, 1999). Research recommended the requirements for seat belt use as greater than 36 kg (80 lb), greater than 147 centimeters (cm) tall (58 inches) and a sitting height of more than 74 cm (29 inches) (Ramsey, Simpson, & Rivara, 2000). If seat belt use is examined relative to these current “best practice” recommendations, the majority of the estimated 1.73 million 4 to 9 year olds in Canada are not adequately protected in the event of an MVC (see Appendixes A & B) (Ministry of Education, 2000; Statistics Canada, 2003; Transport Canada, 1998; Wong, 1999). Transport Canada measured and reported restraint use addressing age as the sole developmental issue. The results of Transport Canada’s (1998) limited view can be misleading, and may inaccurately lead to an assumption that Canadians are adequately restraining their children in vehicles.
Table 1

*Child Vehicle Restraint Use in Canada*

<table>
<thead>
<tr>
<th>Type of Vehicle Restraint</th>
<th>Age 3–4 yrs</th>
<th>Age 5–9 yrs</th>
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<tbody>
<tr>
<td>Child restraint device</td>
<td>40%</td>
<td></td>
</tr>
<tr>
<td>Booster seat</td>
<td>17%</td>
<td>5%</td>
</tr>
<tr>
<td>Seat belt</td>
<td>31%</td>
<td>79%</td>
</tr>
<tr>
<td>Unrestrained</td>
<td>12%</td>
<td>16%</td>
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Transport Canada (1998) studies provide insight into the regional similarities and differences in proper restraint use. In Ontario, 86% of 3 to 4 year olds and 82% of 5 to 9 year olds were considered properly restrained. The survey continued with the correct use of the appropriate restraint for ages 3 to 4 years at 76% and 5 to 9 years at 100% within the province of Ontario. The correct use data indicated the proper installation of the restraint device within the vehicle and noted if the harness of the device was used around the child. Transport Canada’s (1998) operational definition of appropriate restraint for these statistics was “children in restraints appropriate to their ages,…3-4 years-child seat; booster seat or seat belt; 5-9 years booster seat or seat belt”. Excluding the recommendations for infants, the guidelines for the appropriate vehicle restraint of a child advocated specific restraint use
according to the child’s weight and height, and not their chronological age (Ramsey et al., 2000; Winston, Durbin, Kallan, & Moll, 2000). The survey definition of “appropriate restraint” and statistics of “properly restrained” children in Ontario again focused solely on the age and not the physical development of the child (Transport Canada, 1998). This narrow focus of measurement generates questions regarding the accuracy of the survey results, as recommendations denoted the vehicle seat belt as an inappropriate device to properly restrain children under 36 kg.

The importance of identifying an appropriate restraint for children too large for the required CRD cannot be over emphasized. Occupant vehicle trauma continues to represent the leading cause of morbidity and mortality in children (Block et al., 1998). Consideration of the three physical parameters of seat belt recommendations is vital in the accurate measurement of an appropriate restraint for a child over 18 kg. The exclusion of such developmental indicators in the measurement criteria offers only limited information regarding the safe utilization of vehicle restraints for children.

_Growth and Development_

Canadians must begin to consider the vulnerable position we place our young children in by utilizing restraint standards designed for a developmental stage usually reached at an older child or preadolescent developmental stage (Wong, 1999). A person spends the fewest number of years of life as a child. However, this is the stage of life that the body physically matures and takes shape to create the adult form. Physical development varies in its pace and there are periods of accelerated and decelerated growth. Although the sequence of development is rather fixed, the timing is individualized. Thus, it is difficult to
exact a child's growth and development relative to chronological age. Guidelines according to chronological age are the closest measure available (see Appendix A). By age 2, a child has reached approximately 50% of their total linear growth and then begins a steady growth rate of 5 - 6 centimeters (2 - 2.5 inches) per year until puberty. Weight is similar in pattern, in that an infant quadruples its weight in the first two years, and then "normally" gains at a rather steady state of 2 - 2.75 kg (4.5 - 6 lb) per year until adolescence (Wong, 1999). The factors that influence body weight are too numerous and varied for this paper to explore. Wong suggested that a child reaches 18 kg sometime after 3 years of age. However, these physical recommendations for seat belt use are not accounted for by Ontario legislation when permitting a child greater than 18 kg to be legally restrained in a device designed to protect a person greater than 36 kg (Ramsey et al., 2000; Ontario Provincial Offences, 1999). Federal survey measurements also overlooked the physical recommendations for seat belt use and grossly inflated the statistics of the latest national survey (Transport Canada, 1998). National survey results are limited, and Canadians must recognize the extent of trauma related injuries reported and conclude that we are not adequately securing our children in vehicles and change is needed (Patterson, 1999; Transport Canada, 1998).

If national surveys and provincial legislation do not account for the growth and development patterns of young children, then it is not surprising that lawmakers and health educators focus little attention on the dangers of placing children in seat belts designed for the adult frame. Guidelines for normal growth and development are just that, guidelines. The uniqueness of each child, genetically and personally, significantly impacts the final stature of the adult. Booster seats are available, and when correctly installed offer a safe
alternative for young children. However, very little literature addressed booster seat use, and those that did indicated they were not widely utilized (Ramsey et al., 2000). Accounting for the growth and development of young children is key to accurately measuring, reporting and possibly influencing legislation regarding the security of Canadian children as vehicle occupants.

*Use and Misuse*

The exploration of the use and misuse of child restraints is extensive in the current literature. Use and misuse, although frequently studied together, are two separate concepts. The use of CRDs and seat belts has repeatedly demonstrated a reduction in morbidity and mortality of young children (Johnston, Rivara, & Soderberg, 1994; U.S. Department of Transportation, 1998). Incorrect use, or misuse of the devices diminishes the restraints’ effectiveness in preventing morbidity and mortality associated with MVCs (Margolis, Wagenaar, & Molnar, 1992). Much of the research available on the use and misuse of vehicle restraints for children was conducted in the United States, and only a very few recent studies focused on the booster seat as the necessary standard for restraining children 18 to 36 kg (Ramsey et al., 2000; Winston et al., 2000). Published physical guidelines for seat belt use indicated that booster seats should be the only acceptable restraint system for the young child and yet the literature did not note this as the common practice (Ramsey et al., 2000).

The evaluation of booster seats was frequently omitted in restraint use research. The medical and nursing research reviewed evaluated appropriate restraint use for children under 18 kg. Research on CRDs reported that most adults securing children in vehicles
were middle-aged, were the parents of the children and restrained themselves within the vehicle (Decina & Knoebel, 1997; Margolis et al., 1992). Decina and Knoebel (1997) studied a large sample of children under 27 kg (60 lb) in four American states and reported CRD use at 50%, seat belt use 37% and no restraint use 13%. The same researchers noted the adults transporting the target children were local residents, largely under 40 years of age (82%) of which 77% were female, 87% of the adults were the parents of the children and almost 82% of the adults were also restrained (Decina & Knoebel, 1997). Another study conducted in Michigan, noted 75% of children less than 4 years were restrained in CRDs or seat belts, with restrained drivers observed at 86% (Margolis et al., 1992). Neither of these studies considered booster seats as the preferable restraint system for children 18 to 36 kg and children in seat belts were noted as "restrained" within the research results (Decina & Knoebel, 1997; Margolis et al., 1992).

Adequate vehicle restraint protection for the young child is best met with a booster seat until at least 36 kg (Ramsey et al., 2000; Weber, 2000). However, some restraint is always better than no restraint in the event of a crash (Ramsey et al., 2000). Research described a number of determinants that influence the adult and the complete lack of restraint of the child occupant (Chorba & Klein, 1993; Margolis et al., 1992; Sahai, Pitblado, Bota, & Rowe, 1998). Unrestrained adults were less likely to restrain their child passengers and were more likely to demonstrate greater risk-taking behaviours such as smoking, speeding and drinking while driving (Sahai et al., 1998). There was a notable decrease in child restraint use with increasing child age and an early graduation to seat belts for children who have outgrown a CRD (Ramsay et al., 2000; Winston et al., 2000).
Reasons cited for not using a CRD or booster seat for toddlers or preschoolers were child fussiness and discomfort, inconvenience in using the device and needing the restraint device for a new child (Decina & Knoebel, 1997). Study results also indicated that as the number of vehicle occupants increased the number of unrestrained young children also increased (Decina & Knoebel, 1997). Increased numbers of unrestrained child passengers were reported with drivers of low income, and adults with less than a high school education believed that CRDs were uncomfortable and that societal norms did not support the use of CRDs (Chorba & Klein, 1993; Margolis et al., 1992).

Although the literature described an overall increase in restraint use for young children in the United States, the number of child fatalities related to MVCs also increased (Chorba & Klein, 1993). This grave truth was attributed to a lack of protection, as 70% of the child fatalities were unrestrained (Chorba & Klein, 1993). The literature offers insight on the influencing factors and the determinants of use, as measured with the parents or caregivers and assists to target appropriate interventions to improve use (Chorba & Klein, 1993; Decina & Knoebel, 1997; Margolis et al., 1992). However, the research was based in the United States and little attention was paid to booster seat use. Canadian research on CRD and booster seat use and misuse is lacking. Heavily enforced Canadian seat belt legislation may impact behaviours and societal norms rendering results from the American studies difficult to generalize to the Canadian people (Ontario Provincial Offences, 1999).

Misuse of vehicle restraints for children has been frequently studied, however, the research focus has varied widely in definition, measurement and research design yielding a variety of results (Decina & Knoebel, 1997). Studies suggested that generally 60 to 80% of
CRDs are utilized incorrectly with such indicators as; device not belted to vehicle seat securely or not belted, vehicle belt threaded improperly through the device, required device tether not used or not anchored properly, harness strap misuse or nonuse, harness chest retainer clip misuse or nonuse and device inappropriate for the child’s height and weight (Decina & Knoebel, 1997; Margolis et al., 1992; Winston et al., 2000). Multiple variables were suggested that possibly influenced the dismal restraint misuse reported. However, there was consistent agreement that the numerous models and styles of restraint devices, combined with a multitude of different types of vehicles these devices are placed in, promoted confusion for the parents and created a potentially lethal scenario for the children (Block et al., 1998; Murphy, 1999; U.S. Department of Health and Human Services, 1998). Misuse was also associated with an increased frequency of removing and replacing the CRD in the primary vehicle increasing the potential of an unsecured fit of the device to the vehicle (Decina & Knoebel, 1997).

The various sources parents use to obtain product information also contributed to the challenge of correct use of CRDs. Sales personnel, family and friends all offer advice while research reported only 50% of parents actually read the product manual on how to secure the child properly (Block et al., 1998; Decina & Knoebel, 1997; Gaines, Layne, & DeForest, 1996). The use of the CRD instruction manual is inversely proportional with misuse and reports that the manuals are difficult to comprehend are a plausible contributing factor (Block et al., 1998). Families that obtain a CRD second-hand reported the product instructions were often not available for reference (Block et al., 1998).
It is clear that the misuse of CRDs stems from multiple sources. Current findings were generated from the United States, and although Canadians and Americans share similar lifestyles, our values, beliefs, and social norms are not so similar. Margolis et al., (1992) assessed social norms regarding CRDs with questions focusing on support for the legislation requiring CRDs and the law as an infringement of individual rights. Few Canadian generated studies are available to support or refute these beliefs, and mandatory restraint laws have been enforced in Ontario since 1976. As recent as 1998, 35 American states with seat belt use laws specified secondary enforcement. Secondary enforcement permits law enforcement to issue a violation for no restraint use only if the vehicle is in violation of another primary enforced vehicle offence (U.S. Department of Transportation, 1998; Transport Canada, 1995). Secondary enforcement legislation in many states persists despite a 1995 National Highway Traffic Safety Administration (NHTSA) study that indicated the states with primary enforcement seat belt laws achieved significantly higher belt usage than the states with secondary enforcement laws (U.S. Department of Transportation, 1998). This alone suggests that enforced legislation is a positive influence in promoting restraint behaviour. Ontario restraint legislation is heavily enforced. However, the "proper" use of restraints for vehicle occupants remains in question when examining Transport Canada statistics (1998). A Michigan study found that knowledge of the law was the strongest predictor of correct use of a CRD however, it did not influence use versus nonuse (Margolis et al., 1992).

Canadian restraint laws are heavily enforced and behaviours and societal norms stemming from this enforcement may also influence the selection, use and correct use of
child vehicle restraint devices. Flaherty (2000) reported a lower than national average of seat belt use for African Americans. It is difficult to generalize this data to the black communities of Canada as cultural values and norms may play a significant role in restraint behaviour. Heavily enforced restraint legislation and societal norms combined with the absence of Canadian research to reveal the prevalence and determinants of CRD misuse, limits the usefulness of findings generated in the United States.

*Booster Seats*

Knowledge of booster restraints for children over 18 kg is largely an unconquered frontier at present. However, two recent articles addressed the need for booster seat use prior to seat belt use for the young child. Ramsey et al., (2000) noted that only one third of children who graduated from CRDs were restrained with belt-positioning booster seats. The remaining two thirds were restrained in lap or lap-shoulder restraints on the basis of most parents’ perception that their child was large enough to not require a booster seat. Fifty-seven per cent of the parents of these 3 to 8 year olds in seat belts actually owned but did not use a booster while driving (Ramsey et al., 2000). Winston et al., (2000) in a large sample population found seat belt use began at age 2 and was the most common form of restraint by age 4. Less than 1% of children older than 5 were restrained in a booster seat creating a greater potential for serious injury for children in seat belts versus CRDs (Winston et al., 2000). The literature focusing on use and misuse of CRDs addressed many contributing factors leading to the inappropriate restraint of young children. At present, research on booster restraints for children graduating from CRDs remains uncharted
territory, however valuable information from the available literature will be considered and will guide the present research.

*Intervention Research of Child Vehicle Restraints*

Health researchers have begun to test and develop strategies that promote and teach automobile restraint safety. Several creative plans to properly secure children in infant and/or CRDs have been the focus of study (Arneson & Tripplett, 1990; Block et al., 1998; Gaines et al., 1996). One American intervention study focused on CRD use and observed adults placing their child in a CRD in preparation for a ride (Gaines et al., 1996). A minimum of two days of training was required to prepare the health care personnel to detect use error and offer information and corrective education (Gaines et al., 1996). Health care workers offered these safety checks at day care centres, health fairs and shopping malls and were legally advised not to physically correct misuse themselves, but to describe to the parents the errors noted in restraint use (Gaines et al., 1996). A challenging aspect of this type of intervention is the extensive training required and the liability involved in advising correct restraint use for child passengers.

Another study implemented a similar intervention utilizing home visitation (Block et al., 1998). Nurses visited 149 rural and suburban homes in one state and assessed CRD misuse through observation as mothers prepared their infant or toddler for a ride. Nurses also physically manipulated the CRD to further assess for misuse (Block et al., 1998). Visiting nurses taught proper CRD use through verbal instruction and return demonstration utilizing the family vehicle. Again, the nurses’ training necessary to properly assess and instruct the use of CRDs was extensive relative to the multiple models of restraint devices
available. The clients appreciated the individualized teaching, but visits took longer than expected. Outcomes of the study indicated that three-quarters of the CRDs were used incorrectly, although the mothers were only aware of one-third of the instances of incorrect use (Block et al., 1998). The most frequent errors noted were loose harness straps restraining the child and the loose fit of the CRD to the vehicle seat (Block et al., 1998). Neither of these interventional studies offered longitudinal data to measure longevity of skill and information retention of the subjects (Block et al., 1998; Gaines et al., 1996).

A five-day educational program aimed at promoting automobile safety for preschoolers noted that the children were generally more knowledgeable after the program but little gain was observed in their actual use of seat belts or car CRDs (Arneson & Triplett, 1990). This finding supported previous research suggesting that education alone is not enough to effect a behaviour change in children (Arneson & Triplett, 1990). Developmentally, preschool children are still dependent on adults to ensure their safety in a vehicle and no formalized educational experience was provided for the parents during this study (Arneson & Triplett, 1990). Some of the interventions studied included, but did not exclusively focus on, booster seat use and education (Block et al., 1998; Gaines et al., 1996). Several sources of information are available as guidelines for teaching adults appropriate CRD selection and use of devices and recommend booster seats for children 18 to 36 kg (Anonymous, 1999; Committee on Injury and Poison Prevention, 1996; Weber, 2000).

Clearly, intervention programs are vital in supporting the prevention of physical injury to children in the event of a MVC. However, the training involved related to
knowledge of multiple CRDs and vehicle models, and the legal implications of providing advice in the United States, hinders the development of effective intervention programs promoting correct CRD use. Canadian intervention studies have not been documented in the current literature. Research to identify a CRD model that is easy to use in most vehicle types while offering maximum protection would assist in the effective implementation of educational interventions and prevent trauma related injuries.

*Injuries Associated with Vehicular Crash*

Much has been reported in the medical and nursing literature depicting injuries children sustain during a MVC. Health care professionals stressed the important differences in vehicle restraint devices in terms of design specificity for infants, young children and adults (Johnston, Rivara, & Soderberg, 1994; Weber, 2000). Research indicated adults prematurely move children out of a CRD and into a seat belt often without using a booster seat (Winston et al., 2000). The objective of a booster seat is to enhance the correct anatomical fit of the seat belt to the child’s body frame (see Appendix C) (German, Gardner, Howard, Mackay, & Letts, 1999). Young children, 4 to 9 years old have a lower centre of gravity when compared to the infant or toddler (Statter & Vargish, 1998). The body structure of young children differs from adults in that the intra-abdominal organs are less protected by the pelvis and bony thorax and the iliac crests of the pelvis are not sufficiently developed to adequately serve as anchor points for a belt, allowing it to ride up over the abdomen (see Appendix C) (Statter & Vargish, 1998).

Often a young child’s physical size impedes the proper use of the shoulder harness of the lap-shoulder or three-point restraint system, and it is placed behind the child’s back
creating a two-point restraint system (Weber, 2000). With rapid deceleration during a crash, the lap belt restraint acts as a fulcrum and allows excursion of the head and torso (Henderson, Brown, & Griffiths, 1998). Common patterns of injury in children restrained with seat belts are a direct result of such excursion and include spinal fractures, spinal cord injuries, head and neck injuries and abdominal injuries. Fatalities resulting from such injuries are not uncommon in young children (Ramsey et al., 2000; Winston et al., 2000).

Several studies have been conducted on injury patterns, restraint use and seating positions of children during a MVC (Berg, Cook, Corneli, Vernon, & Dean, 2000; Weber, 2000; Winston et al., 2000). Several authors agree that some restraint is better than no restraint in the event of a crash. However, when restraints are properly fitted to the occupant’s frame, the child is 2.7 times more likely to endure the crash without serious or fatal injury than the unrestrained child, regardless of seating position (Berg et al., 2000; Weber, 2000). The literature points to the unmistakable problem that our young children are inadequately restrained in vehicle seat belts following graduation from a CRD. The rationale for adults selecting this inadequate restraint over a booster seat has not been the focus of research to date.

In conclusion, a wealth of information and research focusing on children and vehicle restraints is available in the current literature. Transport Canada (1998) suggested that approximately 75% of children 3 to 4 years and 100% of children 5 to 9 years are properly restrained in vehicles. However the definition of “appropriately restrained” creates concern as only a small percentage of these same children utilize booster seats. Guidelines for growth and development indicate that most children would not meet the parameters for
seat belts until well beyond the age of nine (see Appendix A) (Wong, 1999). Current research identified multiple issues that affect the use and the correct use of CRDs, however most of this literature placed little emphasis on booster seat use (Decina & Knoebel, 1997; Margolis et al., 1992). Studies describing determinants of CRD use or interventions to promote the correct use of these devices largely originated in the United States. Although Canadians share parallel lifestyles, our social values and beliefs as well as our seat belt legislation are not alike, resulting in limited generalizability of American research findings (Gaines et al., 1996; Margolis et al., 1992). The pattern of injuries sustained in young children restrained by seat belts during a MVC is often serious, disabling or fatal (Berg et al., 2000).

Preventing injury to young children through proper vehicle restraint for this population remains the responsibility of the adult. The literature focusing on vehicle occupant protection for children over 18 kg is lacking, and Canadian research is limited to findings from Transport Canada. Despite gaps in the literature, current research findings guided this study in its examination of the types of child vehicle restraints used and the factors that contributed to use in Canadian families. Results of the study are intended to reflect the vehicle restraint behaviours of parents of young children in Ontario.
CHAPTER 3

Theoretical Framework

Revised Health Promotion Model

Potential trauma to young children resulting from MVCs is best addressed by using theoretical frameworks that focus on health promotion and injury prevention. Promoting health related behaviours and the utilization of an appropriate model to enhance such behaviour established the framework for this study. The revised Health Promotion Model (HPM) was the theoretical framework used to guide and develop new knowledge related to the factors influencing the selection of a child vehicle restraint (Pender, 1996). People are multidimensional creatures when interacting with their environment as they pursue health. The HPM attempts to explain this complex interaction (Pender, 1996). Various constructs from the expectancy-value theory and the social cognitive theory are blended to create the HPM (Pender, 1996). The social cognitive framework is "an interactional model of causation in which environmental events, personal factors, and behaviour act as reciprocal determinants of each other" (Pender, 1996, p. 53). It is the integrated components of the social cognitive theory, individual characteristics and experiences, behaviour-specific cognitions and affect and behavioural outcome, that lay the foundation of the HPM and its revised model and were of interest to this particular study.

Individual Characteristics and Experiences

There are seven assumptions of the HPM and they all suggest that a person must play an active role in order to mold and maintain health-related behaviours (Pender, 1996). One major assumption of the study was that the choice of a vehicle restraint for a child
requires a dynamic and active involvement of an adult, which in turn was influenced by multiple factors. Various researchers have investigated the explanation and prediction of health behaviours using the HPM, which have led to the modification of the framework, the revised Health Promotion Model (Pender, 1996). The revised framework (see Figure 1) suggests that individual characteristics and experiences effect the person’s behaviour-specific cognitions and affect, which then leads to a behavioral outcome, described as a health-promoting behavior (Pender, 1996). Prior related behaviour directly influences health related behaviours through the acquisition of habits. An individual may have engaged in an action automatically with little attention to detail, such as consistently fastening a seat belt once seated in a vehicle. Repetitive actions or habits of parental restraint use or misuse may have impacted the multiple factors of misuse of CRDs as previously discussed (Decina & Knoebel, 1997; Margolis et al., 1992).

Personal factors also fall under individual characteristics and experiences that are categorized into biological, psychological and sociocultural factors. Biologic factors include age, gender, strength or agility. The psychological category focuses on personal variables such as self-esteem, self-motivation, and personal competence. Personal sociocultural factors include race, ethnicity, education, and socioeconomic status. The components of the category of personal factors directly influence behaviour-specific cognitions and affect, as well as directly influencing the health promotion behavior (Pender, 1996). As previously described and supported by the literature, age, gender, race, relationship of the adult to the child, marital status, education, income and the child’s age or weight are biological and sociocultural personal factors that influenced health promotion
Figure 1. The Revised Health Promotion Model. Adapted from Health Promotion in Nursing Practice (3rd ed.), by Nola J. Pender, 1996, p. 67. Copyright 1996 by Appleton & Lange. Reprinted with permission of the publisher.
behaviours and were considered in this research (Decina & Knoebel, 1997; Margolis et al., 1992). The prior related behaviour of parents’ personal use of a seat belt was also considered (Decina & Knoebel, 1997; Margolis et al., 1992). Measurement of these indicators of vehicle restraint selection and use for young children were considered within this study.

**Behaviour-Specific Cognitions and Affect**

There are six components of behaviour-specific cognitions and affect, or motivational factors of the revised HPM (Pender, 1996). Noted at the top of the diagram (see Figure 1), is perceived benefits of the action. Anticipated benefits stem from outcomes based on the individual’s prior direct experience. The personal or observed experience of the outcome positively influences the anticipated benefit of a health-related behaviour (Pender, 1996). Preventing possible injury to a child vehicle occupant through proper restraint use or preventing a costly legal infraction by restraining all occupants could be viewed as perceived benefits and motivate the adult to engage in vehicle restraint behaviour (Margolis et al., 1992; Pender, 1996). Questions addressing the adult’s experience with prior personal or family MVCs and their perceptions of the importance of vehicle restraints were also included on the study questionnaire.

Following perceived benefits is perceived barriers to the action. Barriers are real or imagined, and involve the unavailability, expense, inconvenience, or time commitment of a specific action. The literature indicated issues of the complexity of the device, difficult product installation instructions, child fussiness and requiring the CRD for another child as some of the barriers to CRD use (Block et al., 1998; Decina & Knoebel, 1997). Based on
the current CRD literature, this research attempted to discover some of the specific barriers involved with implementing booster seats for young children.

Perceived self-efficacy and activity-related affect are the next two categories of the revised HPM. Self-efficacy within the model is a judgment of one’s own capability to plan and perform a specific action. Activity-related affect is the subjective feeling that one occurs before, during and after the behaviour, and the resultant feeling affects one’s decision to engage in the behaviour again or maintain the action long-term. Self-efficacy and activity-related affect were not relevant to this particular research.

Interpersonal influences form the fourth category under behaviour-specific cognitions and affect and are best described as the cognitive factors of behaviours, beliefs or attitudes of others (Pender, 1996). These cognitions may or may not be reality-based. Components of influence are norms, social support and models and these too were examined. Significant sources of interpersonal influences are families, peers, health care providers and legislative enforcement (Pender, 1996). Less than half of parents refer to the product manual for information on securing their child in a CRD, while others accept information from family, friends, sales personnel and nurses (Block et al., 1998; Decina & Knoebel, 1997). Legislation in Ontario mandates the restraint of all vehicle occupants establishing a norm for restraint behaviour (Ontario Provincial Offences, 1999). However, this established norm is not adhered to as 10% of vehicle occupants in Ontario were unrestrained as recent as 1999 (Transport Canada, 1999). This study investigated beliefs relative to the established restraint norm and beliefs associated with booster seat use.
Information regarding interpersonal influences is necessary for nurses to design interventions tailored to enhance booster seat use (Block et al., 1998; Pender, 1996).

Situational influences form the last component of behaviour-specific cognitions and affect of the revised HPM. These are actions that include perceptions of the options available, demand characteristics and the aesthetic traits of the environment (Pender, 1996). The selection of a restraint for a young child may hinge on issues of dependability of the device, ease of maintenance, ease of operation of the device and aesthetic attractiveness of the device (Batavia & Hammer, 1990). Questions addressing the selection criteria of the vehicle restraint for the young child were included on the survey questionnaire.

**Behavioural Outcome**

The behavioural outcome of the revised HPM involves the person’s commitment to an action plan and the initiation of the specific behaviour (Pender, 1996). The target behaviour will succeed if immediate competing demands can be avoided or resisted. Competing demands are environmental influences such as income restraints, vehicle size or needing the CRD for another child (Decina & Knoebel, 1997; Pender, 1996). These demands present a very low level of control for the adult to avoid or resist and directly affect the restraint selection for the child occupant. It is assumed by the present author that the proper protection of a young child in a vehicle presents a strong competitive demand, but the literature suggests otherwise. On average 85% of 3 to 9 year olds are restrained in vehicles according to the latest Transport Canada findings (1998). Restraint selection, frequency of use, perceived benefits and barriers were addressed during the study and the findings may direct future investigations of competing demands.
Other demands that threaten the successful implementation of a health related behaviour are personal preferences. Preferences are alternative actions with powerful abilities to compete for the decision to perform a specific action or activity. Preferences are viewed as demands under which the person has a considerable amount of control, and can be resisted based upon the individual’s ability to be self-regulating (Pender, 1996). Preferences relating to restraint use and vehicle destination were also considered during this investigation.

Empirical testing of the revised HPM had yet to be completed at the time of publication of the model, and this study explored a number of the components influencing the outcome behaviour (Pender, 1996). The results of this study may aid in the development of an intervention based on the revised HPM. The intervention could focus on enhancing the effectiveness of the adult’s selection and use of the appropriate vehicle restraint for the young child. Research conducted on the effectiveness of the intervention, as measured by the outcome of restraint behaviour for the child passenger, would offer the necessary empirical testing of the model.
CHAPTER 4

Method

Design

Survey research is a non-experimental descriptive research design. The aim of survey research is to acquire information related to the prevalence, the distribution, and the relationships of variables within a population. Survey research is flexible and broad in its scope and it is capable of an extensive, rather than intensive, range of data within the same survey (Polit & Hungler, 1999). Research examining the issue of the appropriate restraint of children 18 to 36 kg remains largely uninvestigated in Canada. This study offered an initial look at the parents’ or caregivers’ selection of vehicle restraint for their children and the possible factors that influence restraint behaviour for the child over 18 kg. The components of the revised HPM provided the framework for the research, and the multiple factors influencing a health-related behaviour supported survey research as an appropriate form to initially address this particular issue.

Participants in a sample population involved in survey research provide data through self-report, which is limited in content only by the respondent’s ability and willingness to report on the survey subject (Polit & Hungler, 1999). Self-reporting is limited in that the researcher can only assume that the information the respondent has offered represents exactly how he/she feels or what he/she knows (Polit & Hungler, 1999). A questionnaire is a data collection instrument of survey research and when compared to interview data collection, offers a unique form of confidentiality and anonymity as questionnaires can be self-administered (Polit & Hungler, 1999). Anonymity also enhances
the self-reporting process and eliminates interviewer bias and for these reasons, a questionnaire that could be independently completed without personal identification was designed for this particular study (Hulley & Cummings, 1988).

Sample

The sample was obtained by convenience. Parents of children 18 to 36 kg were accessed from public school-based latch key programs located in a large county in southwestern Ontario. The area is largely comprised of both urban and rural settings with a predominantly industrial economic base. The county has a population of 374,975 and consists of one large city, five towns and their rural perimeters (Statistics Canada, 2002).

A latch key program is an organization that provides before and after school supervision for students. Supervision is provided by Early Childhood Educators (ECEs) and parental involvement and input direct the mandates of the programs. The latch key programs were an appealing sample source as the administration utilized an uncomplicated research approval process. The administration approved the research to be conducted at all 13 of the English latch key programs located throughout the county, allowing for the opportunity to access a representative sample. The age range of the 741 children in the 13 programs registered for the autumn of 2001 was 3.8 to 12 years.

The selection criteria included the children in grades junior kindergarten to grade three inclusive and were approximately 4 to 9 years of age. This age range largely reflected the physical stature most appropriately restrained by a booster seat (Ramsey et al., 2000; Wong, 1999). There were 398 children between the ages of 4 and 9 years registered within the 13 programs, which comprised a total of 297 families. Questionnaires were distributed
to parents using the students’ schoolbags. The latch key staff deposited the survey in the schoolbags for the parents or adult caregivers to complete and return by mail if they chose to participate in the study. The participants were required to read and write the English language to complete one questionnaire per household. One hundred completed questionnaires were received contributing a total of 105 valid cases yielding a 34% response rate.

The Parents

The features of the sample population were relatively homogeneous (see Table 2). The distinguishing demographic characteristics of the sample were parental age greater than 35 years, university educated and a household income of greater than $80,000 per year (see Table 2). Statistics Canada (2001a, 2001b) indicated that 21.3% of family units held a university degree or higher and the average income for a two-parent family with children was slightly less than $73,000. Unlike the national statistics, the sample demonstrated a much greater representation of university education as well as higher household incomes.

The Children

The children ranged in age from 4 to 11 years with an approximately equal gender representation. Fifty-six per cent of the children were between the ages of 4 and 6 years and 45% of the dependents were 18 to 22.7 kg (refer to Table 3). Growth and development charts placed the majority of 4 to 11 year olds with a weight range of 16 to 37 kg in the fiftieth percentile, suggesting the sample children were of average developmental stature (see Appendix A) (Wong, 1995; Wong, Hockenberry-Eaton, Wilson, Winkelstein, & Schwartz, 2001). Only five of the dependents were reported to weigh over 36.4 kg (refer to
Table 2

*Descriptive Statistics of the Sample Population*

<table>
<thead>
<tr>
<th>The Parents</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age: 18 – 25 years</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>26 – 30 years</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>31 – 35 years</td>
<td>31</td>
<td>30</td>
</tr>
<tr>
<td>36 – 40 years</td>
<td>44</td>
<td>42</td>
</tr>
<tr>
<td>41 – 45 years</td>
<td>15</td>
<td>14</td>
</tr>
<tr>
<td>Over 45 years</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Female</td>
<td>89</td>
<td>89</td>
</tr>
<tr>
<td>Two-parent household</td>
<td>91</td>
<td>88</td>
</tr>
<tr>
<td>Caucasian</td>
<td>95</td>
<td>91</td>
</tr>
<tr>
<td>High school education</td>
<td>14</td>
<td>13</td>
</tr>
<tr>
<td>College education</td>
<td>40</td>
<td>38</td>
</tr>
<tr>
<td>University or Post graduate education</td>
<td>51</td>
<td>49</td>
</tr>
<tr>
<td>Household income: $\leq60,000</td>
<td>22</td>
<td>21</td>
</tr>
<tr>
<td>$61-80,000</td>
<td>19</td>
<td>18</td>
</tr>
<tr>
<td>$\geq80,000</td>
<td>62</td>
<td>60</td>
</tr>
<tr>
<td>Parent to the child</td>
<td>104</td>
<td>99</td>
</tr>
</tbody>
</table>

*Note. Total cases = 105; N = number; % = percentage based on total cases rounded to nearest whole digit.*
Table 3

Descriptive Statistics of the Sample Population

<table>
<thead>
<tr>
<th>The Children</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 – 6 years</td>
<td>58</td>
<td>56</td>
</tr>
<tr>
<td>7 – 11 years</td>
<td>46</td>
<td>44</td>
</tr>
<tr>
<td>Male</td>
<td>50</td>
<td>51</td>
</tr>
<tr>
<td>Female</td>
<td>49</td>
<td>49</td>
</tr>
<tr>
<td>Weight: &lt;18 kg</td>
<td>14</td>
<td>13</td>
</tr>
<tr>
<td>18 – 22.7 kg</td>
<td>47</td>
<td>45</td>
</tr>
<tr>
<td>22.8 – 27.3 kg</td>
<td>23</td>
<td>22</td>
</tr>
<tr>
<td>27.7 – 36.4 kg</td>
<td>16</td>
<td>15</td>
</tr>
<tr>
<td>&gt;36.5 kg</td>
<td>5</td>
<td>5</td>
</tr>
</tbody>
</table>

*Note.* Total cases = 105; N = number; % = percentage based on total cases rounded to nearest whole digit, < = less than, > = greater than.

Table 3), an adequate body weight for the appropriate fit of a vehicle’s seat belt assembly (Ramsey et al., 2000).

*Instrument*

The researcher developed a self-administered questionnaire, as other established instruments were not designed specifically for this area of study. The questionnaire consisted of a total of 27 questions (see Appendix D). The question content also
reflected the knowledge gained from the literature reviewed. The first ten questions were developed to elicit descriptive information on personal factors defined in the revised HPM. Biological personal factors such as age, gender and weight of the child are addressed, while race, education and income are sociocultural personal factors included on the questionnaire. Questions such as seat belt comfort and why seat belts are or are not important addressed the perceived benefits or barriers of the action. Social norms and social support are components of interpersonal influences, and were addressed in questions regarding vehicle restraint selection, use and frequency of use, as well as the law as a reason for the restraint selection. Questions concerning personal and family experience with MVCs and injuries are examples of situational influences included in the questionnaire.

Questions were designed to be clear and concise in their intent. An expert panel of five reviewed the instrument and offered some revision suggestions. Following the panel’s suggestions, additional questions were incorporated into the instrument to extend the quality and clarity of the data being gathered. The closed-ended questions offered a selection of possible alternatives enhancing a response from the participant, as these response options are quick and easy to answer. Questions allowing for more than one response were designed to increase the subject’s consideration of each response while weighting the response with a Likert scale reply for each response option (Hulley & Cummings, 1988). This feature of the instrument was incorporated following feedback offered by the expert panel members. An area for additional comments followed some of the questions to allow the respondent to submit a more detailed response to the question.
if their opinion was not reflected within the alternatives offered. Only one of the questions was open-ended and required the respondent to comment on their belief regarding the importance or unimportance of vehicle restraints.

The participant’s written response on the questionnaire reduced investigator biases inherent within direct interactions of interview survey research (Hulley & Cummings, 1988). The neat appearance of the questionnaire further promoted its user-friendly quality as indicated by the pilot study participants. The Likert scale responses for two questions were redesigned for improved clarity following an evaluation of the pilot study data. These participants also noted the time required to complete the tool was approximately five to seven minutes. There were no identifying markers on the instrument ensuring anonymity of the respondents (Hulley & Cummings, 1988).

**Pilot Study**

A pilot study was conducted prior to the initiation of the research. Ten families, all who owned vehicles and each with a child of the approximate target age and body weight, were selected by the researcher to complete the questionnaire. Parents were requested to complete the form and indicate any difficulties they encountered relating to question clarity or content. Seven responses were received and several commented on the ease of completing the form. Upon evaluation of the pilot study data, two of the Likert scale response options were redesigned offering more space between response selections enhancing the user-friendly quality of the tool.
Validity

Content validity addresses the appropriateness of the instrument items as they are related to the particular construct under investigation (Polit & Hungler, 1999). The questionnaire had not been previously utilized, but supported the construct of vehicle restraint behaviour performed for young children within the question content. Several of the questions were based on findings of prior research related to restraint device use with infants and toddlers and were consistent with the revised HPM framework (Decina & Knoebel, 1997; Margolis et al., 1992; Pender, 1996).

An initial draft of the instrument was developed and distributed to an expert panel for evaluation. The five reviewers were very familiar with the issues of motor vehicle occupant safety and trauma related to MVCs. The written feedback from the panel members indicated the instrument content reflected the intended construct. Suggestions for revisions to enhance the organization of the tool and expand the response options with Likert scales augmented content clarity. The addition of an operational definition of “booster seat” limited the instrument’s threat to validity and also resulted from panel feedback (Burns & Grove, 1997).

Following revisions, the questionnaire was piloted with a small group of parents reflecting the target population. Questionnaire responses and general comments regarding the instrument indicated vehicle restraint behaviour was clearly reflected in the question content (Hulley & Cummings, 1988). Pilot study participants commented on the organization of the questions, indicating the layout promoted clarity and a minimal
completion time. These features encourage subject participation enhancing the external validity or generalizability of the study (Burns & Grove, 1997).

Reliability

Reliability speaks to the degree of consistency with which an instrument measures the attribute it is designed to measure (Polit & Hungler, 1999). Measuring reliability focuses on one of the aspects of reliability: stability, equivalence, or homogeneity (Burns & Grove, 1997). Instrument homogeneity is determined by split-half reliability using Cronbach’s alpha coefficient and examines the extent to which the items of the instrument measure the same construct (Burns & Grove, 1997). Vehicle restraint behaviour performed by a parent for a child, as described in question 23 of the questionnaire (see Appendix D), generated a reliable coefficient of 0.8149. With a newly developed instrument, a reliability of 0.70 is considered acceptable (Burns & Grove, 1997). Further tests of reliability were not generated related to the design of the instrument questions. Future research utilizing this questionnaire would require a restructuring of the questions and response options to generate further reliability measures of parents’ vehicle restraint behaviour (Burns & Grove, 1997).

Procedure

The research proposal was reviewed and was approved by the Research Ethics Board of the University of Windsor prior to the study initiation. A verbal agreement to consider participation in this research was obtained by telephone from the latch key administrator. A written request and explanation of the study accompanied by a copy of the study questionnaire was then forwarded for the administrator’s consideration. Upon review
of the written explanation and questionnaire, the latch key administrator granted verbal permission to conduct the study. The study proceeded during the fall session as administration indicated summer enrolment is only one-third of the regular school year enrolment.

The researcher made telephone contact with the latch key staff of each of the 13 county programs to establish a mutual date to visit and to gain directions to the program location. All 13 programs were visited within four consecutive school days. The latch key programs are in operation Monday to Friday from 7:00 to 8:30 a.m. and again from 2:30 to 6:00 p.m. providing before and after-school care for school age children up to 12 years of age. The letter of explanation, the questionnaire, a stamped return envelope, and a reminder notice printed on bright pink paper were delivered to the latch key staff for distribution to each primary grade student in the program. Instructions regarding the distribution were verbally given to the lead staff member of each program along with a written copy of the instructions. Researcher contact information was available on the staff members' instruction sheets. The researcher distributed 406 questionnaires to the 13 latch key programs.

The children, junior kindergarten through grade three inclusive, delivered the letter, the tool, and the stamped addressed envelope home in their school bags to a parent or family caregiver to complete. Only one completed questionnaire per family was requested. The latch key staff were instructed to distribute the bright pink reminder notices to the students two weeks following the initial questionnaire distribution to further encourage participation in the study.
The latch key staff members were again contacted by telephone four weeks following the questionnaire drop-off to discuss the distribution process. None of the 13 programs were in need of more questionnaires to distribute. Only three of the programs stated that they had surveys left over, five at one program, twelve at another and approximately 25 at the third. The staff member of the program with 25 remaining surveys stated she had not personally distributed the questionnaire, but left them on the daily registration desk for parents to collect.

Another latch key staff member noted that all of the parents of her program completed the questionnaire and returned the sealed envelopes to her. This staff member stated that she personally deposited them in a Canada Post mailbox. All the programs indicated the reminder notices had been distributed approximately two weeks following the questionnaire distribution.

One parent telephoned the researcher with a message requesting a more thorough explanation of the Likert scale responses utilized in question 23. A brief explanation was left on the parent’s answering machine. No further contact from the parent ensued. One hundred (100) returned questionnaires were received to a rented mailbox in the eight weeks following the initial drop off to the programs. No questionnaires were received in weeks nine to twelve inclusive and the mailbox rental agreement was terminated.

Data Analysis

The researcher reviewed the data from the returned questionnaires. The demographic data of the parents and the children was categorical, ordinal and interval in nature and the findings from the frequency analysis are presented descriptively in Tables 2
and 3 (Polit, 1996). Due to insufficient numbers for statistical testing, parents’ age was grouped into two categories, under 35 years and over 35 years. Marital status was also grouped into two categories consisting of a two-parent household and a single parent household (see Table 2). Frequencies of the other descriptive factors addressed in the survey are presented in Tables 4 to 7 inclusive. Although not statistically supported, data from the multiple Chi-square tests performed suggested insight into the factors that influenced parents’ selection and use of a child vehicle restraint. Correlations utilizing the Pearson correlation coefficient were used to analyze the strength of association between various demographic factors and vehicle restraint behaviour for both the parent and the child (Shavelson, 1996). Significant associations were not found. Types of child vehicle restraints utilized were condensed into two groups, seat belts and booster seats for statistical analysis. The results were compared with current research literature and with provincial and national statistics where appropriate.

The responses to the open-ended question concerning the participants’ opinions of why seat belts are important or unimportant were analyzed utilizing content analysis (Polit & Hungler, 1999). Many parents wrote additional comments on the questionnaires and these were also included in the content analysis. The qualitative data is presented in text and aided to support the quantitative findings of the study.

Ethical Considerations

Prior to the distribution of the questionnaires, approval for the research was sought and granted by the Research Ethics Board of the University of Windsor. The confidentiality of study participants was protected by the anonymity of the questionnaire (Polit & Hungler,
1999). There were no inherent risks to the respondents through participation in the study. The letter of information (see Appendix E) described the nature and the intent of the study. Completion of the questionnaire and its mailed return via the stamped envelope provided indicated the respondents’ agreement to participate (Hulley & Cummings, 1988). There were no identifying markers on the questionnaires. Participation in the study was voluntary and participants were free to respond to any or all of the survey questions at their own discretion (Polit & Hungler, 1999).
CHAPTER 5

Results

The purpose of this research was to examine parents' behaviours and the factors that influenced these behaviours as they related to restraining their child vehicle occupants. The majority of the questionnaires were completed in their entirety, with very little missing data.

Parents' Vehicle Restraint Use, Experience and Beliefs

Parental vehicle restraint use was investigated as a possible influencing factor in the health promotion behaviour of child vehicle restraint selection and use. Parents reported that they wore their seat belts “all of the time” (see Table 4). This data was similar to provincial norms, as drivers 25 to 49 years of age operating cars and passenger vans, wore their seat belts approximately 93% of the time (Transport Canada, 2000). Noncompliance with seat belt use is a punishable and enforced offence on Ontario roadways (Ontario Provincial Offences, 1999). This enforced legislation is a likely contributor to the well-established norm of seat belt use in Ontario and was evidenced by this study’s findings and Transport Canada’s statistics (2000).

Experience indirectly impacts the health promotion behaviour through prior related behaviour and perceptions of benefits and barriers of the action (Pender, 1996). Ninety-nine per cent of the parents indicated they wore their seat belt with three fourths of the sample indicating they had been in a MVC (see Table 4). However, only six parents (6%) were seriously injured in a MVC. This may suggest that the perceived benefit of wearing a seat
Table 4

*Parents’ Use, Experience and Beliefs*

<table>
<thead>
<tr>
<th>Variables</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wear their seat belt</td>
<td>104</td>
<td>99</td>
</tr>
<tr>
<td>Wear seat belt “all of the time”</td>
<td>98</td>
<td>94</td>
</tr>
<tr>
<td>Yes, have been in MVC</td>
<td>80</td>
<td>76</td>
</tr>
<tr>
<td>Seriously injured in MVC</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Family/friend seriously injured/die in MVC</td>
<td>38</td>
<td>37</td>
</tr>
<tr>
<td>Perceive seat belts as “comfortable” to wear</td>
<td>59</td>
<td>56</td>
</tr>
<tr>
<td>Perceive seat belts as “somewhat comfortable” to wear</td>
<td>36</td>
<td>34</td>
</tr>
<tr>
<td>Feel seat belts are important</td>
<td>105</td>
<td>100</td>
</tr>
<tr>
<td>Restrain their child in vehicle</td>
<td>104</td>
<td>99</td>
</tr>
</tbody>
</table>

*Note.* Total cases = 105; N = number; % = percentage based on total cases rounded to nearest whole digit; MVC = motor vehicle collision.

Belt stems from experience. Data from the Ministry of Transportation of Ontario (1999) further mirrors the safety of seat belts, as almost 97% of reported collisions do not result in serious or fatal injury.

Although the majority of parents had been involved in a MVC, this was not associated with the frequency of parents’ vehicle restraint use \( \chi^2 (1, N = 104) = 0.15, p = .70 \). Frequency of use was further examined, and neither serious personal injury in a MVC
\( \chi^2 (2, \ N = 104) = 0.61, \ p = .74 \), or knowing a family member or friend who experienced serious injury or death from a MVC \( \chi^2 (1, \ N = 103) = 0.02, \ p = .89 \) were statistically supported.

Parents’ vehicle restraint behaviour measured by the reliability coefficient, was further measured utilizing t-tests. Prior MVC experience demonstrated a significant effect on parents’ vehicle restraint behaviour \( (p = .001, \ yes \ M = 2.88) \). This indicates that parents with MVC experience agreed with the components that comprised vehicle restraint behaviour. Those who had not experienced a MVC had significantly higher vehicle restraint behaviour scores when compared to those who had experienced a MVC \( (p = .001, \ no \ M = 3.46) \). Other factors examined did not generate significant measurements to reveal an effect on parents’ vehicle restraint behaviour.

When seat belts are worn “all of the time” this is a likely influence towards the parents’ perceptions of comfort or discomfort of the device. Only half of the parents described a seat belt as “comfortable”, but it was unanimous the device was important (refer to Table 4). Parents’ personal factors were investigated with their perceived comfort of a seat belt. Comfort was examined as “uncomfortable”, “somewhat comfortable” and “comfortable” with age \( \chi^2 (2, \ N = 99) = 2.72, \ p = .26 \), education \( \chi^2 (6, \ N = 100) = 2.51, \ p = .87 \), and income \( \chi^2 (4, \ N = 98) = 1.39, \ p = .85 \). The findings did not support these demographics as influencing the parents’ perception of seat belt comfort.

Comfort was also measured with parents’ frequency of use of the device. Although parents largely reported using a seat belt “most of the time” and “all of the time”, there was no relationship towards an “uncomfortable”, “somewhat comfortable” or “comfortable”
perception of the device $\chi^2 (3, N = 104) = 2.22, p = .53$. Perceived comfort could not be considered as a benefit or a barrier towards the frequency of seat belt use.

Parents' beliefs were examined to reveal their influence relative to vehicle restraint use and the possible benefits or barriers to use gained from experience. Parents described their beliefs of the importance of seat belts in their qualitative responses. The key factor revealed in the content analysis in response to why seat belts were important was clearly vehicle occupant protection. Comments such as "they (seat belts) increase your chance of survival", they "prevent ejection" and aid in avoiding "impact with objects in the vehicle" indicated knowledge of the benefits of the device. Statements that seat belts were "simple to use", "developed a good habit" and ensured that "children remained seated" further expressed parents' beliefs and revealed the acceptance of an established norm. There were no responses suggesting seat belt use posed a barrier to safety or comments suggesting negative situational experiences with seat belt use influenced current vehicle restraint behaviour. The qualitative comments supported a perceived benefit of protection and were positively associated with the use of the vehicle restraint by the parent and the child. The benefits of seat belts expressed by the parents can be best summed up in one parent's response, "The crash test dummy proved it".

*Child Vehicle Restraint Selection and Use*

The use of the selected child vehicle restraint represents the health promoting behaviour of this study (see Figure 1). The results indicated that over half (61%) of the children described were restrained with the vehicle's seat belt assembly (see Table 5). With
Table 5

*The Vehicle and Child Vehicle Restraint Selection and Use*

<table>
<thead>
<tr>
<th>Variables</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vehicle child frequently rides in: car &amp; sedan</td>
<td>47</td>
<td>45</td>
</tr>
<tr>
<td>van</td>
<td>39</td>
<td>37</td>
</tr>
<tr>
<td>sport utility vehicle</td>
<td>14</td>
<td>13</td>
</tr>
<tr>
<td>truck w or w/o extended cab</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Child restrained with:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>lap &amp; shoulder</td>
<td>54</td>
<td>52</td>
</tr>
<tr>
<td>lap</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>booster with lap &amp; shoulder</td>
<td>30</td>
<td>29</td>
</tr>
<tr>
<td>booster with lap</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Child “always” uses vehicle restraint in:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>neighbourhood</td>
<td>99</td>
<td>95</td>
</tr>
<tr>
<td>city</td>
<td>104</td>
<td>100</td>
</tr>
<tr>
<td>on highway</td>
<td>103</td>
<td>100</td>
</tr>
</tbody>
</table>

*Note. Total cases = 105; N = number; % = percentage based on total cases rounded to nearest whole digit, w = with, w/o = without.*

the exception of five children, none of the child passengers met the appropriate weight requirements to be properly secured by the lap and shoulder harness (Ramsey et al., 2000).

Approximately one-third of the children utilized the protection of a booster seat with the vehicle’s restraint device (refer to Table 5). Parents in this study reported a much
higher booster seat use and a lower seat belt use than the national statistics for 5 to 9 year olds. It must be considered that Transport Canada's (1998) most recent data on child vehicle restraint use (refer to Table 1) reflected 1997 national survey results, and may not accurately describe current child vehicle restraint practices in Ontario. Parents' personal factors were investigated as sources of influence with the type of child vehicle restraint used. Age $\chi^2 (3, N = 100) = 10.49, p = .015$, education $\chi^2 (9, N = 101) = 6.99, p = .64$ and income $\chi^2 (6, N = 99) = 9.04, p = .17$ showed no relationship towards impacting the type of vehicle restraint selected for the child.

An association between the child vehicle restraint selected and the weight of the child, while controlling for the child's age was conducted using a three-way Chi-square test. Results were not statistically significant due to insufficient quantities of data. However, the data did indicate that the 4 to 6 year olds were largely 18 to 22.7 kg and were restrained in a booster seat with the lap and shoulder harness $\chi^2 (12, N = 58) = 20.06, p = .07$, while most of the 7 to 11 year olds were greater than 22.7 kg and consistently utilized a lap and shoulder restraint $\chi^2 (4, N = 45) = 3.20, p = .53$. This suggests the parent is more likely to place the younger and lighter weight child in a booster seat and the older and heavier child within the vehicle's seat belt assembly. Unsolicited comments such as "we used the booster when our child was 4 and 5 years old", "I no longer use the booster seat" and "it's (booster seat) not cool" were common responses from parents whose children weighed less than the seat belt requirement of 36.4 kg.

Parents reported their children were most frequently transported in a car or a van (see Table 5). The type of vehicle the child most often rode in was not associated with
influencing the vehicle restraint selected for the child $\chi^2 (6, N = 101) = 4.17, p = .65$. The type of vehicle was also examined with those parents who own but do not use a booster seat. Results were not generated for this inquiry relative to insufficient numbers ($n = 18$). The literature noted that type of family vehicle presented a barrier to CRD use and also enhanced misuse relative to the available space for the device in the vehicle (Block et al., 1998; Murphy, 1999). In the absence of statistical support, the type of family vehicle did not present a barrier to booster seat use within the current study.

Results also noted that parents’ perceived seat belt comfort had no relationship to the type of child vehicle restraint selected $\chi^2 (12, N = 104) = 9.37, p = .90$. A three-way Chi-square test sought a relationship between the type of child vehicle restraint selected and the comfort of the child in the chosen restraint, while controlling for the perceived comfort of the parent. Most of the parents (56%) perceived seat belts as “comfortable”, and although the results indicated that parents agreed their choice of a child vehicle restraint was comfortable for the child there was no supported relationship influencing the type of child vehicle restraint selected $\chi^2 (8, N = 55) = 4.32, p = .83$. Prior research revealed child fussiness and discomfort as a barrier to using a CRD, however perceived comfort of the parent and the child cannot be associated as a barrier or a benefit of the action within the current study (Decina & Knoebel, 1997).

As previously mentioned, a significant number of parents (76%) had been involved in a MVC (refer to Table 4). Despite parents’ high collision involvement, the experience with this situation did not influence the type of child vehicle restraint selected $\chi^2 (4, N = 104) = 1.09, p = .90$. Results also revealed that children reportedly utilized the selected
vehicle restraints only 95% of the time while driving in the neighbourhood (see Table 5). Nationally in 2000, over 71% of all MVC injuries and fatalities were in urban settings with a speed limit at the collision site of less than 60 kilometers per hour (Transport Canada, 2001). Any unrestrained or improperly secured vehicle occupant is at great risk despite the limited distances travelled and the lower speed limits of the neighbourhood. The parents reported using the vehicle restraint for the child 100% of the time in the city and on the highway (see Table 5). The less use reported in the neighbourhood versus the city or highway may suggest parents perceive that an accident and injury is less likely so close to home.

Reasons Parents Selected Child Vehicle Restraint

The choice of a vehicle restraint for a young child remains the responsibility of the parent or adult caregiver. Table 6 lists the four most prevalent reasons parents made their particular choice. However, each of the nine reasons for the restraint selection listed on the questionnaire (see Appendix D) underwent Chi-square testing and correlation analysis with parent age, education, income and with the type of child vehicle restraint selected. No statistically supported relationships were noted.

Parents were in strong support that their choice of a child restraint was a safe choice (refer to Table 6). Parents that used a booster seat as their choice of child vehicle restraint were not statistically associated with choosing this restraint because it was safe \( \chi^2 (8, N = 97) = 17.51, p = .03 \). The fact that parents perceived their choice was safe and most of the children did not meet the weight guidelines for seat belt use suggests parents may lack the knowledge to appropriately measure safety.
Table 6

*Top Reasons Parents Selected Child Vehicle Restraint*

<table>
<thead>
<tr>
<th>Variables</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Child vehicle restraint chosen as:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>It is safe</td>
<td>90</td>
<td>92</td>
</tr>
<tr>
<td>Easy to use</td>
<td>81</td>
<td>81</td>
</tr>
<tr>
<td>Appropriate for child’s wt</td>
<td>80</td>
<td>81</td>
</tr>
<tr>
<td>This restraint required by law</td>
<td>82</td>
<td>81</td>
</tr>
</tbody>
</table>

*Note.* Total cases = 105; N = number; % = percentage based on total cases rounded to nearest whole digit. Valid percents calculated from “agree” & “strongly agree” responses.

Parents also selected their choice of a child vehicle restraint because it was “easy to use” (see Table 6). None of the seat belt or booster seat restraint selections were associated with ease of use as a reason for device selection $\chi^2 (8, N = 97) = 4.60, p = .80$.

Although ease of use did not influence the type of child vehicle restraint selected, the majority of children (61%) utilized the vehicle’s seat belt while booster seats remained underutilized. Parents viewed operating a seat belt as an easy task, which perhaps lead them to believe the device is comfortable for the child as well as the misconception that it was appropriate for the child’s weight. The data must also be applied to the small number of parents who selected booster seats and also found the device easy to use. Device operation presented barriers to use and promoted misuse of the legally required CRDs (Decina & Knoebel, 1997; Margolis et al., 1992). However, the operation of a booster seat
did not present a barrier to use and reasons for the underutilization of the device requires further inquiry.

The reason “it is appropriate for the child’s weight” was one the foremost selection reasons (see Table 6). However, there was no association between the vehicle restraint selected and a perception the device was appropriate for the weight of the child $\chi^2 (8, N = 93) = 11.16, p = .19$. The absence of a significant association suggests that parents lack knowledge of seat belt and booster seat guidelines, as selection was not based on appropriateness for the child’s weight.

The legal mandate of “it is required by law” also topped the list of reasons parents selected their child’s vehicle restraint. Restraining all vehicle occupants is a legal requirement, but an awareness of the law was not associated with a particular choice of child vehicle restraint $\chi^2 (8, N = 98) = 19.87, p = .01$. Currently provincial legislation does not require special restraint devices for the child 18 kg or greater, and parents placing children in the vehicle’s seat belt met current legislation requirements (Ontario Provincial Offences, 1999).

**Booster Seats**

Booster seat use was the optimal health promoting behaviour for children 18 to 36 kg. Booster seats promote the anatomically correct fit of the vehicle’s seat belt for the young child occupant (Weber, 2000). The study revealed that over half of the respondents (55%) owned a booster seat, but many (32%) did not use the device (refer to Table 7). Several parents perceived that their child had “reached a body weight (18 – 22.7 kg) where we no longer use it” or they “stopped using it at age 4”. Those that practiced booster seat
Table 7

**Booster Seat Use**

<table>
<thead>
<tr>
<th>Variables</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Households that own a booster seat</td>
<td>56</td>
<td>55</td>
</tr>
<tr>
<td>Have booster seat in every family vehicle</td>
<td>29</td>
<td>52</td>
</tr>
<tr>
<td>Booster seat is moved to vehicle child is riding in</td>
<td>45</td>
<td>80</td>
</tr>
<tr>
<td>Booster seat was acquired: retail</td>
<td>52</td>
<td>93</td>
</tr>
<tr>
<td>Booster seat selected for: ease of use</td>
<td>46</td>
<td>82</td>
</tr>
<tr>
<td>fits well into vehicle</td>
<td>36</td>
<td>64</td>
</tr>
<tr>
<td>high back</td>
<td>35</td>
<td>63</td>
</tr>
<tr>
<td>Own a booster seat but do not use</td>
<td>18</td>
<td>32</td>
</tr>
</tbody>
</table>

Child is <18 kg & not in a CRD                              | 8  | 57 |

*Note. Total cases = 56; N = number; % = percentage based on total cases rounded to nearest whole digit. Total cases for <18 kg = 14, < = less than, CRD = child restraint device.*

use did not always operate the device correctly. A few parents indicated operating a high back booster seat with the aid of only the lap belt, an incorrect and potentially dangerous application (Weber, 2000).
A large proportion of parents (80%) indicated they moved their booster seat to the vehicle the child was riding in (see Table 7). Results also indicated that 57% of the children less than 18 kg were not restrained in the vehicle by a CRD, and several were placed in the lap and shoulder harness of the vehicle.

As previously discussed, parents exhibited seat belt use as a norm and believed seat belts were essential equipment for occupant protection. The young child passengers most frequently utilized the lap and shoulder restraint and this behaviour was consistent once the child reached 22.7 kg and age 7. A smaller proportion of the parents implemented booster seats more regularly for smaller children, but the correct use of the device was not measured within this research.

The results of the study indicated that parents consistently utilized their seat belts, a behaviour likely attributed to the established societal norm and a belief in the protection of the device. The majority of the children over 18 kg were restrained using the lap and shoulder harness of the vehicle with fewer of the smaller and younger children utilizing booster seats with the lap and shoulder harness. Parents selected the child’s vehicle restraint with the firm belief that it was “safe”. Use of child vehicle restraints varied slightly with local and highway or city driving. Several parents owned but did not employ the security of a booster seat, while some indicated they previously owned and utilized a booster seat when the child was younger. Early graduation to the vehicle’s seat belt, whether it was from a CRD or a booster seat, was a common finding within this research. These findings offer an initial look at vehicle restraints utilized for young children in a Canadian setting and provide a foundation for future research endeavors.
CHAPTER 6

Discussion

The most compelling finding of this study was the notably low booster seat usage for children less than 36.4 kg. Parents were diligent in restraining their young children and believed their actions would enhance the child’s safety in the event of a crash. However, the majority of the children were restrained using the vehicle’s seat belt assembly.

One plausible explanation for seat belt use with young children may lie in the established norm. Seat belt use is an established norm in Ontario initiated with a legal mandate in 1976 (Transport Canada, 1995). The parents who participated in this study were in elementary school when this mandate was introduced, and many can likely recall family motor trips with a lap belt immobilizing them in the seat. These parents largely reported they utilized their seat belts while driving or riding, and this behavioural norm may have influenced their choice of a seat belt for their young child. Experience with a MVC was associated with vehicle restraint behaviour. The reported personal experience with non-injury MVCs was high among parents in the study, but similar to national findings (Transport Canada, 2000). Many parents experienced a MVC yet were uninjured due to the effectiveness of the seat belt. Thus, parents’ reliance on the seat belt to prevent injuries may be a powerful influence on how they restrain their children. Future research that investigates the influence of the seat belt ‘habit’ and the involvement in a MVC on the selection of a vehicle restraint for the young child would offer insight into the influences of socialization and previous MVC experience on parents’ use of safety systems for children.
Perhaps two of the more practical reasons for such infrequent use of booster seats are simply that they are expensive and are not required by law. Legislation and enforcement impacts vehicle restraint behaviour as Canadians have demonstrated with high rates of seat belt use nationally (Transport Canada, 1995). In contrast, the use of seat belts is much less frequent in the United States (U.S. Department of Transportation, 1998). American research demonstrated that information alone does not appear to impact vehicle restraint behaviour (Arneson & Triplett, 1990). Despite wide media and health promotion efforts focusing on the benefits of seat belt use, several American states still employ secondary enforcement laws with much lower seat belt use in comparison to the primary enforcement states (U.S. Department of Transportation, 1998).

Enforced legislation has influenced the establishment of a seat belt norm in Canada. This established norm points out that Canadians do not share similar beliefs and values as the American public when it comes to road and vehicle safety. In fact, one American study noted that those with a high school education or less felt that societal norms did not support the use of CRDs (Margolis et al., 1992). Findings from American studies do offer variables to be considered when designing research for a Canadian setting. However, as this study suggests, Canadians exist with a separate and unique experience from our American neighbours and it must be accounted for in research.

At present, limited research focused on booster seats has been conducted in both Canada and the United States. The absence of research findings impedes the lobby for legislative change mandating booster seat use. The benefit of booster seats is largely understated and may be viewed as an unnecessary expense given the present legislation and
the availability of seat belts. Future research needs to explore the influence of the current seat belt legislation on the choices parents make regarding the use of booster seats, as findings may support a change in the seat belt legislation.

The multiple relationships addressing parents’ personal characteristics, type of vehicle, collision and injury experience, beliefs and reasons for selecting a child vehicle restraint device were examined, but were not associated with selecting a booster seat. The most compelling argument to explain such infrequent booster seat use may be the parents’ lack of knowledge of seat belt guidelines and the benefits of booster seats. As previously stated, future research must focus on understanding the influence of vehicle safety legislation on parents’ behaviours and knowledge, as these must be recognized to offer effective interventions for enhancing booster seat use.

Booster seats are relatively new on the market in comparison to the legally required infant and CRDs, and a norm for their use has not been established. The introduction of booster seats arrived with little public education on the benefits of the device or the potential for injury to the young child related to an ill-fitting seat belt. Automobile manufacturers and the booster seat manufacturers do little to emphasize the benefits of a proper fit of the seat belt when aided by a booster seat. Physical guidelines for seat belt use are not readily found on vehicle seat belts or visible to the consumer on the booster seat packaging. Information regarding booster seat use is reaching the public as one-third of the children in this study revealed, however, seat belt use and early graduation of the child from a booster seat indicates a need for enhanced dissemination of information.
The literature clearly demonstrated that an inappropriate fit of the seat belt to the child’s small body frame poses a significant safety threat (German et al., 1999; Ramsey et al., 2000; Statter & Vargish, 1998). It is not unusual that parents perform behaviours for their children based on safety, and do not willingly place them in harm’s way. Parents must be unaware of the physical guidelines and the potential injuries seat belts may promote, as the majority of the children were too small for, but restrained with the lap and shoulder harness of the vehicle. If the results in this study are indicative of patterns of use in Ontario, 60% of Ontario children are utilizing seat belts, and an estimated 437,000 Ontario children are riding at risk (see Appendix F) (Ministry of Education, 2000). With the high frequency of use of seat belts, parents’ MVC experiences, the absence of a booster seat mandate and the lack of widely published seat belt guidelines, it is little wonder that parents graduated their children directly from a CRD to the vehicle’s seat belt (Ramsey et al., 2000).

The expense of booster seats may play a role in parents’ use of seat belts for the young child. However, it was puzzling that many parents owned a booster seat but graduated their child early, no longer utilizing the device frequently after age 6. This was also a similar finding in recent literature (Ramsey et al., 2000). The majority of parents reported they acquired their booster seats from a retail distributor. Starting at approximately $50 or more, this is a notable expense to prematurely store in the garage.

Early booster seat graduation behaviour requires further consideration. Does the advanced cognitive development, and perhaps protests, of the primary grade student over the previous less independent preschooler play a role in the decision to graduate the child early from a booster seat? Within the vast amounts of literature on parenting, it is
recognized that the behaviour of the child shapes the actions of the parent, and perhaps protesting 6 year olds influence the parent’s decision to enforce booster seat use (Fagot & Kavanagh, 1993; Ostberg & Hagekull, 2000). Physical growth spurts and developmental milestones, such as entering grade one, may also impact the parent’s vehicle restraint choice. Perhaps the parent views the grade one student “big enough” now that he or she attends school for full days every weekday. Does a heightened independence in the 6 year old’s behaviour aid to convince the parent the booster seat is now unnecessary? Future studies might begin to examine the influences of children’s behaviour on the parents’ selection and use of vehicle restraints for their children.

The question of social stigma impacting the young child utilizing a booster seat must also be asked. One mother reported that they no longer used their booster seat because “it was not cool” (to ride in a booster seat). Does a social stigma imposed by the child and peers impact the parent’s vehicle restraint selection? It must also be considered that the booster seat may be needed for a younger child, graduating the older sibling into the seat belt assembly early. This particular need was not specifically indicated in the qualitative comments, but remains a possibility. The parents only noted that their child was now “too big” for the device. Future studies need to question why the parent chose to graduate the child early, as this information is key to developing interventions promoting the effective use of booster seats until 36.4 kg.

While research must continue in the area of vehicle restraints for the young child, the injury outcomes of MVCs for children hasten nurses to intervene now. Parents recognize the benefits of proper occupant protection in the event of a crash, but lack the
knowledge of proper restraint as it relates to the smaller frame of the young child. Crash trauma to child passengers under the age of 11 resulted in seven (7) acute pediatric admissions in 2000-2001 in the community this research was conducted in. Twenty-six (26) children under the age of six were treated and released from the Emergency Department as a result of MVC passenger injury in the same year (Trauma Services Hotel Dieu Grace Hospital, 2001). In the year prior (1999-2000), trauma to children 1 to 10 years accounted for over 12,000 inpatient hospital days in Ontario. One hundred and eighty-two (182) patients under the age of 10 years suffered a catalogued injury as a passenger in a MVC (Ontario Trauma Registry, 2002). Intracranial head injuries and internal injuries to the chest, abdomen and pelvic organs were listed third and fourth in prevalence for the same age group only behind orthopedic and superficial injury categories (Ontario Trauma Registry, 2002). This data does not account for the long-term effects on health, education, or future productivity of these injured children. The community and provincial evidence clearly supports a need for immediate education and prevention measures.

The final issue noted from this study was the fit of the revised HPM as a context for understanding parents’ use of child vehicle restraints. A child’s behaviour, or response is a familiar key motivator for many parental actions. The revised HPM, although not empirically tested at the time of publication, was designed for adults performing health-related behaviours for themselves (Pender, 1996). Utilizing a portion of the revised HPM, the current study revealed a limited usefulness of the model as only a few components reflected plausible explanations of the parents’ vehicle restraint behaviours performed for their children.
One explanation may be that prior related behaviour of the revised HPM is proposed to have a direct effect on the health promoting behaviour through the formation of habits (Pender, 1996). The majority of parents used their seat belts, perhaps out of habit, or perhaps it was perceived as a benefit. This habit and/or perception of a benefit may have been transferred as they restrained their children in their vehicle, the majority of them in the lap and shoulder harnesses. However, knowledge of appropriate seat belt guidelines only contradicts any perceived benefit transferred to the young child, and parents are likely acting without accurate information. Perhaps the model requires a component addressing appropriate information or education regarding the targeted health promoting behaviour? The study also revealed that those who owned booster seats often did not use them, suggesting other variables may influence vehicle restraint behaviour for children. Without proper knowledge, the perceived barrier component of the model was likely influential for those parents who discontinued using the booster seats too early in the child’s development.

Seat belt use could be viewed as an established societal norm according to the revised HPM (Pender, 1996). Parents’ may have automatically transferred this behavioural norm to their children assuming it was safe and appropriate for their smaller body frames as well. Seat belt use may also be facilitated by a situational influence also noted in Pender’s model (1996). The situational influence of a previous non-injury MVC experience is a plausible stimulus for the parent to continue to utilize their seat belt and may motivate them to provide the same measure of safety for the child. Influencing variables such as knowledge and the relationship between the parent and child must be considered when
explaining a health-promoting behaviour for a child, and such are not accounted for in Pender’s (1996) model.

The model indicates that immediate competing demands or preferences present just prior to the performance of a health promoting behaviour (Pender, 1996). As previously discussed, some parents graduated the child prematurely to the vehicle’s seat belt assembly. Findings indicated that parents perceived their child was “too big” for a booster seat which suggests a perception of both a larger physical stature as well as a matured cognitive ability from the child. Future research could possibly reveal if the child’s response or resistance to using a booster seat performs as a competing demand or preference and discourages the existing health-promoting behaviour. This early graduation behaviour suggests that competing demands may play a unique role in health behaviours performed for children by parents that are presently not featured in the model.

The components of perceived self-efficacy and activity-related affect also did not apply to this particular study as previously outlined, and may not play any role in a model describing an action performed by one for the benefit of another.

The revised HPM offers a few components to consider with future child vehicle restraint research. It does not however, appear to offer a comprehensive view of health promoting behaviours performed by parents for children and other models need to be reviewed to shape future research efforts. Further study is vital, as empirical evidence offers nurses insight into behavioural influences to develop effective interventions and arms them with findings to lobby for legislative change.
Implications for Nursing Practice

It is important to note that most nurses currently are not equipped to educate parents on the benefits of booster seats and the potential dangers of seat belts, as most are not formally educated on the topic. It could be argued that the automotive industry or even law enforcement officers are better prepared than nurses to address vehicle safety. Financially the automotive industry is more capable, but unlike corporate educational campaigns, nurses can offer a personal approach to questions and their experience with the outcomes of MVCs adds relevance to the information. Law enforcement officers lack the experience of both the immediate and the long term effects that MVC trauma inflicts. Nurses are equipped with trauma injury experience and are recognized by the public as credible health educators, making them excellent advocates to convey the benefits of booster seats. However, efforts to educate nurses in a number of settings must precede any education plan directed at the public.

Once informed, nurses could implement interventions for screening and parent education for booster seat use in many health care and educational settings. Programs developed to inform parents of the potential dangers of seat belts and the benefits of booster seats could be presented at service clubs, ethnic help centres, seniors groups, schools, hospitals and public health units. The nurse practitioner, the emergency department triage nurse and the public health nurse frequently encounter young children and their parents, and nurses must take the opportunity to educate them on the benefits of booster seat use. Community health nurses visiting homes where young children reside or are cared for also need to educate families regarding the advantages of booster seat use.
Pediatric nurses in the hospital setting often have parents available throughout the patient’s hospitalization and must take the opportunity to encourage booster seat use for every vehicle ride.

Guidelines for vehicle seat belt use must reach the general public to enhance awareness. The information could be distributed or posted in any health care or community setting where parents and children congregate. Day care centres, elementary schools, science clubs, scouts, guides, summer camps, adult service organizations, vehicle service departments and shopping malls are just a few of the settings nurses could begin to educate.

Involvement in booster seat education programs would offer nursing students invaluable exposure to trauma prevention in a variety of health care and community settings. Nursing students provide supervised care in several health care settings with opportunities for booster seat screening and education for both children and adults. Nursing education programs must equip future nurses with the information and the experience to prevent MVC injuries and protect young Canadians.

*Partnerships and Legislation*

Nurses cannot tackle educating the public on booster seat use alone. The health care community must partner with automakers and booster seat manufacturers and engage the media to educate adults on the guidelines for seat belt use and the benefits of booster seats. The findings supported seat belt use and unanimously recognized the injury prevention benefit of the device. This awareness is a likely contributor to restraint habits, and it is possible with education, to encourage booster seat behaviour and norms for the child vehicle occupant. The physical recommendations for seat belt use could be posted on a
label sewn to the seat belt assembly or vehicle sun visor. Seat belt guidelines must be visible on the booster seat packaging reinforcing the parent’s safe choice in purchasing the product. Television, newspapers, popular magazines and cereal boxes are also excellent avenues to disseminate information to the masses. Traditionally nurses are better known as health educators within health care settings and are unfamiliar participating in these types of interventions. However, public funding for such educational activities is vital to success, and nurse consultants could offer considerable contributions to a corporate partnership.

In addition to urging manufacturers and the media to educate the public, nurses must become involved with lobbying for legislative change. Nurses have the knowledge and experience with the outcomes of MVCs. As expert patient advocates there is a crucial need for the profession to actively lobby for legislation changes mandating booster seat use. Transport Canada (1999) data clearly demonstrated an established norm of seat belt use across Canada that would not be evident without legislation and strong enforcement measures. Nursing can create change through information and knowledge. Gaining the support of strong politically active local and provincial organizations is a necessary step to encourage change at the government level. Without change, pediatric trauma will continue to devastate lives and rob Canadians of promising futures.

Limitations of the Study

Survey research and questionnaires can pose a threat to the representativeness of the sample. This particular research design was limited to those subjects who have an adequate command of the English language, particularly, comprehension and writing skills. This fact possibly eliminated the immigrant population from
participating in this study, as their English language skills may have been inadequate to complete a survey questionnaire (Polit & Hungler, 1999). Data collection was limited to families who access latch key programs, perhaps eliminating families of lower economic means who cannot afford the before and after school supervision.

The absence of male, ethnic, low income and less educated subjects restricted the representativeness of the sample and limits the projection of the findings to a larger provincial audience (Polit & Hungler, 1999). In future research, a random sample of parents nation-wide with children registered in school, grades junior kindergarten to grade three inclusive, would enhance the representativeness of the study findings (Polit & Hungler, 1999).

Survey research demonstrates several attributes of self-reporting desired for this particular study. However, self-reporting also presents the possibility of bias associated with social desirability, a misrepresentation by some to respond according to the prevalent social norm (Polit & Hungler, 1999). It is difficult to evaluate the impact social desirability had on the findings given the particular research approach conducted.

This study offered an initial look at vehicle restraints for children over 18 kg in Ontario and future research endeavors can only benefit from an awareness of the study’s limitations.

**Conclusion**

Trauma remains the leading cause of death of young children for the past 30 years (Block et al., 1998). Recent studies addressing vehicle restraint devices for children were conducted in the United States and omitted booster seat use within the investigations. This
study was limited in its representativeness relative to a homogeneous sample but contributes as an initial look at vehicle restraints for young children over 18 kg in a Canadian environment.

This study revealed that the majority of children, who should be restrained in a booster seat for maximum safety, are most often restrained in the lap and shoulder harness restraint. Some effort from parents to utilize booster seats was evident within this study and indicated some public knowledge and action towards occupant safety. However, this effort wanes after age 6 or 22.7 kg leaving young children vulnerable in a vehicle restraint device designed for a small adult frame (Ramsey et al., 2000). The lack of parental knowledge regarding seat belt guidelines and the benefits of booster seats, an established seat belt norm and an absent booster seat legislation were suggested as strong influences in the parents’ restraint choice for their children.

Nursing plays a significant role in health information and education. Knowledge and preventative measures promoted by hospital and community health nurses are the only defense against vehicular injuries to our young child occupants. Nurses, partnered with community organizations and businesses, can exhibit a tremendous impact on the knowledge of the public and the lawmakers to affect change. Protecting and promoting health for young Canadians is a responsibility requiring immediate attention and nursing must actively contribute in order to meet success.
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*Ontario trauma registry 2002 report.* (2002). Ottawa: Canadian Institute for Health Information.


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http://www.tc.gc.ca/roadsafety/STATS/c19804/eng


http://www.tc.gc.ca/roadsafety/tp2436/rs200002/en/tab4_e.htm


Trauma Services Hotel Dieu Grace Hospital. (2001). *Trauma pediatric statistics.* Windsor, ON.


protection (NHTSA Publication DOT HS 808 954). Washington, DC:

National Center for Statistics & Analysis.


APPENDIX A

Average Height and Weight Measurements for Young Children

<table>
<thead>
<tr>
<th>Age</th>
<th>Males</th>
<th>Females</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Height</td>
<td>Weight</td>
</tr>
<tr>
<td>4</td>
<td>101.25 cm</td>
<td>16.7 kg</td>
</tr>
<tr>
<td></td>
<td>40.5 in.</td>
<td>36.75 lb</td>
</tr>
<tr>
<td>5</td>
<td>108.1 cm</td>
<td>18.75 kg</td>
</tr>
<tr>
<td></td>
<td>43.25 in.</td>
<td>41.25 lb</td>
</tr>
<tr>
<td>6</td>
<td>114.4 cm</td>
<td>20.68 kg</td>
</tr>
<tr>
<td></td>
<td>45.75 in.</td>
<td>45.5 lb</td>
</tr>
<tr>
<td>7</td>
<td>120.0 cm</td>
<td>22.84 kg</td>
</tr>
<tr>
<td></td>
<td>48.0 in.</td>
<td>50.25 lb</td>
</tr>
<tr>
<td>8</td>
<td>125.0 cm</td>
<td>25.34 kg</td>
</tr>
<tr>
<td></td>
<td>50.0 in.</td>
<td>55.75 lb</td>
</tr>
<tr>
<td>9</td>
<td>130.0 cm</td>
<td>28.18 kg</td>
</tr>
<tr>
<td></td>
<td>52.0 in.</td>
<td>62.0 lb</td>
</tr>
<tr>
<td>10</td>
<td>135.6 cm</td>
<td>31.47 kg</td>
</tr>
<tr>
<td></td>
<td>54.25 in.</td>
<td>69.25 lb</td>
</tr>
<tr>
<td>11</td>
<td>141.25 cm</td>
<td>35.34 kg</td>
</tr>
<tr>
<td></td>
<td>56.5 in.</td>
<td>77.75 lb</td>
</tr>
<tr>
<td>12</td>
<td>147.5 cm</td>
<td>39.89 kg</td>
</tr>
<tr>
<td></td>
<td>59.0 in.</td>
<td>87.75 lb</td>
</tr>
</tbody>
</table>

Note. Average measurements = fiftieth percentile. Age noted in years. Adapted from Whaley and Wong's Nursing Care of Infants and Children (5th ed.) (p. 1919, 1924), by D. Wong, 1995, St. Louis: Mosby.

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Figure B1. Estimated population of junior kindergarten (JK) to grade three students in Canada 1996 & 1998. Adapted from “Population and Dwelling Counts, for Canada, Provinces and Territories, and Census Divisions, 2001 and 1996 censuses-100% data,” 2002, Statistics Canada; available:


Figure C.1. Positioning of a Seat Belt With and Without a Booster Seat.

A. Correct positioning of vehicle seat belt on a young child enhanced by a booster seat. B. Incorrect positioning of vehicle seat belt on a young child seated on the vehicle seat.
APPENDIX D

A Questionnaire on Vehicle Restraints

Please circle or mark the appropriate answers to all questions.

Information about you

1. Age: __Under 18 __18-25 __26-30 __31-35 __36-40 __41-45 __Over 45

2. __Male __Female

3. Marital status: __Single __Married __Divorced __Common law __Widowed

4. Race/ethnicity: __Caucasian __Black __Asian __Arabic __First Nations __Hispanic __East Indian __Other: ________________

5. Education: Mark the highest level achieved.
   __ some Elementary __Elementary
   __ some High school __High school
   __ some College __College
   __ some University __University
   __ some Post Graduate __Post Graduate

6. Household income: __less than $25,000 __$25-35,000
   __$36-45,000 __$46-60,000
   __$61-80,000 __more than $80,000

Information about your child (who brought home this questionnaire)

7. Age of the child: 4 5 6 7 8 9 10

8. Your child is: __ Male __ Female

9. Child’s weight: __ less than 18 kg (<40 lbs.) __ 18-22.7 kg (40-50 lbs.)
   __ 22.8-27.3 kg (51-60 lbs.) __ 27.7-36.4 kg (61-80 lbs.)
   __ more than 36.4 kg (>80 lbs.)

10. Your relationship to the child:
    __ Parent __ Step-parent __ Grandparent __ Caregiver (sitter)
    __ Other: ________________
11. Type of vehicle your child most frequently rides in.
   ___ car  ___ sedan
   ___ truck  ___ sport utility vehicle
   ___ truck with extended cab  ___ passenger van
   ___ other ____________________________

   Information about your vehicle restraint use

12. Do you wear your seat belt?    Y   N

13. How often do you wear your seat belt?

   ___ Never  ___ Sometimes  ___ Most of the time
   ___ All of the time  ___ Only with a child present

   Information about your experiences and your opinions

14. Have you ever been in a motor vehicle accident?    Y   N

15. If yes, were you seriously injured?    Y   N   Does not apply

16. Have any family members or friends been involved in a motor vehicle accident involving serious injury or death?    Y   N

17. Do you perceive a seat belt as a comfortable device to wear?

   ___ Uncomfortable  ___ Somewhat comfortable  ___ Comfortable  ___ No opinion

18. Do you feel seat belts are important?    Y   N   No opinion

19. Briefly state why you feel seat belts are important or unimportant.

   Information about your child’s vehicle restraint use

   Concerning the child who brought home this questionnaire:

20. Do you restrain your child in a vehicle?    Y   N
21. How is your child restrained in the vehicle he or she most commonly rides in?

___ lap belt  ___ lap & shoulder belt
___ booster seat with lap belt ___ booster seat with lap & shoulder belt
___ no restraint  ___ Other: __________________________

(A booster seat is a separate device, may have a high, low or no back and may or may not have handles/guides to route the vehicle seat belt through to secure the child.)

22. The child uses the above restraint when driving:

<table>
<thead>
<tr>
<th></th>
<th>Never</th>
<th>Rarely</th>
<th>Sometimes</th>
<th>Most of time</th>
<th>Always</th>
</tr>
</thead>
<tbody>
<tr>
<td>In the neighborhood</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>In the city</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>On the highway</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

23. I have chosen to use the restraint selected in Question 21 because:

\[
\begin{array}{cccccc}
\text{Strongly disagree} & 1 & 2 & 3 & 4 & \text{Strongly agree} & 5 \\
\text{It is safe} & 1 & 2 & 3 & 4 & 5 & \text{Don’t know} \\
\text{Easy to use} & 1 & 2 & 3 & 4 & 5 & \text{No opinion} \\
\text{Easy to clean} & 1 & 2 & 3 & 4 & 5 & \text{No opinion} \\
\text{It is appropriate for the child’s weight} & 1 & 2 & 3 & 4 & 5 & \text{Don’t know} \\
\text{It was affordable} & 1 & 2 & 3 & 4 & 5 & \text{No opinion} \\
\text{It is comfortable for the child} & 1 & 2 & 3 & 4 & 5 & \text{Don’t know} \\
\text{My child prefers it} & 1 & 2 & 3 & 4 & 5 & \text{Don’t know} \\
\text{This restraint is required by law} & 1 & 2 & 3 & 4 & 5 & \text{Don’t know} \\
\text{An accident is unlikely} & 1 & 2 & 3 & 4 & 5 & \text{No opinion}
\end{array}
\]
Other reasons I use the restraint indicated in Question 20:

24. Do you own a booster seat? Y N

(If yes please complete Questions 25 to 28. If no, stop here.)

25. Is there a booster seat in every vehicle you own? Y N

26. Do you move the booster seat to the vehicle the child is riding in (such as a second family vehicle or grandparents’ vehicle)? Y N

27. Where did you purchase/obtain your booster seat?

___ retail store
___ garage sale
___ second-hand store
___ new as a gift
___ used from family/friend
___ Other: ____________________

28. Indicate any feature(s) in a booster seat that you looked for:

___ appearance (colour/attractiveness)
___ Brand name
___ high back
___ low back
___ cost
___ easy to use
___ easy to clean
___ fits well in the vehicle
___ clear instruction manual
___ Other reasons: ____________________
APPENDIX E


Dear Parent, Guardian or Caregiver:

As a graduate student in the Masters of Science in Nursing Program at the University of Windsor, I am conducting thesis research pertaining to occupant vehicle restraint devices. I am particularly interested in vehicle restraints for young schoolage children. The intent of this study is to explore the present use and behaviours associated with various vehicle restraints. This research project has received clearance from the University of Windsor REB. You can direct any concerns about the ethics of the project to the Ethic Coordinator at (519) 253-3000 ext. 3916.

The purpose of this letter is to request your participation in this study by completing the attached anonymous questionnaire and return it by mail in the accompanying stamped return envelope. The questionnaire takes approximately 10 minutes to complete. No names or addresses are known to the researcher and the questionnaire was distributed to your child by the latch key staff.

Your participation is voluntary and you may complete all or part of the questionnaire should you choose to participate. Only one (1) completed questionnaire per family is requested. There are no risks involved by participating. Neither the researcher nor latch key staff will know who chooses to complete the survey. All study data will be anonymous. No individual results will be shared. Group findings will be shared with the latch key administration for distribution to families upon study completion.

If you have any questions regarding this research please do not hesitate to contact me or any of the persons listed below. I appreciate your time and consideration in completing this survey.

Sincerely,

Annette M. Scott, RN
254-5577 ext. 52305

Ms. L. Bunt
Administrator Essex County English
Latch Key Daycare
728-1188

Dr. A. Snowdon
Faculty Advisor University
of Windsor
253-3000 ext. 2275

Ethics Coordinator
Research Ethics Board University
of Windsor
253-3000 ext. 3916
APPENDIX F

- Population JK-OAC students in Ontario: 2,143,599
- Population JK-OAC students in Ontario: 693,122
- Estimated population of JK-3 students in Ontario utilizing seat belts: 436,667

*Figure F1.* 2000-2001 population of junior kindergarten (JK) to grade three students in Ontario utilizing seat belts as estimated from study findings. OAC = Ontario Academic Credit or grade 13. Adapted from “Quick facts. Ontario schools. Enrolment by Grade, 1998-99,” 2000-2001, *Ministry of Education.* Available:

VITA AUCTORIS

Annette M. Scott was born in 1964 in Belleville, Ontario. She graduated from Almonte and District High School in 1983. From there she went on to the University of Windsor where she obtained a Bachelor of Science in Nursing in 1987. Her nursing career has focused on critically ill adults and children. She is currently a candidate for a Master's of Science degree in Nursing at the University of Windsor and hopes to graduate in 2003.