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Baseline Knowledge Assessment of Cobb County Safe Kids Inspection Station Participants

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ABSTRACT

INTRODUCTION: The leading cause of injury and death among children in the United States is motor vehicle crashes. Even though laws have been amended and public awareness campaigns and education has increased, many children are still improperly restrained or not restrained at all. When correctly used, child restraints significantly reduce risk of injury or death in a motor vehicle crash.

AIM: The purpose of the questions is to exhibit the baseline knowledge of participants before receiving car seat education from certified technicians.

METHODS: Over an eight week period, Safe Kids Cobb County Car Seat Technicians distributed a 16-item survey, with 10 knowledge-based questions and 6 demographic questions to Inspection Station participants. Descriptive statistics were run and t-tests were calculated to determine if participant age, ethnicity, and gender were associated with overall knowledge scores. A simple linear regression test was run to determine the association between participant education level and total car seat safety knowledge.

RESULTS: One-hundred and sixty nine surveys were completed. Participant knowledge of car seat safety ranged from 0% to 90% on all ten items. No significant correlation between participant knowledge and age was found. The relationship between total knowledge and education level was found to be slightly significant. However, ethnicity and gender were found to be significantly associated with total knowledge scores.

DISCUSSION: The results from this study describe baseline knowledge among a sample of participants at Safe Inspection Station activities held in Cobb County, Georgia. These results can help inform tailoring of future programming so that the impact of enhanced health education / prevention messages for intended populations can be maximized.

INDEX WORDS: car seat safety, parental knowledge, survey research

BASELINE KNOWLEDGE ASSESSMENT OF COBB COUNTY SAFE KIDS INSPECTION STATION PARTICIPANTS

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Baseline Knowledge Assessment of Cobb County Safe Kids Inspection Station Participants

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER I

INTRODUCTION

1.1 Background

Childhood Injury

Childhood injury is the leading cause of morbidity and mortality among children between 1 and 18 years old (Morrongiello, 2008; Bruce, 2005; Safe Kids Worldwide (SKW), 2007). In the United States each year, 1 out of 4 children will need medical attention for an injury. (Morrongiello, 2008). The costs of childhood injury range from missing school or other daily activities, to physical morbidity and even death (Bruce, 2005). Many studies have shown that 90% of injuries can be prevented (Bruce, 2005) and reducing the risk of childhood injury is the most important part of an effective injury prevention program (Brown, 2006).

Over the last two decades, the United States has seen an overall reduction in mortality rates involving unintentional injury. In 1987, 9,041 unintentional deaths involving children under 14 years of age occurred. In 2004, this number dropped 38% to 5,638 deaths. Table 1 outlines the leading causes of unintentional injury deaths among children (SKW, 2007).

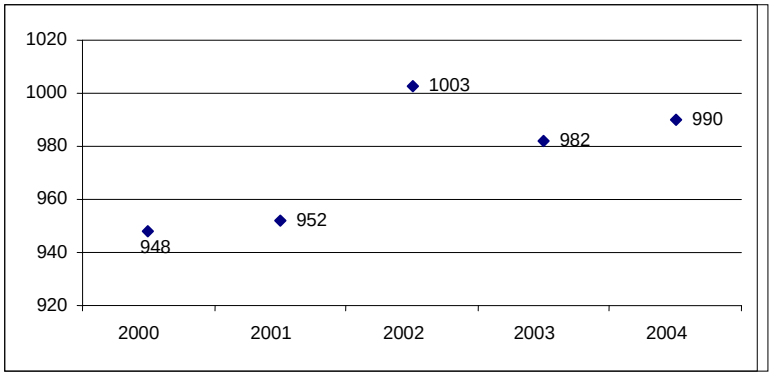
Table 1 Leading Causes of Unintentional Injury Deaths Among Children Ages 14 and Under from 1987 to 2004 (SKW, 2007)

Type of Incident	# of Deaths in 1987	# of Deaths in 2004	% Decrease/Increase
Motor vehicle crash	3,587	2,431	↓ 32%
Drowning	1,363	761	↓ 44%
Pedestrian Injury	1,283	583	↓ 55%
Fire and/or burn injury	1,233	512	↓ 58%
Suffocation	690	963	↑ 28%
Bike	389	132	↓ 66%
Falls	149	107	↓ 28%
Poisoning	100	86	↓ 14%
Firearms	247	63	↓ 74%
Totals:	**9041**	**5638**	**↓ 38%**

Motor Vehicle Crashes

In the United States, the leading cause of childhood injury and death is motor vehicle crashes (MVCs) (Hansen, 2004; Snowdon, 2009; National Highway Traffic Safety Administration, 2007; SKW, 2007). Even with laws, legislation, education, and mechanical improvements, MVCs are a health concern around the world (Hansen, 2004). In 2004, MVCs accounted for more than 43% of all childhood deaths from accidental injury (SKW, 2007). Every day, motor vehicle crashes claim the lives of 3,200 people worldwide (Snowdon, 2009). In 2006, in the United States, 5 children under the age of fifteen were killed in a motor vehicle accident each day; 568 children were injured. In the United States, it is estimated that around 975 children under the age of 14 die as a result of MVC's each year (Safe Kids USA, 2007). Figure 1 shows occupant death rate in children under 15, from 2000-2004.

Figure 1 Motor Vehicle Traffic Occupant Deaths, Ages 0 to 14, United States (Safe Kids USA, 2007)



In 2006, 42,642 motor vehicle crash fatalities occurred in the United States. Children under the age of 14 years old made up 4% (1,794) of these fatalities, 8% (208,000) of all injuries, and 7% (184,000) of vehicle occupants involved in the MVCs (NHTSA, 2007). From 1993 to 2002, 159 child deaths in children under the age of 12, were associated with airbag deployment. Investigators found that 69.2 % of child fatalities involved unrestrained children and 29.2% of the children were improperly restrained (Safe Kids USA, 2007). For all children under the age of fifteen, the total annual cost of death and injury caused by motor vehicle crashes exceeds $17.8 billion. For every $45 car seat purchased, society gains $1,800 in benefits. For every $30 booster seat purchased, society gains $2,000 in benefits (SKW, 2007).

Child Restraint Laws

There are mandatory seat belt enforcements in every state, except for New Hampshire (Insurance Institute of Highway Safety, 2009). In 38 states, these laws only cover passengers in the front seats. In 22 states and the District of Columbia, passengers in the rear seats are included in the legislation. In Georgia, a "primary safety belt law" is the policy (Georgia Traffic Injury Prevention Institute, 2007). This allows law enforcement officers to administer citations

solely for lack of seat belt use. In states with a "secondary seat belt law", the driver must be stopped for another violation, but can be given a ticket for not have their seat belt buckled. All passengers under the age of eighteen must be restrained by a seat belt, regardless of location in the vehicle or type of vehicle (GTIPI, 2007).

Every state in the United States, including the District of Columbia, has child restraint laws (IIHS, 2009; Safe Kids USA, 2007). These laws differ by state, but all require child passengers to ride in approved child restraint devices. In November 2006, 38 states and the District of Columbia tightened previous child restraint policy to include the use of booster seats or another type of appropriate child restraint system for all children under 10 years old (Safe Kids USA, 2007).

Each state has different policy involving the age that a child can be moved from a rear-facing position to a forward-facing position and from a child restraint to an adult seat belt (IIHS, 2009). In Georgia, effective July 1, 2004, children must be restrained if they are under the age of 6 (GTIPI, 2007; SKW, 2007; Georgia Office of Highway Safety, 2007).

In Georgia, the child restraint system, whether a safety seat or a booster seat, must be appropriate for the child's height and weight and must also be installed and used following the manufacturer's directions (GTIPI, 2007). Infants must be kept in a rear-facing seat until they reach the age of 1 and weigh at least 20 pounds (Safe Kids USA, 2007), Booster seats must be restrained using a lap/shoulder harness. Children under the age of 6, are required to ride in a rear seat if available (GTIPI, 2007; IIHS, 2009; GOHS, 2007).

If these laws are not followed, the person transporting the child will be fined $50 and will receive 1 point against their license. With a second conviction, the fine is raised to $100 and 2

points are placed on the driver's license. A citation can be given for each unrestrained or improperly restrained child (GTIPI, 2007). There are several exceptions to the Georgia law:

- If a car does not have a rear seat or if all rear seat positions are occupied by other child passengers, children under the age limit of six may ride in the front seat, as long as they are properly restrained.

- If there are not lap/shoulder belts in the vehicle, children over 40 pounds, riding in a booster seat, can be restrained using a lap belt only.

- If the driver can prove that the child is over 4'9'', a seat belt can be used instead of a booster seat or child safety seat.

- If the driver has a physician's note stating that a physical or medical condition prohibits the child from riding in a safety seat or booster, the child can ride unrestrained (GTIPI, 2007).

The laws are in place to protect children and prevent injury or accidents in motor vehicle crashes. In a study performed by the National Highway Traffic Safety Administration (NHTSA), evidence showed that most parents believe it is best practice to follow these state laws (NHTSA, 2007). However, most state laws, including Georgia's current legislation; do not meet American Academy of Pediatrics (AAP), NHTSA, or the National Safety Council (NSC) recommendations (GOHS, 2007).

Child Restraint Recommendations

Over the years, states have improved child restraint legislation, but there are still gaps in the laws that cause injury and death to occur. Many organizations provide best practice

guidelines for child restraint use. It is important that parents are not only aware of state legislation, but also guidelines provided by such organizations as the AAP, the NSC , and SKW, in order to prevent childhood injury or death in motor vehicle crashes (GOHS, 2007).

There are four different groupings of child restraints available to consumers and the type a child needs depends on the vehicle and the child's size and age. The four categories of car seats are infant seats, rear-facing convertible seats, forward-facing convertible seats, and booster seats. Table 2 provides a brief summary of these seats and the guidelines recommended by the AAP (AAP, 2009).

Table 2 American Academy of Pediatrics Car Seat Guidelines (AAP, 2009)

Age	Type of Seat	General Guideline
Infants	Infant-only seats and rear-facing convertible seats	All infants should always ride rear-facing until they are at least 1 year of age and weigh at least 20 pounds.
Toddlers/ Preschoolers	Convertible and combination seats	It is best to ride rear-facing as long as possible. Children 1 year of age and at least 20 pounds can ride forward-facing.
School-aged children	Booster seats	Booster seats are for children who have outgrown their forward-facing car seats. Children should stay in a booster seat until adult belt fits correctly (usually when child reaches 4'9" in height and is between 8 and 12 years of age).
Older children	Seat belts	Children who have outgrown their booster seats should ride in a lap belt in the back seat until 13 years of age.

It is recommended that all children under the age of 13 are properly restrained and ride in the back seat of the vehicle (NCS, 2009; AAP, 2009; SKW, 2007). Infants should ride rear-facing from birth until they reach the weight and/or height maximum specified on the car seat (NCS, 2009; AAP, 2009; SKW, 2007). Some manufacturers have started making rear-facing seats with higher weight and height limits to allow larger infants to remain facing backwards. If a seat has higher maximums, the NSC recommends keeping the child rear-facing until he

outgrows the limits (NCS, 2009). Safe Kids Worldwide recommends placing the child in a rear-facing seat until he reaches 30-35 pounds, if the car seat is made to hold an infant of this size (SKW, 2007). The minimum requirements for infant seats are to keep children rear facing until they reach 20 pounds and are one year old (NCS, 2009; AAP, 2009; SKW, 2007). This is the exact verbiage of Georgia's infant car seat law.

There are two types of seats for infants: infant-only seats and rear-facing convertible seats. Both seats are rear-facing, but infant-only seats can only face backwards, while rear-facing convertible seats can be turned forward. Infant-only seats are fairly small in comparison to the other types of car seats and they come with a carrying handle. This seat typically comes with a base that can be left in the car. The carrier is locked into the base when installed into the car. This type of rear-facing seat is typically used for an infant weighing somewhere between 5 and 22 pounds, with some models going as high as 35 pounds. The rear-facing convertible seats can be used longer than the infant-only seat because it can be "converted" from a rear-facing position to face forward (AAP, 2009). This seat is typically a bulkier than an infant-only seat and does not come with a base. The rear-facing convertible has a higher rear-facing weight and height maximum, making it a better option for larger infants (AAP, 2009).

The AAP makes the following recommendations for rear-facing seats:

- The car seat must be installed securely and have the harness snugly locked around the infant. The seat should not move more than 1 inch side-to-side and front-to- back. The harness should be tight enough, so that it cannot be pinched between the fingers.
- Rear-facing seats should only be placed in the back seats of a car. The air bags located in the front seats could cause serious injury or death, if activated.

- The harnesses must be located in the slots that are at or below the infant's shoulders. Move the position as the baby grows. The chest clip needs to be placed at armpit level.

- Make sure the seat belt used to secure the seat is located in the correct belt path position.

- Rear-facing seats must be installed at the correct angle. This prevents the child's head from flopping forward or to the side. Most seats have angle indicators that can help guide caregivers in the right direction, but 45 degrees is a good angle to aim for.

- Become familiar with the car's seat belts and child restraint attachments. Some cars have seat belts that do not lock and require the use of the locking clip that comes with the car seat. Cars made after 2002 may come with a LATCH system that provides an alternative way to secure the seat into the car.

Once the child reaches the height and/or weight limits of the rear-facing seat, a forward-facing convertible is the next seat utilized. There are two main types of forward-facing car seats. The forward-facing convertible is the same seat as the rear-facing convertible; it just places the toddler in a forward-facing position. The combination seat can also be used in two different formats; as a forward-facing seat with harnesses or as a booster seat without harnesses. The child's size determines if the harness system or seat belt is used (AAP, 2009).

The AAP suggests the following guidelines when using forward-facing seats:

- The harness system needs to be positioned to allow the shoulder straps to be located at or above the child's shoulders.

- If switching from a rear-facing to a forward-facing convertible, the angle of the seat may need to be changed. Follow the manufacturer's instructions.

- If the vehicle was manufactured after 2002, it should have a LATCH system that provides an alternative way to secure the seat. Make sure to follow the vehicle and car seat manuals when using LATCH.

- Cars made after 2000 are required to have tether anchors. Forward-facing seats come with tether straps that should be attached to the tether anchors. The tether system adds additional security to the top of the seat and protects the child's head during a MVC or sudden stop (AAP, 2009).

It is recommended to keep children in a forward-facing harnessed seat until the child weighs at least 40 pounds (NCS, 2009) and is four years old (AAP, 2009). If the seat has a higher weight limit, the child should stay in the harness system until he outgrows the seat (NCS, 2009).

Once a child reaches the height and/or weight limits of the forward-facing seat, a belt-positioning booster seat should be used. Booster seats do not have a harness system, but utilize the seat belt for restraint purposes. Booster seats make the child sit higher in the seat and ensure a proper shoulder/lap belt fit (SKW, 2007).

There are two different types of belt-positioning booster seats: high-back and backless. High-back boosters can be used in vehicles that do not have low head rests or no head rests at all. This option provides the same amount of back support found in forward-facing harnessed seats. Combination seats can be turned into a high-back booster by removing the harnesses. Backless boosters are for older, larger children that do not need the back support provided by the high-back option. This type of booster is cheaper and its small size makes it easier to move from vehicle to vehicle (AAP, 2009).

The AAP makes the following recommendations regarding booster seat use:

- Only secure a booster seat with a shoulder-lap belt system. Never use a lap-only belt.
- The lap belt should always be snugly placed across the child's upper thighs.
- The shoulder belt should fall over the child's shoulder and be placed across the chest. It is vital to make sure the shoulder belt does not touch the child's neck (AAP, 2009).

Children should stay in a booster seat until they are tall enough to make the adult seat belt fit properly (AAP, 2009). Safe Kids Worldwide states that seat belts usually fit children who are around 8 years old and 4'9" tall (SKW, 2007). The AAP widens the age range for seat belts to somewhere between 8 and 12 years of age (AAP, 2009). To ensure that the seat belt fits correctly, the child should be tall enough to sit up straight, with his back flush with the seat, and knees bent around the seat's edge (NCS, 2009). The lap belt must sit low and fit tightly around the child's upper thighs. The shoulder belt must sit away from the neck and land across the shoulder and the middle of the chest (AAP, 2009; NCS, 2009).

The AAP makes the following recommendations regarding seat belts:

- Do not allow the child to tuck the shoulder belt behind the back or under the arm. The shoulder belt is meant to protect the upper body of the child and if it is not properly placed over the chest, there is a great risk of injury from a sudden stop or motor vehicle crash.
- Do not allow passengers to share seat belts.
- Children who are tall enough to use a seat belt should remain in the back seats of the vehicle until they are 13 years old (AAP, 2009).

The AAP, the NSC, and SKW recommend having a certified child passenger safety technician check child restraints to make sure that they are properly installed (NCS, 2009; AAP, 2009; SKW, 2007). It is important for consumers to understand that there is not a "best" or "safest" seat. The "best" and "safest" seat is one that fits your child, fits securely in the vehicle, and is installed properly (AAP, 2009).

Effectiveness of Child Restraints

Overall death rates from motor vehicle crashes have been declining in the United States since 1999, but injuries and deaths caused by car accidents remain the largest contributor of childhood injury and morbidity (Basco, 2009). Several studies have reported that when child safety seats are properly used, it drastically reduces the risk of severe injury or death among children involved in motor vehicle crashes (Hansen, 2004; Beringer-Brown, 2005; Snowdon, 2008). In a motor vehicle analysis performed by the NHTSA, it was determined that proper use of child restraints can reduce the risk of death by 54% in toddler-aged children and 71% in infants (NHTSA, 2007; Snowdon, 2008; SKW, 2007). In 2006, 425 children under the age of 5 were saved because of a child restraint (NHTSA, 2007).

Although car seats significantly reduce risk of injury or death among children, misuse occurs regularly (Snowdon, 2009). In the United States, correct installation and use of child safety seats has been found to be between 17% (school-aged children) and 72% (infants). National studies have shown that at least 4 out of 5 child restraints are "unintentionally misused", increasing the risk of injury or death caused by a sudden stop or MVC (Snowdon, 2008). A 2009 study performed by A.W. Snowden et al revealed that 11.8% of children in the United States, who should have been restrained, were not in a child safety seat or seat belt

(2008). In 2006, 6,983 children under age 15 were victims of a fatal motor vehicle crash. When restraint use could be determined, 25% of those killed and 45% of the children who were injured, were riding unrestrained (NHTSA, 2007).

Child restraints are not easy to install or use, making mistakes fairly common. Each seat presents a slightly different installation process and using child restraints correctly involves several additional facets (SKW, 2007). Children must be transferred from one type of seat to another at the correct age and size. The car seat must be used each time the child is transported and it must be installed and positioned correctly in the vehicle. It is of utmost importance that the child is securely fastened into the seat and the harnesses are adjusted and tightened properly to provide security (Snowdon, 2008).

At SAFE KIDS BUCKLE UP events, held over the 17-month period from July 1997-November 1998, information about child restraint use was gathered by certified car seat technicians. This data showed that 85% of car seats were misused, with an average of 2 errors per seat. The study also determined the most common rear-facing or forward-facing misuses (Safe Kids USA, 2002). These misuses are documented in Table 3.

Table 3 SAFE KIDS BUCKLE UP Most Common Misuses in Child Restraint Installation (Safe Kids USA, 2002)

Type of Misuse	% of Misuse
Safety belt not holding seat in tightly	63%
Harness straps not snug	33%
Harness straps not routed correctly	20%
Harness retainer clip not at armpit level	19%
Locking clip not used correctly	17%
Safety belt not in locked mode	11%
Car seat recalled and not repaired	9%

The study also found that .2% (12 cases) of infants were placed in the front seat, in a rear-facing child restraint and 11% of children were turned forward-facing before they reached 20 pounds and turned 1 year old. These two findings were considered "egregious misuses" because they were more likely to result in death or serious injury if a motor vehicle crash occurred (Safe Kids USA, 2002).

A study conducted by NHTSA and published in March 2005, also determined the "critical misuses" found in child restraint installation and use. In this case, the phrase "critical misuse" was defined as "forms of misuse that could reasonably be expected to raise the risk of injury to a child in the event of a crash (Decina, 2005). The "critical misuse" measures used in the study were:

- Age and weight appropriateness
- Direction of child restraint system (CRS)
- Placement of CRS in relation to air bags

- Installation and secureness of CRS to the vehicle seat (tight safety belt)
- Secureness/tightness of harness straps and crotch strap of the CRS
- Use of locking clip for certain vehicle safety belts
- Fit of vehicle safety belt across child in belt-positioning booster seat
- Defective or broken CRS elements (Decina, 2005)

Six states (Arizona, Florida, Mississippi, Missouri, Pennsylvania, and Washington) were used in the study and data was collected for over 5,527 child restraints in 4,126 motor vehicles. The NHTSA found that 72.6% of the child restraint systems displayed one or more "critical misuses" (Decina, 2005). The most common misuses presented in the study involved looseness of seat belt securing CRS and looseness of harness securing the child. The highest levels of misuse were found among infants and toddlers; 83.9% of 497 infant-only seats, 83.5% of 140 rear-facing convertible seats, 81.9% of 1,247 forward-facing convertible seats, and 79.5% of 766 forward-facing-only seats (Decina, 2005).

Even with laws becoming stricter and the amount of education increasing, SKW and NHTSA studies show that too many children are still riding unrestrained or improperly restrained (Hansen, 2004). The results of the NHTSA "critical misuses" study shows the importance of all children riding in child restraints that are installed and used correctly.

Safe Kids Cobb County

Founded in 1987, by Children's National Medical Center and Johnson & Johnson, SKW is an organization with the goal of preventing accidental childhood injury. Worldwide, there are 450 Safe Kids coalitions in 16 countries that provide education and prevention programs to

educators, corporations, foundations, governments, and communities. In order to effectively meet its goal of reducing injuries (SKW, 2007), Safe Kids coalitions combine several factors when providing prevention and education programs, including:

- Educating adults and children
- Creating safe environments
- Conducting research
- Advocating for effective laws (SKW, 2007)

In the United States, there are 300 coalitions located in all 50 states, including the District of Columbia and Puerto Rico. Through injury prevention messages, safety devices, and hands-on training, Safe Kids has helped reduce the injury death rate by 40% in the United States (SKW, 2007).

Safe Kids Cobb County was founded in 1995 by WellStar Health System and Cobb & Douglas Public Health. The vision of this coalition is to provide the children of Cobb County with "a safe place to grow and play, free from unintentional injuries" (Safe Kids Cobb County, 2009). Through partnerships in the community, government, and other local organizations, the mission of Safe Kids Cobb County is to reduce the amount of unintentional injuries in children ages 14 and younger (Safe Kids Cobb County, 2009).

One method of reducing unintentional injuries in the target population is through the distribution of child restraints and education about their proper use. Safe Kids Cobb County has a permanent Child Safety Seat Inspection Station that is open to the public on most Tuesdays and Wednesdays. The inspection station provides caregivers with education on correct car seat

installation and use. Reduced priced seats are available for those who qualify (Safe Kids Cobb County, 2009). The data from this study was collected by certified technicians at the Child Safety Seat Inspection Station.

1.2 Purpose of Study

The purpose of this study is to evaluate the baseline child passenger safety knowledge of caregivers before going through formal education at the car seat inspection station. This thesis will examine the relationships between knowledge levels and the participant's age, education level, ethnicity, and gender to see if a more tailored education program is necessary.

1.3 Research Questions

This study will answer the following questions:

1. Is knowledge of child passenger safety directly related to the age of the caregiver?
2. Is knowledge of child passenger safety directly related to the education level of the caregiver?
3. Is knowledge of child passenger safety directly related to the ethnicity of the caregiver?
4. Is knowledge of child passenger safety directly related to the gender of the caregiver?

CHAPTER II

REVIEW OF THE LITERATURE

The relationship between demographic characteristics of caregivers and proper use of child restraints is not a heavily researched topic. The Snowdon et al. study conducted in 2008 concluded that caregiver characteristics are directly related to proper child restraint use. When research, such as the Snowdon study, finds relationships between knowledge, demographics, and the proper use of a safety device, the information and relationships can be used to impact the way educational messages and programs are delivered (2008).

The purpose of this study is to gain understanding about the caregiver and how their demographics affect knowledge level. The four demographic characteristics analyzed in this paper are age, education, ethnicity, and gender. This information can be used to improve current child passenger safety educational programs, increase child restraint use, decrease child restraint installation errors, and ultimately, decrease childhood injury and death caused by motor vehicle crashes.

2.1 Caregiver Knowledge

The installation and use of child safety seats makes it difficult for most parents to use child restraints properly (Lane, 2000). A majority of unrestrained children are not in child safety seats because of the lack of knowledge in caregivers (Spanier, 2002; Lane, 2000). Specific

knowledge issuing facing most parents include: difficulty correctly installing child restraint, correctly securing the child into the safety seat, and understanding which type of seat (infant, convertible, booster) the child needs (Lane, 2000).

The study by Lane et al. shows that the best way to educate caregivers is to provide hands-on instruction by a certified professional (Lane, 2000). A 2004 article published in the American Journal of Health Studies, proves that car seat inspection stations increase the self-efficacy of caregivers by 11% and knowledge by 14% (Jones, 2004). Education provided by a certified technician is a best practice recommendation from the AAP and the NHTSA (NHTSA, 2007; AAP, 2009)

2.2 The Relationship between Caregiver Knowledge and Demographic Characteristics

Age

There are a number of studies that present findings on the relationship between age and correct use of child restraints. Most studies conclude that increased parent age is associated with higher rates of proper child restraint installation and use (Bracchitta, 2006; Lane, 2000). In 2008, Snowdon et al. studied the predictors of child restraint misuse in Ontario, Canada. 1,263 participants in an urban area of Southwestern Ontario and a rural area in Northern Ontario completed a knowledge-based survey. Most study participants were over the age of 36, but the age ranges were characterized from less than 25 years old, to greater than 45 years old. For the most part, the results showed a higher correct installation and use rate in the participants in the older age groups (Snowdon, 2008). Table 4 displays the findings:

Table 4 Demographic Variables for Parents/Caregivers and Variables for Correct Use of Child Safety Restraint Devices (values based on per child) (Snowdon, 2008).

Age	**Total sample *n* (%)**	**Correct use *n* (%)**
Under 25	10 (0.6%)	7 (70.0%)
26- 30	133 (6.7%)	98 (73.7%)
31- 35	407 (19.6%)	328 (80.6%)
36- 40	861 (40.5%)	679 (78.9%)
41- 45	557 (26.2%)	446 (80.1%)
Over 45	157 (7.4%)	127 (80.9%)
Total	2125 (100%)	1685 (79.3%)

The Robinson et al. (2002) study involving 688 parents found that a number of demographics, include parent age, effected use of child restraints. In the study, researchers showed parents three pictures and parents were supposed to choose the picture of the car seat that was properly installed. Those parents over the age of 22, were more likely to identify the correct picture when compared to the younger parents (Robinson, 2002).

A 2008 study by Tsoumakas et al, conducted in Greece, found that parent knowledge regarding child passenger safety is associated with the age of the mother, but not the father. The study produced results which characterized the older mothers as "more informed" (Tsoumakas, 2008). Studies by Lane et al. (2000) and Bracchitta (2006), also provided evidence that the caregiver's age effects proper use of child restraints (Bracchitta, 2006; Lane, 2000).

Education Level

Bracchitta's research determined that the educational level of the female caregiver was the highest predictor of child restraint knowledge and correct installation. The higher level of

education achieved by the mother, indicated a greater knowledge of child passenger safety. This study also indicated that the lack of child passenger safety knowledge seen in lower socioeconomic statuses, might be related more to the lower levels of education in this population, than the actual socioeconomic levels (Bracchitta, 2006).

The Snowdon et. al study mentioned above also shows a direct correlation between education level and correct use of child restraints. With every increase in education level, the percent of correct use increases. The caregivers involved in the study, range in education level from some high school (3.4% of the caregivers; 73.6% of correct use of car seats) to post-graduate degrees (10.6% of the caretakers; 83.6% of correct use of car seats). The majority of the population studied earned a college diploma (35.3%), and their correct use rate was 76.6% (Snowdon, 2008). Snowdon explains these results with the possibility that the more educated individuals are more likely to understand and practice a "culture of safety" that involves awareness of risks and taking proactive measures to avoid the known risks (2008).

The Toumakas et al. research produced similar results. The more educated caregivers were more informed about risk and prevention of injuries in motor vehicle crashes. Toumakas explained these results by indicating that more educated parents are more willing to obtain information concerning current issues (2008).

Ethnicity

A 2002 study conducted by Safe Kids USA, involving a sample size of 9,332 children in 6,297 vehicles, indicated that minority children (23%) were more likely to be unrestrained than Caucasian children (10%). Most research involving ethnicity data, shows that minority

populations have lower rates of correct child restraint use and installation, when compared to the Caucasian participants (Lane, 2000; Safe Kids USA, 1999).

The Robinson et al. study that involved choosing the picture of the correctly installed child restraint, concluded that African-American parents were the population least likely to choose the correct picture (Robinson, 2002). Bracchitta's research reached similar conclusions, showing that African-American mothers had the lowest scores on the child passenger safety questions involved in the study (Bracchitta, 2006).

Additional research performed by Safe Kids USA, shows that children 14 years and younger, who are of the American Indian and Alaska Native ethnicity, are almost one and a half times more likely than white children to die in a motor vehicle crash (SKW, 2007). This same study indicates that Hispanic children under the age of 5 are one and a half times more likely to die in a car accident, than a non-Hispanic child (SKW, 2007).

The Safe Kids and Robinson et al. studies indicate that more minority children are not restrained properly, or at all, while riding in motor vehicles. The second Safe Kids survey, continued the research and found that more minority children die in crashes than their Caucasian counterparts. Multiple places throughout the paper indicate that when children are properly restrained in a correctly installed child safety seat, risk of injury or death dramatically decreases (SKW, 2007).

The Lane et al. (2000) study of hands-on instruction and other forms of education, showed that the Asian population had fewer installation errors when compared to Caucasian participants (Lane, 2000).

Gender

Gender is the least researched demographic characteristic of the four presented in this paper. In most studies involving demographics, it was not used for analysis. When gender is included as part of the research, most studies show that females have a higher knowledge rate about child passenger safety (Snowdon, 2008; Tsoumakas, 2008)

The Canadian study by Snowdon et al. indicates that females were more likely than males to install and use child restraints correctly. Females correctly used child restraints 79.8% of the time, compared to 75.0% found in males. Snowdon suggests that females are "more aware" of the correct ways to use car seats (Snowdon, 2008). Male caregivers in the study even indicated that the child restraints were "their wife's territory" (Snowdon, 2008). It is also a possibility that male caregivers would be less likely to ask for or accept education or assistance involving child passenger safety (Snowdon, 2008).

The Tsoumakas et al. study, showed that older female caretakers had more information about car seats and child passenger safety, than younger mothers. This data does not produce the same results when analyzing the age of the fathers. This could indicate the strong cultural roles of females and males. The mothers have more of a responsibility in the raising the children, whereas the fathers are responsible for providing for the family (Tsoumakas, 2008).

Other Caregiver Knowledge and Behaviors

Safe Kids Worldwide indicates that driver seat belt use is directly correlated with child restraint use. One study showed that almost 40% of children, who rode with unbelted drivers, were also completely unrestrained, compared to 5% of children who were being transported by belted drivers. This same study also indicated that 96% of parents believed their child's seat was

correctly installed, but nearly 73% of the car seats were "critically misused" (Decina, 2005; SKW, 2007).

Another study conducted by SKW estimated that children under the age of 13 can decrease the risk of death by 36%, if seated in a rear seat instead of the front seat. However, estimates show that nearly one-third of children are allowed to ride in the front seat. Children being transported by unbelted drivers, children who are the only passengers in the vehicle, and children over the age of six are all more likely to be seated in the front seat of a motor vehicle (SKW, 2007).

Children ages 4 to 9, present an interesting problem in regards to child passenger safety. This group has outgrown traditional child restraints, but in regards to height and weight this population is still too small to safely use a seat belt (Hansen, 2004). A study by Simpson et al. indicates that as many as 86% of children, who should be using belt-positioning booster seats, are instead using seat belts (Snowdon, 2008). Several studies conducted in the United States and Canada reported that caregivers may not be aware of the dangers of premature graduation into a seat belt. A study performed by Safe Kids Canada reported that 84% of caregivers believed their child was too big or too old to be using a belt-positioning booster (Snowdon, 2008; Bruce, 2005).

2.3 PRECEDE-PROCEED Planning Model

The PRECEDE-PROCEED Planning Model, developed in the 1970's and based on the Socio-ecological theory, is used in many health education and promotion community programs (Green and Kreuter, 1992;). In this health model, program planners start with health objectives and work backwards to decide what plans need to be implemented to achieve objectives. One of the key goals when using PRECEDE-PROCEED is to provide a health intervention that

improves quality of life in target individuals and in the community. This model is only successfully implemented when program planners collaborate with health professionals and other community members (Green and Kreuter, 1992).

PRECEDE is an acronym that stands for: Predisposing, Reinforcing, Enabling Constructs in Educational/Environmental Diagnosis and Evaluation. Figure 3 shows that PRECEDE makes up the first four steps of the planning model. These phases help planners identify health or safety problems and examine available resources (Green and Kreuter, 1992).

PROCEED stands for: Policy, Regulation, and Organizational Constructs in Educational and Environmental Development. Figure 3 shows that PROCEED makes up the last four phases of the planning model. These phases involve program implementation and evaluation (Green and Kreuter 1992).

For the purpose of this study, Phase 4, Educational and Organizational Diagnosis, will be the only phase utilized. Phase 4 involves three different types of factors:

- Predisposing factors- individual knowledge and affective traits
- Enabling factors- factors that make it possible to make a change
- Reinforcing factors- feedback and encouragement resulting from a changed behavior (Green and Kreuter, 1992)

The research presented in this study, evaluates the individual knowledge, or predisposing factors, that caregivers have concerning child passenger safety. From this study, programs can be created that focus on these factors and provide the effective enabling and reinforcing factors to change the baseline knowledge and behaviors of caregivers.

2.4 Specific Programs/Interventions

Injury prevention strategies have been proven to reduce or prevent injury or death, when community partnerships, involving education, legislation, and law enforcement, are utilized (Bruce, 2005). In most states, child restraint laws do not match best practice recommendations (NHTSA,2007). However, two specific programs, *The Boost 'em in the Back Seat Safe Ride Program* and an example of a hospital-based education program, exemplify how community partnerships can be valuable educational resources for caregivers.

Boost 'em in the Back Seat Safe Ride Program

In recent years, researchers have evaluated the use rates of belt-positioning booster seats, and many of these programs have helped dramatically increase child restraint use in older children (Will, 2009). Will et al. (2009), performed a program evaluation in Virginia that used educational videos to change views and efficacy through increasing the caregiver's knowledge of perceived risk (Will, 2009). The *Boost 'em in the Back Seat Safe Ride Program,* was specifically designed to increase risk perception and increase booster seat use in 4-8 year olds. The program presents parents with a 6-minute video that aims to "evoke a high sense of vulnerability to motor vehicle hazards and provide parents with the knowledge to protect one's family from motor vehicle risks" (Will, 2009). At the time of publication, the program was thought to be the first to specifically target caregiver risk perception in order to increase safety seat use (Will, 2009).

The program results showed a positive reception from caregivers. 99% of participants believed that all parents who have children in the target population should see the video and 86% felt that they learned a great deal from the viewing. The study also showed several changes in parent's perceptions of child passenger safety. When compared to the control group, parents who

viewed the video felt stronger regarding seating position in the vehicle (front seats vs. rear seats); had increased comfort levels in regards to booster seat installation; had increased confidence about getting children to sit in a booster seat; and no longer viewed cost as a barrier (Will, 2009).

Overall, the *Boost 'em in the Back Seat Safe Ride Program* successfully used high-threat messages to change caregiver risk perception and increase booster-seat use by 16%. Since the study, the booster laws in Virginia have changed to require anyone under the age of 8 to ride in a booster seat. The previous law involved children who were less than 5 years old. The Will et al. study, not only changed parent perception, but also changed legislation (2009).

Hospital-Based Child Passenger Safety Program

A study performed by Weiss-Laxer et al, focused on an intervention involving the use of educational programs and distribution of discounted seats. Based in a hospital, this program aimed to improve child safety through increasing caregiver knowledge and practices. Education was provided for 1 hour in a group, bilingual setting, to a population made up of mostly Hispanic (78.5%) women (93.7%), who were foreign-born (77.2%). Six months after the educational class, the participants were contacted via phone and a 15-minute survey was performed (Weiss-Laxer, 2009).

The study found that there was a statistically significant decline in caregiver knowledge regarding car seat transitions and child safety laws, with odds ratios of .35 and .16, respectively. The most commonly reported motivators used to increase child restraint use were safety and fear of law enforcement. The most commonly reported barriers to child restraint use were lack of time and lack of understanding that car seats reduce childhood injury and death (Weiss-Laxer, 2009).

The program, formatted very closely to the Safe Kids Inspection Stations, presented several programmatic changes for future study. These included providing parents with reminders in order to maintain child passenger safety knowledge and incorporating parental motivators and barriers into the educational class (Weiss-Laxer, 2009).

2.5 Summary of Literature Review

Installing and using a child restraint properly is a difficult task for most parents (Lane, 2000). Most unrestrained children are not in child safety seats because of the lack of caregiver knowledge. Research has proven that there is a relationship between the caregiver's demographic characteristics and their knowledge of child restraints (Snowdon, 2008). A number of studies show the direct correlation between age, education level, ethnicity, and gender (Snowdon 2008; Bracchitta, 2006; Robinson, 2002; Tsoumakas, 2008; Lane, 2000). The relationship between these demographic characteristics and parent knowledge will be further reviewed in this study.

Chapter III

METHODOLOGY

3.1 Data Sources

The data used in this thesis was collected at Safe Kids Cobb County Car Seat Inspection Stations. These events, held every Tuesday and Wednesday, provide child restraint education for parents and other caregivers. The data involved in this study was collected from July- September 2009. For the purpose of this thesis, the data is considered secondary.

The 16-question survey was given to parents as a way to test baseline knowledge before receiving education from certified technicians. The first six questions involved the caregiver's demographics. The other 10-questions were to test parent knowledge of child restraints. The survey was administered by certified car seat technicians, but caregivers recorded their own answers. Participant identity was kept anonymous. Spanish and English options were available to participants. Refer to Table 5 for survey questions and answers. The answers are in bold.

Table 5 Caregiver Survey

Questions	Answers
What category best describes you?	African American/Black Hispanic or Latino/Latina American Indian Asian Caucasian Other
What is the highest level of educational you have completed?	Grade school High school Technical College or Associate Degree Bachelor's Degree Advanced Degree
Age	<20 30- 34 20-24 35- 39 25-29 40+
Gender	Male Female
Are you a teacher?	Yes No
Georgia law requires children to be in a car seat or booster seat until they turn:	4 years old 6 years old 5 years old 8 years old
An infant should be kept rear-facing in his car seat until:	The child turns 1 year old The child turns 2 years old **The child turns 1 year old and weighs 20 pounds** The child weighs 20 pounds
An infant seat should be kept at what angle?	A 90 degree angle (fully upright) **A 45 degree angle (a little reclined)** A 180 degree angle (fully flat) No angle (it doesn't matter)
You should replace your car seat if:	It has been in a crash It is over 6 years old It is broken or has missing parts **All of the above**
Georgia law requires children under 6 to ride:	In the front seat It doesn't matter **In the back seat**
Where should the harness clip be on the child?	At the child's belly button **At the child's armpit level** At the child's neck level There should not be a retainer clip
When your child has reached 40 pounds, what type of seat should he use?	A rear-facing seat A forward-facing seat **A booster seat** The vehicle seat belt only
A child should use a car seat with a 5-point harness until:	He turns 4 years old **He had reached the upper weight limit for the seat** He is able to get out of the car seat by himself He weighs 50 pounds
Is it a good idea to buy a used car seat?	Yes, it is a good way to save money **No, the seat might not be safe** No, the seat might not be the right color Yes, any seat is a good seat
How do you know if the harness is tight enough?	The straps do not hang off the shoulder **The straps lie snug on the child's body and you can't pinch any slack**

	You can put one finger under the harness You can put two fingers under the harness

3.2 Study Measures

This study measures the relationship between the knowledge base of caregivers and four demographic traits. These characteristics are age, education level, ethnicity, and gender. After reviewing the submitted data, it was determined that primary language and the teaching profession questions would be omitted.

The ten knowledge-based questions were used to evaluate caregiver knowledge of child restraint installation and use. Each of these questions was formulated to address specific Georgia laws, safety regulations, and best practice recommendations that caregivers should know about child restraint systems.

3.3 Analysis

For the purpose of this thesis, the collected data were transferred from the original paper copies to an identical electronic survey on PsychData data collection system. From the PsychData system, the information was downloaded to SPSS version 17.0 for analysis. Table 7 displays the coding used to analyze the demographic data.

Table 7 Recoding of Demographic Data

What category best describes you?	0- All other ethnicities
	1- Caucasian
What is the highest level of education you have completed?	1- Grade school
	2- High school
	3- Technical College
	4- Bachelor's Degree
	5- Advanced Degree
Age	0- >30 years old
	1- ≤ 30 years old
Gender	0- Male
	1- Female

Age, ethnicity, and gender were analyzed using independent 2 sample t-tests. T-tests compare the mean scores of two groups on a given variable. Each of the population groups (0, 1) within a demographic characteristic were to be compared to each other based on total knowledge scores. All knowledge items were scored 0 for incorrect and 1 for correct. A new variable 'total knowledge' was computed. The total knowledge score range was zero to 10. When analyzing data, the higher mean values indicate the higher knowledge levels. The t-test was used to determine if the differences in the mean scores among groups based on ethnicity, race, and gender were significantly different. A simple linear regression test was used to determine if education level was significantly associated with total knowledge score.

3.4 Hypotheses

The following hypotheses were developed based upon the review of literature and development of the study:

H: Knowledge scores will be higher among younger (under 30 years old) parents.

H: Knowledge scores will be higher among participants with more education.

H: Knowledge scores will be higher among Caucasians than other ethnicities.

H: Knowledge scores will be higher among women than men.

Chapter IV

RESULTS

The results in Chapter VI presents findings to the research questions posed in Chapter I. The main objective of this study was to show the relationship between the caregivers' demographic characteristics and their total knowledge of child passenger safety.

4.1 Total Knowledge of Caregiver

The study population was comprised of 169 caregivers who attended Safe Kids Cobb County Car Seat Inspection Stations. Most participants were mothers, fathers, or expecting parents from the Northwest Metro Atlanta Area, specifically Cobb County. All participants were asked to fill out the questionnaire, so no selection process was involved. This survey provides detailed information about the participants' demographic characteristics. The demographics surveyed included: age, education level, ethnicity, gender, primary language, and if the caregiver was a teacher. The population demographics are shown in Table 6.

Table 6 Demographic Characteristics of Study Population

Demographics	Total # of Participants	Total % of Participants
Age	**N=163**	**96.4%**
< 20	5	3.0%
20-24	17	10.1%
25-29	40	23.7%
30-34	53	31.4%
35-40	29	17.2%
>40	19	11.2%
Education Level	**N=163**	**96.4%**
Grade School	6	3.6%
High School	31	19.0%
Technical College/ Associate Degree	23	13.6%
Bachelor's Degree	73	43.2%
Advanced Degree	30	17.8%
Ethnicity	**N=169**	**100%**
African-American/Black	40	23.7%
American Indian	0	0%
Asian	7	4.1%
Caucasian	89	52.7%
Hispanic or Latino/Latina	27	16.0%
Other	4	2.4%
Gender	**N=167**	**98.8%**
Male	47	27.8%
Female	120	71.0%
Primary Language	**N=169**	**100%**
English	152	89.9%
Spanish	15	8.9%
Other	1	.6%
Teacher	**N=152**	**89.9%**
Yes	8	4.7%
No	144	85.2%

The participant population was mostly comprised of Caucasian (52.7%) women (71.0%) between the ages of 30-34 (31.4%). African-American (23.7%) and Hispanic or Latino/Latina

(16.0%) ethnicities also made up a substantial portion of the study group. A majority of the caregivers spoke English as their primary language (89.9%) and had graduated with a Bachelor's degree (43.2%). Interestingly enough, the next highest level of education was a high school degree (19.0%). A small amount of teachers were surveyed (4.7%), but most participants were not teachers (85.2%).

The sixteen question survey provided the demographic characteristics and baseline knowledge of the caregivers that came through the Safe Kids Cobb County Inspection Station. Table 8 shows the knowledge-based survey questions and answers, as well as the frequency and percent of answers chosen.

Table 8 Caregiver Survey Results

Survey Question	Answer	Frequency	Percent
Georgia law requires children to be in the car seat or booster until they turn:	Correct	74	43.8%
	Incorrect	92	54.4%
	Missing	3	1.8%
An infant should be kept rear-facing in his car seat until:	Correct	73	43.2%
	Incorrect	94	55.6%
	Missing	2	1.2%
An infant seat should be kept at what angle?	Correct	116	68.6%
	Incorrect	49	29.0%
	Missing	4	2.4%
You should replace your car seat if:	Correct	151	89.3%
	Incorrect	16	9.5%
	Missing	2	1.2%
Georgia law requires children under age 6 to ride:	Correct	166	98.2%
	Incorrect	2	1.2%
	Missing	1	0.6%
Where should the harness retainer clip be on the child?	Correct	99	58.6%
	Incorrect	66	39.1%
	Missing	4	2.4%
When you child has reached 40 pounds, what type of seat should he use?	Correct	94	55.6%
	Incorrect	70	41.4%
	Missing	5	3.0%
A child should use a car seat with a 5-point harness until:	Correct	93	55.0%
	Incorrect	70	41.4%
	Missing	6	3.6%
Is it a good idea to buy a used car seat?	Correct	8	93.5%
	Incorrect	158	4.7%
	Missing	3	1.8%
How do you know if the harness is tight enough?	Correct	50	29.6%
	Incorrect	116	68.6%
	Missing	3	1.8%

The data provided by the survey shows a wide range of answers. The caregivers were very knowledgeable about certain car seat information. Almost all of the caregivers, 98.2%, understood the Georgia law involving children under the age of 6 riding in the back seats. 93.5% of those surveyed were knowledgeable about the dangers of buying a used car seat. 89.3% of caregivers knew that they should replace a car seat in certain situations.

Other questions seemed to present challenges to those being surveyed. Only 29.6% of caregivers understood the proper tightness of the harness system. Less than half of the caregivers, 43.8%, were aware of the Georgia law requiring children 6 years and younger to be in some type of child restraint. Only 43.2% of caregivers surveyed knew that children need to ride in a rear-facing child restraint until 1 year old and 20 pounds. Laurie—add a sentence about the range of total knowledge scores that was used as your dependent variable in the statistical tests.

4.2 Total Knowledge of Caregiver Based on Age

The relationship between knowledge and age did not produce a significant correlation. When comparing the two population variables, caregivers under 30 years of age and those older than 30 years of age, the results from the p-value (.135) does not indicate significance. The mean and standard deviation values are shown in Table 12. The results from the t-test and Levene's test are found in Table 13. Age does not affect total knowledge base, which rejects the original hypothesis.

Table 9 Group Statistics for Total Knowledge Among Age Groups

	Age	N	Mean	Std. Deviation	Std. Error
Total knowledge	>30 years old	56	5.7857	1.41054	.18849
	<30 years old	96	5.4375	1.35966	.13877

Table 10 t-test for Total Knowledge Among Age Groups

		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	t	df	Sig. (2-tailed)
Total knowledge	Equal variances assumed	.000	.998	1.502	150	.135
	Equal variances not assumed			1.488	111.769	.140

4.3 Total Knowledge of Caregiver Based on Education Level

The association of total knowledge and education level was examined using a simple linear regression test. For the purpose of analysis, the dependent variable was total knowledge score and the covariate was level of education. The results in Table 11 show moderate significance (.054) between total knowledge and level of education. The data analysis supported the hypothesis higher educated caregivers demonstrated higher knowledge scores.

Table 11 Linear Regression Analysis- Total Knowledge Based on Education Level

Source	Type III (Marginal) Sum of Squares	Df	Mean Square	F	Sig
Corrected Model	7.186_a	1	7.186	3.767	.054
Intercept	309.006	1	309.006	162.010	.000
Level of Education	7.186	1	7.186	3.767	.054
Error	284.192	149	1.907		
Total	4942.000	151			
Corrected Total	291.377	150			

4.4 Total Knowledge of Caregiver Based on Ethnicity

The relationship between total knowledge and ethnicity of the caregiver was found to be significant. The mean values showed higher levels of knowledge in Caucasians (5.8000), compared to the other ethnic groups (5.3186). The mean and standard deviation values are reported in Table 9.

Table 12 Group Statistics for Total Knowledge Among Ethnic Groups

	Race	N	Mean	Std. Deviation	Std. Error
Total knowledge	Caucasian	80	5.8000	1.42965	.17211
	Other	69	5.3188	1.32550	.14820

The p-value results reveal that there is a significant difference between the two groups (.035). The hypothesis that Caucasian caregivers would have a higher knowledge about child restraints when compared to other ethnicities was supported. For this study, the level of significance used was $p \leq .05$. The t-test results are presented in Table 13.

Table 13 t-test for Total Knowledge By Ethnicity

		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	T	Df	Sig. (2-tailed)
Total knowledge	Equal variances assumed	.667	.415	-2.130	147	.035
	Equal variances not assumed			-2.111	139.980	.036

4.5 Total Knowledge of Caregiver Based on Gender

The relationship between total knowledge and gender was found to be significant. The mean values show that women (5.7714) have more child restraint knowledge than men (5.0833). The difference in these mean scores was found to be significant. Results are presented in Table 14.

Table 14 Group Statistics for Total Knowledge Score by Gender

	Gender	N	Mean	Std. Deviation	Std. Error
Total knowledge	Male	48	5.0833	1.30194	.18792
	Female	105	5.7714	1.37461	.13415

The results of analysis indicate the significant relationship between knowledge and gender. The t-test values are shown in Table 15. The hypothesis that predicted women would have more child restraint knowledge than men was proven correct.

Table 15 t-test for Total Knowledge Among Genders

		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	t	df	Sig. (2-tailed)
Total knowledge	Equal variances assumed	.141	.708	-2.920	151	.004
	Equal variances not assumed			-2.980	95.858	.004

Chapter V

DISCUSSION AND CONCLUSION

5.1 Discussion

Childhood injury is the leading cause of serious injury and death in children under the age of 18 years old (Morrongiello, 2008; Bruce, 2005; SKW, 2007). In the United States, as well as in many other countries, motor vehicle crashes are the leading cause of childhood death and injury (Hansen, 2004; Snowdon, 2009; NHTSA, 2007; SKW, 2007). Even with stricter laws, and more legislation, education, and mechanical improvements, motor vehicle accidents are still considered a health concern around the world (Hansen, 2004).

Every state, including the District of Columbia, has child restraint laws that require proper seat installation and use (IIHS, 2009; Safe Kids USA, 2007). These laws require the seat to be weight and height appropriate and use must follow the manufacturer's directions (GTIPI, 2007). Booster seats must be restrained using a lap/shoulder harness system and all children under the age of six must ride in the rear seat of the vehicle (GTIPI, 2007; IIHS, 2009; GOHS, 2007). Most parents and caregivers believe that state laws follow "best practice recommendation"; however, most state laws, including the legislation in Georgia, do not meet recommendations made by the NHTSA, the NSC, and the AAP (GOHS, 2007). National studies have revealed that at least 4 out of 5 child restraints are "unintentionally misused" (Snowdon, 2008).

This is a serious public health issue that should be address with a combination of stricter laws, harsher enforcement, and easily accessible and understandable child restraint installation information. If laws were changed to follow "best practice recommendations", the parents who believe in and follow the laws, would be more likely to have their children properly restrained. Child restraint information should be readily available everywhere: doctor's offices, parenting magazines, churches, and inside vehicles. Not only should this information be easily accessible, but it should also be easy to understand. These policy, enforcement, and education changes will not only expand parent knowledge, but it will also increase correct child restraint installation and use and decrease serious injury and death among children.

This study examined the relationship between caregiver knowledge and demographic characteristics. The predictions were that younger respondents; Caucasians; females; and those with higher levels of education would have the highest level of child restraint knowledge.

Only three questions were answered correctly by at least 80% of the population. All other questions ranged from 29.6%-68.6% of the population who were able to answer the question correctly. The mean of the population who were able to answer the questions accurately was 63.5% and the median was 58.6%. When examining the relationship between knowledge and age, the results showed no significant correlation between the two variables. Several studies have contradicted these results, including Snowdon's Canadian study. A majority of Snowdon's population were over the age of 36 (Snowdon, 2008) and most of the population (68.2%) surveyed in this study were under the age of 36. The different ages presented in the two study groups could indicate why the results are not contradicting. With a much younger population in this study, it could indicate that in younger parent's age does not affect knowledge, as much as it does in older parents.

The relationship between total knowledge and education level was found to be slightly significant. The higher level of education a person has obtained indicates the higher level of child restraint knowledge the caregiver will have. The Toumakas et al. research produced similar results. The study found that the caregivers with higher level of education were more informed about risk and prevention of injuries in motor vehicle crashes. Toumakas explained these results by indicating that more educated parents are more willing to obtain information concerning current issues (Tsoumakas, 2008). Education level might also play a role in understanding the complicated directions and process involved in properly installing and using a car seat.

Total caregiver knowledge and ethnicity were also found to be significantly associated. Caucasian men and women are more likely to properly install and use child restraints, when compared to other ethnic groups. A 2002 study conducted by Safe Kids USA reported that minority children were more likely to be unrestrained than the white children surveyed, 23% to 10% respectively (Safe Kids USA, 1999). Minority groups often face other adversities including lower levels of educational attainment and socioeconomic status, which could also attribute to these findings.

The association between total knowledge and gender is not as heavily researched as some of the other demographic relationships. This study found a significant relationship between total knowledge level and gender, indicating women have a higher knowledge of child restraints, than men. This finding is similar to the Snowdon et. al (2008) Canadian study. Snowdon, found that 79.8% of women used child restraints correctly, compared to 75% of men. Snowdon believes that females are “more aware” of the correct ways to use car seats and more willing to ask and accept education or assistance involving child passenger safety (2008).

5.2 Study Limitations

Studies conducted in this manner will always face certain limitations. Surveys have the risk of question bias that could cause people to pick the right answer by the way the question has been worded. This could skew the data and make it inaccurate. Multiple choice questions allow participants to have 3-4 choices that could be narrowed down, before making a final decision. This could cause guessing, instead of confidently picking answers. Several participants seemed to skip questions if the answer was unknown, causing their test to not be complete. It is hard to analyze what answers these blank boxes would have produced.

Also, with self-reporting, people could provide false demographic characteristics, instead of accurately depicting themselves. This could cause any of the demographic data to be skewed. With any data entry study, there is always the risk of data entry errors. An error entered for one or two questions, could have impact on the study results overall.

This study is limited to baseline knowledge. Predictions cannot be made concerning knowledge gained during the education session provided after the survey or the level of education sustained six, eight, or even twelve months after leaving the inspection station. This knowledge and information provides the opportunity to do a follow-up evaluation with the surveyed population. This would provide additional understanding about the sustainability of the education and prevention messages received.

5.3 Recommendations

Many of the childhood deaths and serious injuries caused by motor vehicles accidents could be prevented through correct installation and use of child restraints. In the PRECEDE PROCEED planning model, program planners could begin with this health concern and work

backwards to decide what plans need to be implemented to achieve the goal of reducing childhood death and injury in motor vehicle crashes and improve the safety and quality of life for children when riding in vehicles. To create and implement a successful action plan, the program planner must collaborate with health professionals and other community members. This study has shown how individual knowledge and predisposing factors like age, gender, and education level, can directly affect a caregiver's decision involving child passenger safety (Green and Kreuter, 1992,). The research from this study can indicate the baseline knowledge of individuals, and enable program planners and community organizations to provide effective enabling and reinforcing factors to change the knowledge and behavior of caregivers.

It is imperative that the manufacturers, government, law enforcement, and health care providers address this problem. Child restraints are not easy to install or use, even when a caregiver takes the time to read the instructions. The instruction manuals provided by the manufacturer are often hard to understand. Child restraint companies need to make these instructions as simple and precise as possible. Consistency would also make instructions easier to understand and use. If every car seat manual had the same basic set-up, it would make it simple for parents to learn about installation and use each time a new seat is purchased.

Even with precise, simple manufacturer instructions, there are more obstacles for caregivers to overcome. Each car is unique and each car seat is different. Finding the right way to use a certain seat, in a certain car can be very difficult. Child passenger safety should be one of the highest items on car manufacturer's priority lists. Manufacturers need to make cars compatible to car seats and should provide easy, effective ways to properly install child restraints.

The Georgia State Government needs to reevaluate current legislation and create laws that are comparable to the policies presented by the APA, NHTSA, and NSC. These policies preach best practice, but are not as well known to parents as the laws are. The research in this study even revealed that almost half of the population is unsure of the current Georgia laws. So, if and when the laws are updated, it is important to get this information out to the public via PSA's, television and radio commercials, educational brochures, flyers, and newspaper articles.

The police in the state of Georgia can only enforce these laws to the best of their ability. It is very hard to see if a child is properly restrained, especially in a moving vehicle; however, this should be a top priority for law enforcement officers. Georgia is starting to send police officers through certification courses to learn to install and use child restraints correctly. Each precinct should have several officers certified in child passenger safety and out in the community educating and enforcing the laws and best practice recommendations.

Hospitals are presented with teachable moments each day when babies are born. Before the mother and the new baby leave the hospital, educational information and car seat installation should be provided by a certified safety technician. Showing parent's the importance of child passenger safety from the first days of parenthood, could change their views on this important issue. It would also guarantee that all of the children born in the hospital are riding correctly and safely in proper child restraints.

5.4 Conclusion

Each year in the United States, an estimated 975 children, under the age of 14, die as a result of motor vehicle accidents. 69.2% of these fatalities involved unrestrained children and

29.2% of the deaths were caused by incorrect use or installation of a child restraint (Safe Kids USA 2007).

A number of studies have shown a direct correlation between the knowledge level of caregivers and demographic characteristics (Snowdon 2008; Bracchitta, 2006; Robinson, 2002; Tsoumakas, 2008; Lane, 2000). This study found significant relationships between total knowledge and age, education level, and gender of the caregiver. Understanding the caregiver's knowledge base can help improve education programs currently being offered in the community. This baseline information can also be used by child restraint manufacturers, government officials, law enforcement officers, healthcare systems, and other organizations to understand the knowledge deficiencies that lead to this public health concern. Studies have shown that 90% of injuries can be prevented (Bruce, 2005) and reducing the risk of childhood injury is the most important part of an effective injury prevention program (Brown, 2006).

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