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Determinants of Increased Safety Belt Use by High School Students in Motor Vehicles: The Influence of Parents and Peers and Implications for Virginia's Graduated Driver Licensing Laws

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DISSERTATION:
DETERMINANTS OF INCREASED SAFETY BELT USE BY HIGH SCHOOL STUDENTS IN MOTOR VEHICLES: THE INFLUENCE OF PARENTS AND PEERS AND IMPLICATIONS FOR VIRGINIA'S GRADUATED DRIVER LICENSING LAWS

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B.S., May 1976, Old Dominion University
M.P.A., December 1989, Old Dominion University

A Dissertation Submitted to the Faculty of
Old Dominion University in Partial Fulfillment of the
Requirements for the Degree of

DOCTOR OF PHILOSOPHY

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ABSTRACT

DETERMINANTS OF INCREASED SAFETY BELT USE
BY HIGH SCHOOL STUDENTS IN MOTOR VEHICLES:
THE INFLUENCE OF PARENTS AND PEERS AND IMPLICATIONS FOR
VIRGINIA'S GRADUATED DRIVER LICENSING LAWS

Georjeane L. Blumling
Old Dominion University, 2009
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Motor vehicle crashes are the number one cause of injuries and fatalities for persons 15-19 years of age in the United States. The higher fatality rate is caused in part from the lack of driving experience and the increased risk taking behaviors of adolescent drivers. Graduated driver licensing laws have been enacted in most states to address the risks associated with inexperience by adding restrictions on nighttime driving and limiting the number of teen passengers in the vehicle for novice drivers.

Inconsistent use or non-use of a safety belt when riding in a motor vehicle is a prevalent risk taking behavior among the adolescent population. Currently, laws that require safety belt use in motor vehicles in Virginia are not enforced at a primary level and are only required for the front seat passengers. This secondary enforcement requires an additional traffic infraction be identified before a safety belt violation can be addressed. This places parents in the role of primary enforcer of safety belt use for their teenage children at a time when teens are riding in motor vehicles more often with friends than with parents. In addition, adolescence is a time where friends have been shown to be a stronger influence on risky behavior than parents are.

The current study will examine the level of safety belt use by high school students and compare that use to the reported level of safety belt use of their parents and their

friends to determine which group is more influential on the behavior. Additional factors associated with safety belt use including crash experience, gender, level of licensure and age are included in the analysis. A series of correlations and regression models indicated that having parents and friends who always wear a safety belt increases the odds ratio of the high school student always using a safety belt. However, when age was used as a selection variable, the odds ratio of parent influence decreases as the age increases and the influence of friend's safety belt use continued to increase as the age of the student increased.

Implications from the research indicate a need for stronger safety belt use and novice driver licensing policies to increase levels of enforcement by police and better support parental efforts to curb risky driving behavior during adolescence.

This work is dedication to my loving husband Robert,

and my children Daniel, Alan and Michael,

whose patience and love supported me in this challenging effort.

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TABLE OF CONTENTS

Page

Table of Contents, Continued **Page**

Table of Contents, Continued **Page**

LIST OF TABLES

Tables **Page**

LIST OF FIGURES

Figure **Page**

CHAPTER 1

INTRODUCTION

National research has shown that the consistent use of safety belts reduces the level of injury and fatalities from motor vehicle crashes by as much as 50 percent (NHTSA, 2008). Motor vehicle crashes are the leading cause of death and injury among people 15 -19 years of age according to the National Highway Traffic Safety Administration (NHTSA, 2008). These adolescent drivers represent approximately seven percent of the United States driving population but account for 15 percent of all motor vehicle-related deaths annually. Drivers in this same age group have a higher probability of being involved in a motor vehicle crash than any other age group as well as a higher fatality rate from motor vehicle accidents. These fatalities are often the result of risk-taking behaviors such as speeding, distracted driving, and the lack of safety belt use. While there is agreement that the risk-taking behavior of not wearing a safety belt is prevalent in the teenage population (Goodwin & Foss, 2004), there is a lack of evidence with which to identify a specific factor that consistently affects this behavior. Occupant protection laws that have been effective in changing safety belt use behavior in the general population have not been effective with teenagers.

Despite empirical and anecdotal evidence of lower levels of safety belt use among high school students, there is little agreement in identifying the factors contributing to this particular risk-taking behavior. There is also disagreement in the literature as to how strong the effect of parental influence is on teenagers as compared to the strength of the influences from their peer groups. The parental role in influencing adolescent safety belt use behavior has implications for current transportation safety policy, and the

enforcement of the laws governing traffic safety behaviors for teenagers as both drivers and passengers. Identification of the specific influences that may lead to an increase in adolescent safety belt use is essential to better focus enforcement, education and legislative initiatives as well as to direct future occupant protection policy.

Problem Statement

In Virginia, the laws that govern the use of safety belt require that all drivers and front seat passengers that are 16 years-of-age and older are properly secured in a safety belt while riding in a motor vehicle (Code of Virginia §46.2-1094, 1987). Passengers riding in the backseat of a motor vehicle are not covered under the law and are not required to use safety belts. Safety belt use for persons under the age of 16 is addressed within Virginia's child passenger safety laws (Code of Virginia §46.2-1095, 1982). From birth until the age of eight, children are required to be properly secured in child safety seats or booster seats depending on the age of the child. Passengers between the age of eight and sixteen years old are required to be in a properly secured safety belt when riding in any position in the motor vehicle. The driver is responsible for all occupants under the age of 16. At 16 years of age, passengers and drivers are required to use a safety belt when riding in the front seat of the vehicle and are responsible for their own behavior. Safety belt violations for adults (defined as those persons sixteen years of age and older) in the Commonwealth of Virginia are currently enforced at a secondary enforcement level. Secondary enforcement requires law enforcement officers to have an additional observed traffic infraction present before having the authority to give a summons for the lack of safety belt use. It has been shown that the probability of receiving a citation for not wearing a safety belt diminishes significantly in those states

that have enacted laws that only allow for 'secondary enforcement' of safety belt use (Williams & Wells, 2004). In the early 1980's there was a movement in a few states toward enactment of occupant protection laws that included the use of safety belts. This initiative lead to small increases in safety belt use in the United States and Canada, however, initial effects on fatality rates were limited. In an effort to raise public awareness of the value of safety belt use, highly publicized enforcement campaigns were launched in the mid 1980s leading to a more substantial increase in safety belt use by the general population as well as and a decrease in reported fatalities (Dee, 1997). This trend continued as stronger enforcement programs were adopted in various states over the next ten years. The increase in safety belt use was most apparent in states with primary enforcement of occupant protection laws. These states experienced higher increases in safety belt use and more significant decreases in fatality rates (Dinh-Zarr, Sleet, Shultz, Zaza, et al., 2001). Historical review of these policy changes suggests the importance of the use of primary enforcement of all occupant protection laws, the need for police leadership, focused publicity about police enforcement, and sustained rather than single-shot efforts. Nevertheless, even today not all states have chosen to move to primary enforcement of safety belt laws (Insurance Institute Highway Safety, 2009). In states where there is not strong visible enforcement of safety belt laws, there is a lower expectation by drivers that they will be ticketed for non-use. This is especially true in the high-risk population of teenagers (Carpenter and Stehr, 2008). Youths are unlikely to be strongly responsive to safety belt laws due to 'selective recruitment' phenomena, whereby those most likely to be in a crash are those least likely to increase safety belt use in response to a law (Dee, 1997).

Graduated Driver Licensing

In an effort to address the numerous dangers inherent in the first few years of driving experience, 47 states have enacted specific laws directed at novice drivers. These laws referred to as Graduated Driver Licensing (GDL) systems; have been put into place in an effort to mitigate the crash risk for novice drivers by adding restrictions in the early stages of driving. These systems often include restrictions on the number of teenage passengers allowed in the vehicle, nighttime driving curfews and a ban on the use of a cell phone while driving. In some cases, safety belt use is a requirement under the graduated driver licensing provisions (Appendix E). While GDL laws strive to protect novice drivers by restricting driving privileges in the first years of behind the wheel practice, they rely heavily on parents to enforce the restrictions and requirements; because of the secondary enforcement status of the law. If novice teen drivers are not compelled to comply with the restrictions of GDL, because they are not consistently enforced due to the secondary level required by the law, the benefits of this system are greatly reduced.

Parents have long been recognized as the strongest influence on their child's behavior and the first and most important role model in their child's life (Bandura, 1977). However, when a child reaches adolescence parental influence often begins to lessen with the introduction of teenage peers and an increased sense of independence. The forming of strong relationships outside the family structure changes the level of parental influence on adolescent risk-taking behavior. Determining whether outside social relationships are a stronger influence on risk-taking behaviors than the relationship with parents, is important in the development of programs and policies designed to affect safer driving

behaviors. The determination of key factors that most influence safety belt use by teens can support the initiation of countermeasures that are more effective because they are targeted to the most appropriate group.

The consistent use of safety belts by adolescents in Virginia is monitored primarily by parents because of the secondary enforcement level of the law by police. If parents are not found to be a significant factor affecting level of safety belt use by their children during high school, public policy should reflect the need for stronger laws which can support parents in their role of influence, mainly primary enforcement of safety belt laws. Additional behavior-change efforts, whether through legislation or education, can be focused on the specific at-risk population of teenagers, leading to a significant increase in safety belt use. This in turn will support the Federal and State transportation safety goals of reducing death and injury from motor vehicle crashes.

Research Questions

The overarching research question to be addressed in the study can be stated as: "Is Virginia's policy of secondary enforcement of safety belt use and graduated licensing laws adequate to address the goal of reducing crashes, injuries, and fatalities for the high risk population of teens?"

The result of this analysis will provide evidence that will either support or fail to support the current level of enforcement of safety belt use and the graduated driver licensing (GDL) laws in Virginia. The analysis may also provide support for a proposal to increase the enforcement of both graduated licensing laws and safety belt laws to a primary level until the age of 18.

This research question will be answered through the following hypotheses.

1. Is there a correlation between safety belt use by high school students and the level of safety belt use by their parents?

   Hypothesis # 1: The frequency of safety belt use by high school students is positively correlated with the level of parental safety belt use.

2. Is there a correlation between safety belt use by high school students and the level of safety belt use by their friends?

   Hypothesis # 2: Safety belt use by high school students is positively correlated with the level of safety belt use by their friends.

3. Is there is a specific age during the high school years at which safety belt is more highly correlated to the safety belt use of an adolescents friends than the level of safety belt use by their parents?

   Hypothesis # 3: The older the high school student, the more their safety belt use is correlated to the safety belt use of their friends than the safety belt use of their parents.

4. Does the experience of being in a motor vehicle crash affect the level of safety belt use by high school students?

   Hypothesis #4: Being involved in a motor vehicle crash will increases the frequency of safety belt use by high school students.

5. Are there other intervening variables that affect the frequency of safety belt use by high school students?

   Hypothesis #5a: Male students will have a lower frequency of safety belt use than female students will.

Hypothesis #5b: Having a license will increase the frequency of safety belt use for those students of age to obtain a license.

Significance of Study

There has been little research conducted specifically examining the influence of friends and parents on safety belt use by high school students. One of the values of the current research is in the examination of that relationship. Additionally, the data include information concerning motor vehicle trips as a driver and as a passenger, rather than as a driver only. This additional information on safety belt use as a passenger was not found in previous survey research.

The majority of research on safety belt use has relied on crash injury data and motor vehicle fatality reports, or has focused on the teenage driver only (CDC, 2004a; Lang, Waller, & Shope, 1996). Studies where survey data were used, the information was often obtained from a national yearly risk analysis survey entitled the Youth Risk Behavior Surveillance System (YRBSS) in which safety belt use is part of an overall assessment of risk taking. The YRBSS is an epidemiological tool established by the Centers for Disease Control and Prevention (CDC) to monitor the prevalence of risky behaviors that most influence adolescent health including drinking, smoking, and sexual activity. The survey includes one question concerning the level of safety belt use as part of a list of overall risk-taking behaviors. Safety belt use is not the specific focus of the YRBSS survey. The YRBSS is administered to students bi-annually across the nation as well as within specific states. The Commonwealth of Virginia does not currently administer a state specific survey. The current research uses data from a survey specifically designed to measure driving behaviors including safety belt use.

Other research has relied on the national Fatal Accident Reporting System (FARS) as a data source. This is a yearly census of all motor vehicle–related deaths occurring within 30 days of a crash on a public road in the United States and only reports the safety belt behavior of the fatally injured. In addition, neither of these data sources includes information identifying the safety belt use behavior of other influencing groups such as parents or peers.

Methodology

The current research analyzed information obtained from surveys completed by high school students in October 2006. The surveys were part of a traffic safety community based program entitled "*Get It Together*" which was initiated with a number of high schools in the southeastern region of Virginia. The data represented self-reported safety belt use rather than information from post-crash police reports or fatality/injury statistics. The students represented 24 high schools located in six cities and two counties and the school populations ranged in size from a population of less than 1,000 students to over 2,400 and represent various urban, suburban, and rural environments. This level of diversity in addition to the demographic information available offers a rich data source for the research

The data was analyzed using cross tabulation, correlations, and logistic regression to examine the relationship between the dependent variable of personal safety belt use by the high school student and the independent variables of their parent's safety belt use and the level of safety belt use by their friends. In addition, the strength of these relationships at different ages will be investigated to determine if it is consistent throughout high school or if a change in influence takes place and if so at what age does it occur. Other

potential influences on safety belt use by high school students including gender, crash experience, and whether they have obtained a drivers license were also examined.

The United States National Academy of Sciences emphasized the need for an ecological approach to understanding public health issues such as motor vehicle related injuries and fatalities. Based the theory that a persons health and well-being are affected by the dynamic interaction of biology, behavior and the environment, instituting public policy to address motor vehicle safety behaviors needs to focus not only on individual behavior but also on the social forces in the environment that shape and support that behavior (IOM, 2000).

The current research study will add to the body of knowledge of the social forces associated with increasing safety belt use among high school students and the implications for safety belt use and graduated driver licensing (GDL) laws in Virginia. The various components of Virginia's graduated driver licensing laws are enforced at a secondary level. Citations for a violation of the safety belt law cannot be issued unless the officer issuing the citation has cause to stop or arrest the driver of the motor vehicle for the violation of some other provision in the motor vehicle code. After an initial violation is identified, graduated driver licensing infractions can be addressed. This secondary enforcement by police of graduated driver licensing regulations and restrictions, in reality, makes parents the primary enforcers of these laws. If parents are the primary enforcers of graduated licensing restrictions and the results of the current research study find that parents have a diminishing level of influence on safety belt use as the teenager moves into the early years of licensure they may also be less effective in enforcing graduated driver licensing restrictions which would potentially reduce the

safety benefits of graduated driver licensing laws. If safety belt use by friends is found to be the strongest influence on the safety belt use of high school students, additional measures may be necessary to insure compliance of GDL laws.

Study Limitations

A limitation of the current research is the use of a convenience sample. Students were chosen to complete surveys by methods not controlled by the researcher. Written instructions given to personnel at each high school conducting the survey included a request to distribute the surveys randomly to students and to include students from each grade level in the sample. There is no way of knowing if that was done in a scientific manner. Generalization of findings may be limited by the lack of consistency in sampling method. In follow-up phone contacts and interviews by the researcher, school personnel stated that there had been a strong effort to comply with the request that students were chosen from a variety of classes that included a mix of academic levels as well as grade levels.

A total of 3722 surveys from 24 schools located in urban, suburban and rural locations in southeast Virginia comprised the original data set used for the current research. While the data are not random, it is felt that the large sample size and the wide variety of ages, grade levels, school sizes, and locations would act as a control for the use of a convenience sample. However generalizing the results of the current research to other high school populations may be limited.

Another potential limitation is that the data is based on self-reports and therefore may overestimate actual safety belt use (Colon, 1992; Streff & Wagenaar, 1989). With teenage participants, social desirability is the most common reason given for over or

under reporting of behaviors (Shinar, 1993). However, recent research had found self-reporting of driving behaviors to be relativity reliable and free from social desirability bias when responses are anonymous and individuals cannot be singled out (Lajune & Summala, 2003). Questionnaires in the current study were anonymously completed with the name of the high school as the only identifier.

In surveys specifically directed to youth questioning their level of using safety belts, when safety belt use was defined as 'always' or 'not always', the self-reported use over-estimated actual use by only 2% (Nelson, 1996) suggesting the validity of self-report of safety belt use has improved. Questions on standardized self-administered surveys directed specifically at teens such as the CDC's Youth Risk Behavior Surveillance System (YRBSS) have demonstrated good test-retest reliability. Questions on the survey used in the current research are the same as those used in other research on safety belt use.

Questionnaires are popular and widely accepted as a tool in traffic safety research, and are often the best method to reach teenagers when direct contact is not feasible. Questionnaires allow for individual-based data that is not possible to study using other methods like observation, interviews, and analysis of national accident statistics alone.

Study Organization

The study is organized as follows:

Chapter 1 - Introduction. This chapter outlined the current research study, including the purpose, significance, methodology, and limitations of the research.

Chapter 2 - Literature Review. This chapter begins with a review of the literature related to adolescent risk taking behavior and the factors that affect that behavior. Risk

taking while driving or riding in a motor vehicle and specifically the use or non-use of safety belts is included. Specific factors affecting the level of safety belt use by high school students and the strength of the influence from the safety belt use of their parents and friends is examined. Previous research on risk taking behaviors and specifically that of not wearing a safety belt were discussed to provide a foundation for the development of the model of influence proposed in this study. An examination of current graduated drivers licensing policies and the potential impact of the research on those policies was included.

Chapter 3 - Methodology. This chapter posed the research questions as testable hypotheses. Included in the discussion is the operational definitions used for the data, characteristics of the research population, the research instrumentation, the organization and analysis plan of research, and a description of how the results are presented.

Chapter 4 - Data Analysis and Interpretation. This chapter presents all research findings for each hypothesis including the data analysis and interpretation and includes how the current results compare to previous research.

Chapter 5 - Conclusions. This chapter discusses the evidence based on the data analysis and the conclusions to be drawn based on the research findings. Implications for current occupant protection laws and graduated driver licensing policy in Virginia are discussed. Limitations of the current research are reviewed and proposed suggestions for future research are included.

CHAPTER 2

LITERATURE REVIEW AND THEORETICAL FOUNDATION

Overview

Adolescence is a time of life filled with massive change, physically, mentally and emotionally. The years between 14 and 19 years of age are considered the most intense time of change and growth in one's life, second only to the time between birth and five years of age (Jessor, Turbin, & Costa, 1998). These psychological changes account for the adolescent behaviors that parents are familiar with including emotional outbursts, rule breaking, and reckless risk taking. This conduct is a byproduct of the lack of cognitive controls needed for mature behavior. Teens actively seek out experiences to create intense feelings (Greene, Krcmar, Walters, Rubin, Hale, & Hale, 2000). Teens take greater risks in all areas of life than do adults. This may be because teens do not understand the risks involved in certain behaviors nor the potential consequences and therefore they act impulsively (Ferguson, Leaf, Williams, & Preusser, 1996). Research has found that adolescents were often aware of risks but modified their thinking in ways to allow them to continue to participate in the risk taking behavior (Gardner & Steinberg, 2005).

During adolescence, this willingness to take risks is considered both normal and appropriate exploratory behavior as part of the development process. Risk taking is seen as non-deliberative, characterized by a lack of awareness of the need to decide about how to act, and a failure to recognize risk that is apparent to others (Yates, 1992). Rather than an error in judgment, this type of risk taking may stem from a lack of recognition that a judgment is needed due to the adolescent's feelings of invulnerability, which is a

byproduct of the sense of uniqueness common during the adolescent period of life (Greene et al., 2000). Without the ability to recognize that a decision concerning risk taking is required in a specific situation, it is understandable how teens tend to ignore health-related messages. They feel the messages are being directed at others, not themselves, since they do not view themselves as being in a risky situation (Greene et al, 2000). The American Academy of Pediatrics (AAP) suggests that adolescent driving habits and the propensity to take risks is particularly influenced by emotion, peer group pressure and other stresses common during the phase of life (1996). Studies examining influences on risk taking behavior in general also indicate that peers are an important source of social influence on these specific behaviors (Ennett & Bauman 1994; Jaccard, Blanton & Dodge, 2005; and Simons-Morton, Chen, Abrams & Haynie, 2004). The impact of how one's peers behave has been shown to be extremely strong among adolescents. Teens will tend to focus more on the benefits than the costs of the risky behavior and made riskier decisions more often when they are in their peer groups than when they were alone. This powerful peer influence is much stronger among adolescents and youth than in adults (Gardner & Steinberg, 2005). The term 'peer pressure' is often used to describe the powerful influence of friends during the teen years.

In the early stages of novice driver research, Jonah (1986) suggested that increased risk taking behaviors was a main determinant for novice drivers to be more apt to be involved in a crash than older drivers and that the propensity for taking risk while driving for adolescent drivers was part of a general lifestyle characterized by risk taking across a wide range of behaviors and not limited to driving activities. However, this increased risk taking while driving being related to a general level of risky behavior may

not be limited to novice drivers. The National Safety Council (2004) found that the approximately 26 percent of all motor vehicle occupants nationwide who choose not to buckle up, also tend to exhibit a higher level of overall risk taking behavior than those who consistently wear safety belts. The disproportionately high rate of injury among teenagers is directly related to the high level of risky behavior they engage in. Studies found that teenagers consistently underestimate the risk in many situations (Shope, 2006; Williams, 2006). They put themselves and others at risk by speeding, following too closely; making illegal lane changes and other dangerous and potentially life threatening maneuvers while driving. Young drivers more frequently fail to yield the right of way than older drivers that are more experienced. The lack of experience and lack of concern of the risk involved makes teenagers less likely to perceive hidden risks (blind spots, curves, nighttime driving) or respond to them appropriately. The attitude of invincibility many adolescents exhibit reflects both a lack of experience and a belief that what happens is not a matter of choice but one of fate. Fifteen to seventeen year old participants in a study to determine attitudes about injury were found to give responses indicative of a flawed sense of invincibility. Statements such as, "Pretty sure that I would be okay after crashing the car, cars are pretty safe," were common (Monneuse, Nathens, Woods and Mauceri, et al, 2008). Participants in the study failed to recognize the risk in many situations. They lacked judgment to determine the safer option and felt that despite making riskier choices, they were immune to adverse consequences.

Teen drivers are more frequently involved in serious crashes that are a result of dangerous actions such as speeding and impaired driving than any other age group. Statistics indicate that young people involved in fatal crashes have even lower safety belt

use rates than those obtained in observational surveys of the general population (Day & Kinsey, 2000). Two factors that account for increased risk of crashing for adolescent drivers are the lack of experience and the risk taking behaviors they exhibit. The American Academy of Pediatrics (1996) suggested five reasons for this problem: (1)a lack of experience and the ability to perform the many and complex tasks involved in driving, (2) the propensity to take risks influenced by peers and emotions, (3) the difficulty of night driving, (4) the use of alcohol, and (5) a low level of safety belt use. Not surprisingly, this list of problems was the basis for the eventual development and implementation of graduated driver licensing policies a few years later.

Research on adolescent risk taking also found a strong correlation between other risky behaviors such as drinking or smoking and risky driving behaviors (Kidd & Holton, 1993). Adolescents who engage in problem behaviors such as drinking while driving were less likely to engage in other health-enhancing behaviors such as wearing a safety belt (Hawkins, 1992).

Motor vehicle crashes are the leading cause of death and injury among people 15 to 19 years of age, according to the National Highway Traffic Safety Administration (NHTSA, 2009). This age group constitutes seven percent of the United States population but accounts for 15 percent of all motor vehicle-related deaths annually. The most recent statistical data available show that teenagers represent 6.4 percent of all licensed drivers on the road, over 12.8 percent of all drivers involved in fatal crashes and 16 percent of all drivers involved in police-reported crashes (NHTSA, 2008). Recent studies found teenage drivers are the cause of a significantly higher lever of deaths among other age groups as well, both as passengers as well as pedestrians. The National

Highway Traffic Safety Administration (NHTSA, 2005c) found that whether driving or riding as a passenger, teenagers have lower overall safety belt use than any other age group. In 2006, 58 percent of 16 to19 year olds involved in fatal crashes were unrestrained, compared to 46 percent of unrestrained fatally injured adults 21 years and older (FARS, 2007; NHTSA, 2007). In 2007, passenger car and light truck occupants ages 16 to 19 who survived a fatal crash were restrained 60.9 percent of the time. The level of restraint use was only 35.6 percent for those who were killed or injured in fatal crashes. A fatal crash is defined as a crash where at least one occupant is killed (NHTSA, 2008).

Two of the causes for adolescent motor vehicle fatalities that are consistently identified are their driving inexperience and a greater propensity for risk taking behavior such as speeding, drunk driving, distracted driving, and not wearing safety belts (Dee, 1997; Williams, 2000; McCartt and Northrup, 2004). While safety belt use has increased steadily in the general population over the past decade in the United States, this trend has not proven true for the 15 to 19 year-old age group. In fact, not using safety belts is one of the most prevalent risk taking behaviors identified for this age group. While teen drivers are less likely to wear safety belts that other motorists, teenage passengers are even less likely to buckle up. Responses from the Youth Risk Behavior Survey conducted from 2001 though 2003, found that among high school students 16 years of age and older, 59 percent of them reported always buckling up in the driver's seat, but only 42 percent stated they always wore a safety belt when riding as a passenger in a motor vehicle, and only 38 percent reported using a safety belt consistently as both and passenger and driver (Briggs, Lambert, Goldzweig, Levine & Warren, 2008; CDC,

2004b). This disparity is rarely addressed in educational efforts to increase safety belt use in this population. Educational messages tend to focus on the drivers behavior. Many of the current safety belt use laws also ignore the issue of lack of safety belt use in the rear of the vehicle since most states have laws that only cover the driver and front seat passengers.

Research has found that low levels of safety belt use by teens is often affected by the same influences as their general risk taking behavior including parents and peers. Various factors have been identified as influential in determining adolescent safety belt use. Specific factors that were found to affect safety belt use by teens including lack of role modeling by parents (Lau, Quadrel, & Hartman, 1990). If parents did not consistently wear a safety belt then the chances of their children being buckled up was lower. Teens also have a reduced level of perceived risk (Calisir & Lehto 2002). They tend to feel that even if they do not wear a safety belt they will not get hurt if they are involved in a motor vehicle crash. Peer behavior and peer expectations were also found to influence the consistency of safety belt use by teens (Babio & Daponte-Codina, 2006). Among minority youth, a 2005 study found that healthy behavior choices such as whether to use a safety belt were also found to be influenced by personal beliefs and history, and by the expectation of parents and peers (Juarez, Schlundt, Goldzweig & Stinson, 2006). Lower safety belt use, specifically among fatally injured teenage drivers, was found to be associated with increasing age, being a male driver, or being the driver of an SUV, van, or pickup truck (McCartt & Northrup, 2004).

Two groups that are consistently considered major influences the risk taking behavior of adolescents is their parents and peers (Williams, 1996). Early research

examining the correlates of belt use among adolescents in the mid-1980's found the use of safety belt by teens to be strongly correlated to the safety belt use of both their parents and their friends. This relationship held true across gender, ethnicity, and socio-economic status (Maron, Telch, Killen, Vranizan et al., 1986).

In one study, the impact of parental attitude, both positive and negative, about safety belt use was stronger than many other factors examined (Shin, Hong & Waldron, 1999). The study determined that with all other factors being equal, the strongest predictor of lower safety belt use in all settings was the student not being told to 'buckle up' by their parents. These results supported earlier work by Lau, Quadrel & Hartman that had also found that safety belt behavior and beliefs of parents had a substantial influence on their teenager's safety belt use (1990). An examination of the driving habits of new drivers, found that children tended to inherit their parents driving habits mostly through model learning rather than actual driving instruction (Bianchi & Summala, 2004).

While parents are consistently identified as having the strongest influence on behavior during childhood, adolescence is the time of life when parental influences begin to diminish and the role of peers becomes stronger in determining which behaviors to continue and which to discard (Arnett, 2002). This can be viewed as an underlying developmental source of risky driving behavior that includes the power of friends, the optimistic bias, and adolescent emotionality. High school is an environment that is oriented to peers and friends. Teens want to be with friends – not parents, and they do not want their parents around when they are with their friends. The focus on peer interaction tends to strengthen the 'optimistic bias' among teens as well. This

phenomenon is described as a tendency to think that the likelihood of a negative event happening is higher for other people then it is for oneself.

The social dynamic of these friendships leads to higher fatal crash rates for young drivers and their peer passengers in the vehicle. The presence of additional teens in the vehicle with a novice driver has been proven to increase crash risk significantly (Williams, 1996). This was found to be especially true for younger drivers (16 – 17 years of age) in their first year or two of driving. With experienced drivers, the presence of passengers is actually related to lower crash risk for drivers 30 years of age and older (Arnett, 2002).

In an observational study of behavior by teens and adults, both as drivers and passengers, male teen drivers had a lower safety belt use than adult males, and teen passengers buckled up less with teen drivers than with adults. The study also found 40 percent of teenagers did not wear safety belts even when they were riding as passengers of adult drivers (Williams, McCartt, & Geary, 2003). These results appear to contradict the research that finds parental safety belt use to be a primary influence on their teenager's safety belt use behavior, or it is possible that some parents do not demand an equal level of safety belt use in their teen passengers as they themselves engage in. In all cases, both male and female teenage passengers were more likely to use safety belts if the driver was belted, indicating that modeling safety belt use is a strong influencing factor on behavior, whether the driver is a parent or another teen.

While parental behavior has shown to influence safety belt use in some situations, social influence from peers was found to actually motivate safe driving practices among teens (Ulleberg and Rundmo, 2003). Young drivers believing that their friends would

disapprove of drinking and driving were less likely to drive under the influence of alcohol (Aberg, 2001; Brown, Mounts, Lamborn, & Steinberg, 1993). Drivers who believed that significant others would disapprove of them committing violations, and at the same time, felt motivated to comply with these referents, reported less intention to commit violations such as speeding or drinking while driving (Weinstein, 1993). The younger the driver, the more significant the peer influence on overall driving behaviors, potentially making age a factor in the strength of influence from ones peers. While it appears that peers are highly influential, this influence is limited to the modeling of healthy or non-healthy behavior. Adolescent peers do not attempt to teach or train each other in the same manner that a parent must teach their children (Lau et al., 1990).

In addition to the question of how strong the influence of parents and peers is on safety belt behavior, studies have noted other variables that may affect that relationship. In research with older teens, a number of factors including gender, grade point average (GPA), and age (were found to influence safety belt use (Calisir & Lehto, 2002). Focus groups of young drivers ages 16 – 19 reported a significant difference in safety belt use between male and female respondents. Young women were more likely to report that they never drive without a seat belt than the young men in the research groups. However, all participants also reported that they did not wear seat belts as a passenger, especially when riding in the back seat, with any degree of regularity (Day and Kinsey, 2000). Gender differences in safety belt use have been consistently reported across most age groups but are more pronounced within the adolescent population (Dinh-Zarr, Sleet, Shults, Zaza, et. al., 2001). Findings from both self reported use as well as injury/fatality statistics found that males wear safety belts less frequently than females (NHTSA, 2005).

Research found low levels of safety belt use among drivers ages 16 to 19 years of age to be associated with, 1) being male, (30 percent belt use vs. 49 percent for females), 2) being the driver of a pick-up truck rather than a car (20 percent vs. 40 percent belt use), and 3) having a valid driver's license vs. only a learner's permit, (31 percent vs. 38 percent) (McCartt & Northrup, 2004).

Another variable that has shown to have an impact on safety belt use is the presence of teen passengers, especially in the early years of driving (Williams, 2000). Safety belt use in teenage drivers ages 16, 17 and 18 declined significantly as the number of passengers increased. This was true when the passengers were less than 30 years of age; however, with passengers over 30 years of age, their use of safety belts increased the likelihood that the teen driver was using a safety belt, potentially due to the influence of the adult passenger's behavior.

Socio-economic status has been found to be related to level of safety belt use. A lower socio-economic status has been correlated to higher levels of risk-taking behaviors such as smoking, underage drinking, and early sexual behavior among adolescents. An examination of the possible socio-economic differences on safety belt use within an adolescent population found no significant reduction in the level of safety belt use related to socio-economic status when controlling for the type of school the student attended Shin, Hong and Waldron examined (1999). The study concluded that the type of school one attended, inner city vs. middle class or private, was a stronger predictor of safety belt use than individual socio-economic status or ethnicity. However, the student population of the various schools reflected clear differences in socio-economic status by school type. The inner city school population had a high proportion of African-American and

Hispanic-American students from low-income families, while the middle class and private schools had high proportion of non-Hispanic white students from middle class families with college-educated parents (Shin, et al., 1999).

A later study by McCartt and Northrup (2004), also suggested that having a higher socio-economic status has a positive influence on safety belt use. They found that an increase of $1,000 in median household income was associated with a 0.43 percentage point increase in teen safety belt use (2004). These findings, based on statistical data extracted from the Fatality Analysis Reporting System (FARS), only included data from fatally injured teenage drivers. This does not establish mean income as a factor in safety belt use in the adolescent population that has not been involved in a fatal motor vehicle crash.

In an effort to review the large number of theories that has been proposed in the literature as to why teenagers do not use safety belts (Arnett, 2002; Preusser Ferguson, and Williams, 1998), a comprehensive review was undertaken by the National Highway Traffic Safety Administration (NHTSA). The goal of the review was to examine the most frequently cited reasons why teens have the lowest safety belt use and the highest traffic-crash rates of any age group. The major categories NHTSA identified included: (1) driving inexperience, (2) lack of maturity, (3) feelings of immortality, (4) increased levels of risk-taking, (5) the influence of friends, (6) the influence parents, and (7) driving distractions. While the review was comprehensive, the theories and influences identified were divided and categorized with little consideration of the possible synergistic effect of the multiple influences on safety belt behavior. Questions about how driver inexperience

and the propensity to take risks could interact with the influences from peers to decrease the level of safety belt use by teenagers were not included in the discussion.

The current research will primarily examine the relationship between safety belt use by parents and their adolescent children and compare that relationship to the one between those same adolescents and their friends. Potential effects of other identified factors will be analyzed for both their overall affect on teen safety belt use and in combination with the influences of the safety belt use by their parents and their friends.

It is clear that even with the large number of studies over the past 20 years on the use of safety belts by teens, researchers acknowledge that the reasons for the lack of utilizing a proven safety measure are still not entirely clear (Shope, 2006). This is a national concern considering the well-established fact that proper use of safety belts can reduce the risk of injury or death by an average of 50 percent (NHTSA, 2008).

Public policy and the enactment of occupant protection legislation has played a critical role in increasing safety belt use nationally and has contributed to a overall increase in safety belt use from 14 percent in 1993 to over 80 percent in 2007 (NHTSA, 2008). Recent statistics show seat belt use in 2008 to be at 83 percent based on the National Occupant Protection Use Survey (NOPUS), which provides the only nationwide probability-based observed data on seat belt use in the United States. The NOPUS is conducted annually by the National Center for Statistics and Analysis (NHTSA, 2009).

While occupant protection policy is legislated at the individual state level rather than the federal level; the National Highway Traffic Safety Administration (NHTSA), an agency under the Department of Transportation, makes recommendations and sets guidelines for occupant protection in the United States. Its self-described mission is to;

"Save lives, prevent injuries, and reduce vehicle-related crashes." This mission is accomplished through education, research, safety standards, and enforcement activities (www.nhtsa.dot.gov, 2009). As an agency under the Executive branch of the federal government, NHTSA is not empowered to mandate safety belt use. Legislation of safety belt use is under the prevue of each individual state. However, NHTSA is mandated to set best practice standards. These standards are passed down to the states and encouraged to be included in the states occupant protection laws. Each year a portion of Federal highway funding is tied to specific traffic safety efforts and that funding cannot be obtained unless the state has enacted specific legislation to address the identified public safety initiative. An example would be the requirement for the enforcement of driving under the influence (DUI) laws to use a .08 blood alcohol concentration for conviction or the enactment of child passenger safety legislation.

NHTSA also provides funding to promote occupant protection programs within the law enforcement community. States that enact strong occupant protection legislation that meets NHTSA best practice standards qualify for additional transportation funds in the form of safety incentive grants and other highway funding (FHWA.dot.gov/SAFTEALU/legis.htm, 2009). The most current federal funding for these efforts is entitled Safe Accountable Flexible Transportation Equity Act – a Legacy for Users (SAFTEA-LU) under Title 23, United States Code, Public Law 109-99, Section 1406.

Every state except New Hampshire has some form of safety belt law including the District of Columbia. These laws vary dramatically on the age group affected, the coverage of the legislation (front and back seat or front seat only) and the level of

enforcement whether primary or secondary in nature (see Appendix D). Numerous studies have determined the effects of state safety belt laws on overall fatalities and adult seat belt use. Data collected on an annual basis has shown that the adoption of mandatory seatbelt laws significantly increases adult safety belt use and reduces traffic fatalities (NHTSA, 2008). The magnitude of the dramatic increase in safety belt use over the past few years is directly related to the level of enforcement allowed by individual state laws: primary versus secondary enforcement (Cohen and Einav, 2003; Houston and Richardson, 2005). Studies generally agree that primary enforcement laws are more effective that weaker secondary enforcement laws (Carpenter and Stehr, 2008). Standard or primary enforcement laws allow a citation to be issued whenever a law enforcement officer observes an unbelted driver or passenger. Motorists can be stopped and ticketed simply for not using their safety belts. States conducting primary enforcement of safety belt laws have a 14 percent higher safety belt use on average, (NHTSA, 2009). Secondary enforcement safety belt laws require police officers to stop a violator for another traffic infraction before issuing a citation for not using a safety belt. A safety belt violation cannot be used as the initial reason for a traffic stop (McCartt and Northrup, 2004). Previous studies have demonstrated that, on average the effects of primary laws are larger and more consistent than secondary laws in increasing safety belt use and decreasing injuries among adult drivers and passengers (Houston and Richardson, 2002, Centers for Disease Control, 2004b).

In 1986, Washington State enacted the states first mandatory safety belt use law in an attempt to address the 36 percent use rate observed prior to the enactment of the law. The original version was a secondary enforcement law and by 1995, safety belt use had

more than doubled to almost 80 percent. This change was attributed to; 1) the enactment of the laws, 2) the education and training of police, 3) a modest increase in enforcement level, and 4) a public education campaign (Salzberg and Moffat, 2004). In 2002, Washington strengthened the state's safety belt use law to a primary enforcement law and by 2003 overall safety belt use was at 95 percent, and the trend has continued with Washington's safety belt use at an all time high of 96.5 percent in 2008 (NHTSA, 2009). This type of significant increase in the safety belt use rates among the general driving public is common when a state moves from a secondary to a primary enforcement level (Shults, Nichols, Dinh-Zarr, Sleet, and Elder, 2004; NHTSA 2008b).

Recent assessment of safety belt use among high school students that using the Youth Risk Behavior Survey, the Fatality Accident Reporting System, and current safety belt laws, found that in states requiring primary enforcement, safety belt use among high school age youths increased by 45.6 percent. Findings suggest that if all states had primary enforcement of safety belt use, fatalities among young drivers and passengers would decreases by about 120 deaths per year (Carpenter and Stehr, 2008).

Currently, 30 states and the District of Columbia have enacted law requiring primary enforcement of safety belt laws. In 2008, safety belt use averaged 88.2 percent in states with a primary enforcement law and 79 percent in secondary enforcement states (NHTSA, 2009).

Most of the approaches to increase safety belt use in the general population including education and enforcement efforts have not been as effective with teens. The simple establishment of laws requiring use of safety belts in motor vehicles is not as effective with teens as other age groups. When examining the factors related to safety

belt use among fatally injured teenage drivers specifically, the strongest predictor of higher safety belt use was if the crash had occurred in a state with a primary enforcement law safety belt use. Virginia is currently one of 19 states using secondary enforcement of safety belt laws for everyone sixteen years of age and older riding the front seat of a motor vehicle (see Appendix B). As of June 2008, overall safety belt use in Virginia has been determined to be 80.6 percent (NHTSA. 2009).

Graduated Driver Licensing Systems

In the United States, the seriousness of the young driver problem has been acknowledged for decades. For most of the 20th century licensing policies in the United States had failed to adequately address the issues surrounding young inexperienced drivers. Tradition approaches in the 1980's and early 90's included training programs to teach new drivers basic how to drive skills combined with more stringent penalties for traffic infractions committed by novice drivers then for adult drivers. New drivers were more likely to lose their license for speeding or reckless driving infractions that an older more experienced driver.

Historically, states have allowed easy access to a driver's license at a young age (Williams, 1996). In most cases, the minimum age to get an unrestricted drivers license was 16 and as low as 15 years of age in some states. There were few mandatory learner permit stages and few early restrictions. The learner permit stage refers to the initial time period where a novice driver was allowed to drive only when accompanied by a parent or guardian. Most states gave full-unrestricted driving privileges immediately upon licensure. Other factors that could negatively affecting new drivers including alcohol use and the non-use of safety belts were not given any consideration since there were few

states with specific driving under the influence (DUI) or safety belt laws even for adults (Jonah, 1997). Licensing systems were originally enacted as a form of driver control. They served to generate revenue, provide driver identification, selection, and education. They were used to ensure that novice driver met certain minimal requirements that officials felt necessary to operate a motor vehicle. In conventional systems, once the novice driver passed the vision and knowledge test they were issued a license (Mayhew & Simpson, 1990). This approach proved to have limitations in solving the problem of young driver inexperience and risk taking behavior.

The origins for a graduated licensing system for young inexperienced drivers came out of research conducted in North Carolina during the early 1970's. Analysis of data acquired from an origin and destination (O&D) survey conducted by the University of North Carolina Highway Safety Research Center in 1971 found novice drivers to be over represented in fatal crashes between midnight and 6 a.m. and when young passengers were present in the vehicle (Waller, 2003). Findings from these original studies were the basis for proposing that young drivers be introduced gradually into the driving population, with added restrictions based on their initial skill acquisition (Waller & Reinfurt, 1973). An early paper entitled "The Young Driver Paradox," presented in 1975, stressed that experience was critical to the development of driving skills (Warren & Simpson, 1976). The fundamental purpose of a graduated licensing system was to provide the opportunity to gain driving practice under low risk conditions in order to increase the amount of experience that would lead to a decrease in the risk of collision (Mayhew and Simpson, 1990).

In 1977, the National Highway Traffic Safety Administration (NHTSA) developed a model system for graduated driver licensing commonly referred to as GDL. Components included in this system consisted of three complete and separate phases. Beginning with a learner permit phase that includes a significant amount of supervised driving practice, moving to an intermediate phase allowing independent driving but including restrictions to decrease risks such as nighttime and passenger restrictions; and finally a full licensure phase with unrestricted driving privileges. This model was not adopted by any state at the time, although Maryland and California introduced portions the system (Simpson, 2003).

For the next two decades, little progress was made toward the adoption of graduated licensing policies in the United States, even though many agencies and organizations such as the National Highway Traffic Safety Administration (NHTSA), the Insurance Institute for Highway Safety (IIHS), and the American Automobile Association (AAA) continued to strongly champion the concept (NHTSA, 1995). However, progress was being made outside the United States and in 1987; New Zealand introduced the first graduated licensing system. The three-stage program applied to all drivers between the ages of 15 and 25 years of age (Simpson, 2003). The development of the New Zealand program appeared to have become the catalyst for legislative initiatives in the United States and Canada. By the early 1990's, a variety of agencies and individuals in Canada actively promoted graduated driver licensing, which became the foundation with which to make the case to politicians and create a receptive public climate for change.

Another landmark in the history of graduated driver licensing (GDL) occurred in Canada in 1990 when the focus of the graduated licensing program was shifted away from young novice driver exclusively and applied to all new drivers regardless of age. In April 1994, the Ministry of Transportation for the province of Ontario introduced the first graduated license system in Canada. The policy was based on analysis done by researchers Mayhew and Simpson, (1990) which found that decrease in crashes were directly related to increases in experience even among older drivers.

In September 1995, the National Highway Traffic Safety Administration (NHTSA) distributed a State Legislative Fact Sheet introducing the components of a graduated licensing system and encouraging states to implement such policies. Included in the document was a long list of national safety organizations that supported the enactment of graduated licensing policies (NHTSA, 1995). With the publication of this document, NHTSA suggested a major change in the way novice drivers were licensed. Until this time states that had begun to modify their conventional licensing laws to meet the high rate of crashes for new drivers were using a probationary licensing policy. This probationary license established a trial period for new drivers during which their license could be suspended or revoked more quickly than a more experienced driver would be revoked. It would take less demerit points – the most common way driving infractions are tallied – to have ones license suspended for a new driver. This policy is based on the concept of deterrence. It assumes that the threat of punishment will encourage good driving. In contrast, the concept of a graduated license is a provisional licensing system that recognizes that new drivers are inexperienced and at higher risk in some driving situations such as nighttime driving. The graduated licensing system uses restrictions to

limit the exposure of new drivers to high-risk situations until they have more experience (Simpson, 2003). Graduated licensing uses components found in conventional, probationary, and provisional licensing systems, and combines them to ease the novice driver into full licensure is a way that lowers the level of risk and introduces that risk slowly as the novice driver gains experience.

In the United States, graduated driver licensing legislation was first introduce and enacted in the state of Florida on July 1, 1996. Other states followed suite and began making minor changes to their existing driving laws to make it appear as if they also had enacting some form of graduated licensing (Simpson, 2003). These laws differed widely on the level of restrictions and requirements on new drivers but the decreases in crash rates and fatalities resulting from the implementation of these GDL policies have been significant. State level data on fatal crashes rates occurring between the years of 1992 – 2002 reported reductions of 6 – 10 percent in crash fatalities among 15 – 17 year old drivers in states having a 3-stage GDL system. It is important to note that while the results of the implementation of graduated licensing laws resulted in decreases in fatalities the results were not consistent across participating states. Results varied by the quality of the state program and were affected by which components were included (Grabowski and Morrisey, 2005). While GDL programs vary across jurisdictions, research had demonstrated the safety value of the graduated licensing approach for novice drivers over ones that were more conventional (Shope, 2006).

By 2003, public interest in graduated driver licensing (GDL) and its potential effect on decreasing fatality rates for young drivers, reached such a level that the Insurance Institute for Highway Safety became concerned over the lack of consistency in

the various versions of state laws that were being considered as graduated licensing (Simpson, 2003). The Institute produced a report entitled "Graduated Licensing: a Blueprint for North America" to compile all of the specifics of the various state laws. Current graduated driver licensing policies within individual states as well as recommendations and a grading system for those policies is also included. This document has been updated several times over the years with the most recent version available on the IIHS website (www.IIHS.org, 2009).

Encouraging states to strengthen their graduated driver licensing efforts has become a major component of the National Highway Traffic Safety Administration's Driver Licensing Division. Their mission has become; "To provide support for the States in efforts to enact new and improve existing graduated driver licensing laws, modernize and standardization of these laws and ordinances pertaining to the licensing of young novice drivers: Assist in the development of appropriate training materials and procedures to reduce risk taking and improve safety decision making for these drivers." (NHTSA, 2009). As of 2009, forty-seven states have enacted some version of graduated licensing, and each has three distinct stages to the provisional licensing process (www.IIHS.org, 2009, see Appendix E). The three additional states are missing components of the three-phase format. New Hampshire does not require a specific period for new drivers to hold a learners permit. North Dakota has a weak intermediate phase and Wyoming requires only a 10-day learners permit period (aaa.com/public affairs, 2009). Of those states with graduated licensing policies in place, 14 are enforced at a secondary level, and of those, seven have secondary enforcement of safety belt laws as well (www.nhtsa.dot.gov, 2009).

Originally enacted in 1998, the Commonwealth of Virginia's graduated driver licensing system outlines a process that included three specific phases or levels of licensure (see Appendix C). In its current revision, §46.2-334.01 of the Code of Virginia, there is a learner phase of the provisional license which includes the acquisition of a learner's permit. In order to obtain a learner permit, a person must be at least 15 years and 6 months of age, have the consent of a parent or guardian, and pass a written test. Persons with a learner's permit cannot drive unsupervised, they cannot carry more than one passenger under the age of 18 that is not a family member, and they cannot drive between the hours of midnight and 4 a.m. This phase also requires a new driver to drive under the supervision of a parent or guardian for a specific amount of time, in Virginia it is a minimum of nine months after receiving their permit. Revision to the legislation in 2008 added the requirement that during this time, the new driver must complete 45 hours of supervised driving experience, 15 hours of that driving must be completed at night. In addition to the supervised driving experience, the student must successfully complete a 36-hour classroom driver education course and pass a behind-the-wheel driving test (see Appendix C).

The second phase, referred to as the intermediate provisional phase, is the most important portion of the system. In this phase, a novice driver may drive without an adult present in the vehicle but driving is restricted to decrease the potential risks associated with crashes (Goodwin, Wells, Foss, & Williams, 2006). In Virginia, the provisional phase of the GDL law stipulates that in the first year of driving (after completion of the learner's permit stage) there may be no more than one additional passenger under the age of 18 in the vehicle, other than family members. After the first year, the number of

passengers is restricted to no more than three until the driver reaches 18 years of age. During this phase, there continues to be a curfew on driving between midnight and 4 a.m. and in 2007, the Virginia General assembly added a clause to ban the use of cell phones for drivers under the age of 18. When a driver reaches the age of 18, if there have been no traffic infractions that have required loss of driving privileges or return to a earlier driving status, full independent licensure status is obtained.

Currently, all restrictions and requirements in the graduated driver licensing system in Virginia are enforced at a secondary level and no specific requirement for safety belt use after the age of 16 is included. Safety belt use until the age of 16 is addressed in Virginia's Child Passenger Safety law. Infractions are enforced at a primary level and citations for non-use of safety belts by young passengers are given to the driver of the vehicle (Code of Virginia §46.2-1095). At 16 years of age, if a passenger seated in the front seat of the vehicle is not wearing a safety belt when the vehicle is stopped for the violation of some other provision of the motor vehicle code, the passenger receives the citation, not the driver (Code of Virginia §46.2-1094) (see Appendix B). This section of the Virginia Motor Vehicle Code applies to front seat passengers only. As a comparison, North Carolina is one of the states that have a safety belt provision included as part of its graduated licensing policy. All occupants in a vehicle driven by a driver under the age of 18 must be properly restrained or the driver can be cited (Goodwin, et al., 2006).

In the United States, graduated driver licensing laws have reduced the fatal crash rates for novice drivers by 11 percent, and led to a significant reduction in fatalities. While this decrease is a positive outcome, research suggests that many 16 and 17-year-

old drivers fail to comply with the restrictions and requirements of GDL, thus reducing potential safety benefits (Goodwin, Wells, Foss & Williams, 2006). Various states have seen dramatic decreases in crash rates among 15 – 17 year old drivers. In the first few years after implementation of graduated licensing, Florida found an overall decrease of 9 percent among teen drivers and a 19 percent decrease in the 15-year-old age group, compared to no significant decrease in crash rates in the neighboring state of Alabama, which did not have a graduated licensing policy in place. Michigan's program, introduced in 1997, saw a 25 percent decrease in 16 year olds involved in crashes.

In North Carolina, the rate of fatal crashes involving 16-year-old drivers decreased by 57 percent (IIHS, 2008). While decreases in the fatal crash rate among novice drivers after the establishment of graduated licensing policies are a positive result, there is a great deal of inconsistency concerning the level of impact. Few studies have attempted to quantify the effects of graduated licensing using national data. In national studies that reviewed graduated licensing policies in various states using Fatal Accident Reporting System (FARS) data and controlling for other relevant laws, results found that graduated licensing reforms averaged a 4 percent decrease in total fatal crash rates and fatal crash rates involving 16 – 19 year old drivers decreased by 9.4 percent. The specific age group being examined may also affect the difference in the level of reductions for crash rates and fatality rates. If a state's graduated licensing policy includes the raising of the initial age at which a teen is eligible to obtain a driver license, that change will impact the number of crashes and fatalities for drivers in that age group. If a state extends the learner permit phase for 6 months this will potentially reduce the number of

teen that are driving without supervision, which will reducing crash rates as well since supervised novice drivers have a lower crash rates than unsupervised ones.

These reviews are important because they recognize that not all graduated driver-licensing programs are created the same. States have enacted many variations of the graduated licensing policies that were originally suggested by NHTSA in 1995. An attempt to determine the true impact of graduated licensing policies within individual states, found it impossible to compare individual states because the data available did not indicate the level of enforcement of the GDL provisions (Morrisey, Grabowski, Dee, and Campbell, 2006). If enforcement of the graduated licensing law was random across the states reviewed, it reduces the estimated impact of various restrictions within state laws.

North Carolina's graduated licensing legislation went into effect in October 1997. The law has a nighttime and passenger restriction as well as a required safety belt use provision. In 2004, parents, teens, and law enforcement personnel were surveyed to determine their knowledge of the restrictions in the law and their adherence to those restrictions and the level of enforcement. Results found both parents and teens to be aware of the nighttime and passenger restrictions in the graduated licensing law; however, teens reported frequently violating those restrictions, often with their parent's knowledge. Teens expressed little concern about being caught and were found to have little knowledge of the enforcement of graduated driver licensing policies (Williams, 2004). When questioned, some law enforcement officers lacked awareness of the specifics of the graduated licensing restrictions such as the specific time limits on night restricted driving and the number of teen passengers allowed for the first year. If restrictions mandated by graduated licensing policies are not enforced by police

consistently due to lack of knowledge this puts parents solidly into the role of primary enforcement agents.

While the majority of states have embraced the safety benefits of a graduated licensing system, and have seen an improvement in the fatality rate among young drivers, there remains a significantly higher number of teens involved in both vehicle crashes and injuries than older drivers. This may be in part because while much of the problem with novice drivers is due to inexperience, it is also true that young drivers and passengers are prone to risk taking behaviors such as a lack of safety belt use (Shope, 2007). Graduated licensing (GDL) laws are not designed to address deliberate risk taking behavior but instead are focused on the inexperience component of crash risk (Waller, 2003). Graduated licensing is a 'risk management" system with the primary purpose of controlling the amount of exposure to risky driving situations, it is not designed to change drivers attitudes (Williams, 2006). Without high levels of compliance with GDL system components, making the components stronger and more restrictive will not accomplish the goal of decreasing a new driver's exposure to risky driving situations. The role of parents becomes vital in the graduated driver licensing process; they are the main enforcers for their teen drivers of all of the restrictions and requirements of the law. They must be a strong advocate of graduated driver licensing (GDL), and be knowledgeable of the policies within their state and be willing to monitor their teens driving experiences.

Research has found that the perception of parents was that dangerous driving conditions including having multiple passengers, and nighttime driving were only moderately risky situations for novice drivers. There are large differences in the amount of time parents choose to spend teaching their novice driver how to drive as well as

differences in how motivated they are to participate in the licensing process or to enforce GDL restrictions. It is likely that teens in the higher crash risk groups have parents less inclined to participate in the process than those who parents are more willing and able (Williams, 2006). The level of parent involvement may have been related to the perceived risk level involved with driving for their teenage driver. A survey conducted in Connecticut of 351 parents of teens who were currently holding a learners permit to determine their perception of the amount of risk in various driving situations found that 92% felt using alcohol while driving to be very risky but only 63 percent of the same parents felt it was risky to drive without a wearing a safety belt. Overall parent perception of the most dangerous driving conditions – multiple passengers, nighttime driving and lack of seat belt use- were only moderately risky; rated 6 out of a possible 10 (Simons-Morton & Hartos, 2003).

Relationships have been found between parenting and teen driving behaviors. While teens report that their parents set rules involving where they are going, with whom, and when they will return; few place limits on dangerous driving conditions such as multiple teen passengers or the use of seat belts (Beck, Shattuck and Raleigh, 2001). Data from 300 teens with two or less years of driving experience, found that a lack of parental control was related to risky driving behaviors, violations, and crashes among teens (Hartos Eitel, Haynie and Simons-Morton, 2000).

Although parents are in a position to influence their teens driving behavior, research shows that many are less involved than they probably should be, considering the importance of the task (Beck, Shattuck, Haynie, Crump & Simons-Morton, 1999). Many parents appear to be unaware of the risk taking behavior their teens are involved while

driving which included riding with a drinking driver, not wearing seat belts, and a variety of aggressive and distracted driving behaviors. Graduated licensing restrictions may have lowered parent's perception of the risk their teen driver faces and the responsibility they as parents hold as the primary enforcement agent (Simons-Morton & Hartos, 2003).

In October 2008, AAA conducted a phone survey of parents who had teen drivers and soon to be drivers living in the household. The telephone survey was conducted as part of Teen Driver Safety Week, 2008. The survey looked at parents whose oldest child was between the age of 12 and 17, in order to gauge the knowledge level of parents experiencing teen driver safety issues for the first time. In interviews with 1350 parents, researchers found that parents recognized car crashes were a leading health concern for their children, with 59 percent identifying crashes as the greatest threat to teen health. Parents of new drivers were not generally aware of what age crash risk begins to increase. Most felt it was around the age of 16, when in reality an analysis by the Children's Hospital of Philadelphia found crash risk actually begins to increase as young as age 12 (AAA, 2009).

The question remains of what effect, has the enactment of graduated driver licensing laws had on parental management of teen driving behavior? States with strong graduated driver licensing laws that allow for primary enforcement of restrictions found that parents were better able to establish and enforce driving restrictions in general, including those not specifically covered by the graduated licensing law such as safety belt use (Hartos, Simons-Morton, Beck & Leaf, 2005).

While enactment of graduated licensing systems requires the enforcement of the restrictions by law enforcement officers, in states where that enforcement is enacted at

only a secondary level, the restrictions are not always strictly enforced (Morrisey, Grabowski, Dee, and Campbell, 2006). With police enforcement conducted at a secondary level, parents truly become the primary enforcers of the restrictions and requirements of graduated licensing laws, including requiring safety belt use. This puts an increased importance on safety belt use by parents, especially during this critical phase of driving for teens. How well parents adhere to safety belt laws themselves may reflect the level of use by their novice drivers.

The challenge of increasing safety belt use during adolescence requires that we understand what factors influence that use and whether those factors change depending of the age of the high school student. An understanding of the mechanisms of behavior change to increase safety belt use will suggest the direction and focus of compliance efforts. With the variety of influences that research has identified affecting safety belt use for the adolescent population, it is apparent that further study is needed to understand the viewpoints of young drivers themselves, as well as their parents and peers and the relationship between safety belt use and their environment (Shope, 2006).

Theoretical Foundation

Selecting an appropriate theory is situation-specific and depends on the audience, setting, and the characteristics of the behavior to be changed. Social learning theory emphasizes the importance of observing and modeling the behaviors of others. Most human behavior is learned through observation and from that observation people determine how new behaviors are to be performed (Bandura, 1977). This information is then used as a guide for action. During childhood, parents have been recognized as the most influential people in ones life. However, social scientists often assume that parental

influence is curtailed as a child reaches adolescence because of the rising counter-influence of peer groups. This traditional view assumes that parents abdicate much of their authority and influence over adolescent offspring to school and peer groups (Riesman, 1961). Adolescence is a developmental phase where parental relationships become less salient or even inhibitory as the individuals orient themselves to the world of their friends and peers (Blos, 1979). There is much evidence that across the early adolescent years, susceptibility to peer pressure increases while reliance on parents' opinion and advice declines (Berndt, 1979). From this perspective, adolescence is a transitional period when the focus of attachments becomes oriented more toward peers than parents (Cooper, Shaver and Collins, 1998; Furman and Buhrmester, 1992).

While it is true that during adolescence the number of significant others in one's life widens to included peers and others outside the immediate family, more studies have shown that parental influence on health-related behaviors continues to remain high even during these adolescent years. This is true of both positive behaviors such as academic achievement (Dornbusch, Ritter, Leiderman, Roberts & Fraleigh, 1987) and delinquent behaviors such as drug use (Coombs & Landsverk, 1988).

Multiple levels of influence can be found to affect positive health-related behavior, and it is clear that both home and community-level factors are important in shaping that behavior (Sallis & Owens, 1997). Harris (1995), suggests that it is outside-the-home socializations and interaction within peer groups that are largely responsible for an individual's personality and behavior. Through interaction with others, especially parents and peers, and personal experiences with risky behaviors, the acceptable risk level is developed. For example, a teen may perceive there is social pressure to use a

safety belt because he believes that his parents think he should use a safety belt and therefore he is motivated to comply with them. If there are strong peer influences on risky driving behaviors, such as not using a safety belt, they could include direct and intentional encouragement of risky behavior, or they may be indirect, with the teen simply perceiving that his peers would view such behavior as desirable or expected.

There are several different processes in which socializing agents can influence health related beliefs and behaviors. Parents provide strong models of behavior, both healthy and unhealthy. What they buy to eat, how often they exercise, whether they drink alcohol and how much, even how often they see a doctor or dentist. Parents hold the beliefs about health that shape their own behavior and translate those beliefs to their children through the guidance and training they provide to them. They teach their children good health related behaviors: brushing one's teeth, eating vegetables, and not taking drugs.

Peer influences on health related behaviors come mostly from modeling the behavior rather than teaching it. Friends do not teach each other life style behaviors. Observing how ones friends behave and which behaviors they find acceptable often leads the adolescent to model those behaviors as a sign of acceptance and growing independence from ones family. With both of these groups representing a powerful influence on risk-taking behavior and other health related behaviors, is there a specific age at which one of these influential groups – parents and friends – have a stronger influence on behavior?

In determining when and if peer influence outweighs parental influence on health-related behaviors such as wearing safety belts, Lau, Quadrel and Hartman, (1990) discuss

two opposing models: the *lifelong openness model* and the *enduring family socialization model*. In the *lifelong openness model*, people are always open to persuasion from any influential socializing agents, including peers, and give no preeminent status to parents. In contrast, the *enduring family socialization model* argues that preventive health beliefs and behaviors are learned from family and remain reasonably stable throughout life. While these two models appear to be in conflict in explaining the role of parents and peers on health-related beliefs and behaviors, the researchers suggest that although preventive behaviors are primarily learned from one's family, there are periods in life when a person is increasingly open to influences from people outside the family. Lau and his colleagues, refer to these as "windows of vulnerability" defined as critical periods when other socializing agents have an influence on behavior. This model supports the idea that there is a dynamic interaction among biology, behavior and the environment, which changes over the course of one's life. The first of these 'windows' is during adolescence, when older children seek to increase independence from their parents as part of the process of moving to adulthood. If this is a time of life where an increase in risk-taking occurs due to these outside influences, then there is the same potential influence for the modeling of positive health-related behaviors such as wearing safety belts. An extrapolation of this theory for the current research would argue that the *enduring family socialization model* would find that the safety belt use of adolescents is strongly influenced by the level of use by parents and that the influence would remain consistent at all age levels. In contrast, the *lifelong openness model*, could argue that the influence of parents would diminish during adolescence and that safety belt use of teens would

become more influenced by the behavior of their friends and that this peer influence would continue and possibly grow stronger with older teens.

CHAPTER 3

METHODOLOGY

Overview

Determining the most influential variables affecting the use of safety belts by teenagers continues to be a moving target (Shope, 2006). Research suggests a strong link between parental driving behavior and that of their teen drivers especially in driving style and decision-making (Ulleburg and Rundmo, 2003; Shin et al., 1999; Lau, Quadrel & Hartman, 1990). High levels of parental monitoring and family connectedness have been shown to lower rates of crashes while more lenient attitudes from parents on risk taking behaviors tended to raise the rates of crash involvement (Hartos, Eitel, Haynie, & Simons-Morton, 2001). More frequent parental supervision has been associated with less likelihood of teens speeding and a better chance that teens were using safety belts when driving. While research shows the level of risk taking behavior among novice drivers to be related to parental influence, many new drivers report few driving restrictions placed on them by their parents (Simon-Morton, Hartos, & Leaf, & Preusser, 2006). As parents become less engaged with the behaviors of their teen drivers, the influences from peer behavior becomes stronger. Adolescence is a time where the influence of peers on health related behaviors such as safety belt use increases and the influence of parents diminish (Babio, Daponte & Codina, 2006; Calisir and Lehto, 2002). Other variables such as age, gender, crash experience, and level of licensure have also been shown to affect the level of safety belt use by high school students. These variables may also prove to have an effect on the strength of the primary influences of parents and peers on safety belt behavior. (Calisir & Lehto, 2002: McCratt & Northrup, 2004).

This study initially seeks to determine the level of influence from the safety belt use behavior of parents and peers on the safety belt use of high school students. Secondly, whether that influence is consistent at all ages within the high school population will be examined. If there is a change in the strength of influence from either parents or peers based on the age of the high school student is it significant enough to change the level of safety belt use for that age group. If it is determined if there is a significant difference in the level of influence the safety belt use behavior of parents has a positive influence on the safety belt use of their adolescent children. If this influence is determined to be strong enough to affect the behavior of adolescent drivers during the early stages of licensure where by parents can effectively act as enforcers of positive driving behavior, these results support the current enforcement levels of graduated driver licensing (GDL) policy in Virginia. Graduated driver licensing laws enforced at a secondary level by the police, place parents in the role of primary enforcers of the restrictions and requirements of the law including the use of safety belts.

If the safety belt behavior of high school students is found to be more highly correlated to the safety belt use of their friends than that of their parents, this may be an indication that the current safety belt laws and the graduated licensing policies need to be strengthened to better address the risk taking behavior among novice drivers.

One way in which the current law could be strengthened would be to raise the enforcement of the restrictions and requirements included in the graduated licensing system to a primary level. Additionally, mandatory safety belt use for all occupants of a vehicle whose driver is in the graduated system could be added to the current code. To address the use of safety belts in this population as well as in the general population;

raising the enforcement level of the current occupant protection laws to a primary level for all occupants of all ages when riding in a motor vehicle should be considered.

Research Questions and Hypotheses

Specifically, the study will examine the following distinct questions and hypotheses:

1. Is there a correlation between the level of safety belt use by high school students and the level of safety belt use of their parents?

   H: Safety belt use by high school students is positively correlated to the safety belt use by their parents.

2. Is there a correlation between the safety belt use of high school students and their friends?

   H: Safety belt use by high school students is positively correlated to the safety belt use by their friends.

3. Is there a difference/change in the strength of influence of parents and friends on the safety belt use of high school students based on the age of the high school student?

   H: Safety belt use by friends more strongly influences the safety belt use of high school students at higher age levels. The correlation between the safety belt use of parents and that of their child weakens as the high school student grows older.

4. Does being involved in a motor vehicle crash affect the level of safety belt use of high school students?

H: Being involved in a motor vehicle crash increases the frequency of safety belt use by high school students.

5A. Does one's gender affect the level of safety belt use by high school students?

H: Male students will have a lower safety belt use rate than female students.

5B. Does having a driver's license affect the level of safety belt use by high school students who are of age to obtain a driver's license?

H: Having a driver's license will increase the frequency of safety belt use by high school students who are of age to obtain a driver's license.

Data

Archival survey data were acquired with permission from Drive Safe Hampton Roads, a nonprofit traffic safety coalition, based in Virginia Beach, Virginia. Surveys were part of a regional traffic safety program called Get It Together (GIT). The data set was obtained from surveys administered to approximately 3,722 students at twenty-four high schools in southeastern Virginia in October 2006 (see Appendix A). The survey information used in the current study is from a sample group of students from a total high school population of approximately 24,000 students in the Greater Hampton Roads metropolitan area for the school year of 2006/2007.

Specific written instructions from the Get It Together program were used as a guideline for the distribution of the surveys to students with in each high school. Teachers and administrative staff at each school were asked to have 200 students complete the survey as a pre-test as part of the Get It Together traffic safety initiative for that year. Not every school completed and returned all 200 surveys. Specific written

instructions were given to each teacher and included a request to have the survey completed by approximately 50 students chosen randomly from each grade; levels nine through twelve. All surveys were from anonymous participants with the only identifier used on the survey forms being the name of the high school the student attended.

Characteristics of the research population

Samples of students from twenty-four high schools in the southeast Virginia area were included in the current data sample. All were public schools that were located in two counties and six cities in the Hampton Roads area of Virginia. Included were students from the cities of Norfolk, Virginia Beach, Portsmouth, Chesapeake, Newport News, and Hampton, Virginia and the counties of Isle of Wight and Poquoson, Virginia during the 2006/2007 academic year. Overall, students represented school populations that include a wide range of demographic and socio-economic levels as well as suburban, urban, and rural environments.

Survey Instrument

The 10-question survey (see Appendix A) was derived from a longer survey developed and tested in a previous research study examining safety belt use among high school students (Herbert & Porter, 2002). Questions are consistent with those found in most standardized and widely accepted health related survey instruments such as the Youth Risk Behavior Surveillance System (YRBSS). The current survey was field-tested using groups of high school students and teachers for clarity of purpose and validity. The survey was originally given to small groups of students who were asked to describe what answers they thought the questions were designed to obtain.

The survey included questions focusing on the driving habits and behaviors of the respondent, their parents, and their friends, as well as demographic characteristics of the respondents. Representative items specifically addressing safety belt use behavior were, *"Overall, how often do you wear your safety belt while in moving vehicles?"* and, *"If you do not always wear your safety belt, what main reason do you have for not wearing it?"* The representative item addressing the level of safety belt use of the respondents parents was; *"How often do your parents wear a safety belt while in moving vehicles?"* and the survey question that addressed the level of safety belt use of the respondents friends was; *"How often do your friends wear a safety belt while in moving vehicles?"* Additional questions queried respondents about the amount of driving experience they had, and whether the student had ever been involved in a motor vehicle crash. Demographic questions assessed the number of respondents with driver's licenses or permits and standard demographic variables such as gender and age.

Variables

The dependent variable for the study is the self-reported level of safety belt use by the high school student defined as "Level of safety belt use by high school student." Using the survey question – *Overall, how often do you wear your safety belt while in moving vehicles?* The variable, measured on a Likert scale with options for response including: Always, Most times, Sometimes, Rarely, and Never. In addition, the survey included a question that asked the number of times the student reported wearing their safety belt in the last 10 times they rode in a motor vehicle. Using the question: "Think about your last 10 driving trips to any destination (regardless of whether you were the

driver or a passenger), for how many of these trips did you wear your safety belt?" with a numerical response from zero to 10.

The two main independent variables that were examined were the level of parental safety belt use and the level of safety belt use by the high school student's friends. Survey questions asked, "*Overall, how often do your parents wear their safety belt while in moving vehicles?*" and, "*Overall, how often do your friends wear their safety belt while in moving vehicles?*" The variables, again measured on a Likert scale with options for response including; Always, Most times, Sometimes, Rarely and Never.

Demographic variables that were examined included age, gender, and driver licensure status. Addition intervening variables that were examined included the crash experience of the respondent using the question, *"Have you ever been in a motor vehicle crash?"*

Initial frequency analysis of the responses to the questions pertaining to level of safety belt use by the high school student, their parents, and their friends found a skewed distribution of the responses to all three questions between "Always" and other responses (Table 1).

Table 1. Frequency of Self Reported Belt Use (n=3645

Variable	*n*	%
Student Safety Belt Use		
Never	76	2.1%
Rarely	219	6.0%
Sometimes	426	11.7%
Most times	1145	31.3%
Always	1786	48.9%
Parent Safety Belt Use		
Never	65	1.8%
Rarely	142	3.9%
Some times	343	9.4%
Most Times	909	24.9%
Always	2195	60.0%
Friend Safety Belt Use		
Never	133	3.6%
Rarely	380	10.4%
Some times	1187	32.5%
Most Times	1279	35.0%
Always	675	18.5%

Due to the skewed nature of the data on the dependent variable as well as the two main independent variables, these three variables were recoded into dichotomous variables. These new variables were then transformed into; *Student always wears safety belt or not* (SBUALL), *Parents always wear safety belt or not* (PBUALL), and *Friends always wear safety belt or not* (FBUALL) (Table 2).

Table 2. Recoded Safety Belt Use Response

Variable	*n*	%
SBUALL		
Always	1786	48.9
Less than Always	1868	51.1
PBUALL		
Always	2195	60.1
Less Than always	1419	39.9
FBUALL		
Always	675	18.5
Less than always	2979	81.5

(n= 3654)

The recoding of the safety belt use variables into dichotomous variables will be used in the analysis to determine influences of parents and friends on the respondent always wearing a safety belt vs. the respondent not always wearing one.

Frequencies of other responses that were found to be skewed were recoded into dichotomous variables as well. The responses from the survey question, "How many times in the last 10 times you rode in a vehicle did you wear a safety belt?" was dichotomized into, *Always and less than always* (ALLTEN). The question pertaining to licensure status was recoded into, *Has or does not have license* (LICSAT). The following chart gives the definition of all variables used and the symbol used to identify them in the data analysis.

Table 3. Data Dictionary

Variable	Symbol	Description
Student safety belt use	SBUALL	Always or not always wear a safety belt
Parent safety belt use	PBUALL	Always or not always wear a safety belt
Friend safety belt use	FBUALL	Always or not always wear a safety belt
Number of times student wears safety belt in last 10 trips.	ALLTEN	Did the student wear a safety all of the last 10 times they rode in a motor vehicle or not?
Gender of student	GENDER	What is your gender?
Age of student	AGE	What is your age?
Crash experience of student	CRASH	Has the student been involved in a crash
Licensure status	LICSAT	Do you presently have a driver's license?
Attitude of student toward wearing safety belts	ATT	If you do not always wear a seat belt, what is the reason?

Analysis Plan

Descriptive analysis was performed on survey response data including frequencies, mean, median, and standard deviation. A reliability check determined the internal validity of the students self reported safety belt use question.

Correlations and logistic regression models were used to examine the relationships between the safety belt use of high school students and other factors including the use of safety belts by their parents and their friends, as well as the changes in safety belt use based on age, gender, crash experience and licensure status. Phi (φ) and point-biserial (r_{pb}) correlations examined whether the frequency of safety belt use was explained in terms of the variation of these variables as suggested by previous research (Calisir & Lehto, 2002; Williams, McCratt & Geary, 2003). The strength of the correlations and significance of the relationships was also examined.

The differences in the relationship between the respondents parent safety belt use and their friend's safety belt use based on the age of the high school student was analyzed using logistic regression. Using the independent variables of PBUALL, FBUALL and AGE, the variance of the dependent variable SBUALL based on the influence of the independent variables was examined. The parameter estimate was interpreted in terms of the change in adjusted odds ratio (OR) of the high school student always wearing a safety belt when their parents always wear a safety belt and when their friends always wear a safety belt. Adjusted odds ratios (OR) are used to assess the expectation of a particular outcome if a certain factor or factors are present. In this case, the odds ratio was used to show the strength of association between the predictors of parent safety belt use and friend safety belt use and the dependent variable of student safety belt use. Potential interaction effects of age of the respondent with parent safety belt use or friend's safety belt use is included in the analysis. Other independent variables were introduced into the regression model to determine additional influences on the dependent variable of student safety belt use.

CHAPTER 4

DATA ANALYSIS AND INTERPRETATION

Data analysis results and interpretation concerning the relationship between the dependent and independent variables are presented and discussed below. Each of the variables discussed in the Methodology chapter were examined. Other responses from the survey were not used for the current research.

Data Procedures

Data were coded, entered, and analyzed using a statistical analysis package, SPSS 14.0. The descriptive analysis of the sample population and answers to the safety belt use questions included frequencies, percentages for categorical variables, means, standard deviations, and a range of continuous variables. Univariate and multivariate statistical procedures were used to compare the independent variables of safety belt use by parents and safety belt use by friends to the use of safety belt of the high school student. Descriptive statistics were used to analyze demographic data of the sample population. The reliability of the scores on the level of safety belt use by the high school student question was also calculated. Due to the skewed distribution of the safety belt use responses, the response data was dichotomized into Student Belt Use (SBUALL) always/not always. Predictors tested included Friends Belt Use (FBUALL) always/ not always, Parent Belt Use (PBUALL) always /not always. Correlation and logistic regressions were used to examine the relationship between the dependent variable of student safety belt use and the independent variables of parental safety belt use and the safety belt use of friends. The consistency of the relationship between the independent

and dependent variables of safety belt use across all age groups was examined by using specific age groups as a selection variable in the regression analysis.

Gender (GENDER), crash experience (CRASH), and licensure status (LICSTAT); were also examined to determine the relationship between the dependent variable of safety belt use and these additional independent variables.

Presentation of results

The original data set consisted of 3722 surveys. These were entered and cleaned to remove outliers and duplicate responses. A small set of respondents (n=68) did not record a response to the question concerning crash experience. Those surveys were deleted from the data set as missing data. The final cleaned data set consisted of 3654 surveys from students representing twenty-four high schools in the Greater Hampton Roads area of the Commonwealth of Virginia.

The participants were high school students ranging from 13 to 19 years of age. Of the 3654 high school students, 47 percent (n=1717) were male and 53 percent (n=1937) were female. Due to the small number of 13 year old students (n=13) and 19 year old students (n=18) in the original data, age was recoded to include 14 years and under, 15 years of age, 16 years of age, 17 years of age and 18 years and older as the data set. Recoded ages included 19.1 percent (n=698) 14 years of age and under, 24.9 percent (n=909) fifteen years old, 24.0 percent (n=876), sixteen years old, 25.0 percent (n=919) seventeen years old, and 7.0 percent (n=256) eighteen years old and older. The grade levels of students included: Freshmen, 24.7 percent (n=903), Sophomore 27.7 percent (n=1013), Juniors 23.5 percent (n=860), and Seniors 24.0 percent (n=878). The sample included 55.9 percent (n=2042) non-licensed students, 21.8 percent (n=797) students with

a learner's permit only, and 22.3 percent (n=815) with a drivers license. How students got to school included by bus 46.9 percent (1715), walk or bike 7.0 percent (256), drive 17 percent (623), ride with friend 12 percent (437), and ride with parent/family member 17.0 percent (623). Crash experience of the respondents included 44.4% (1624) had been in a crash, and 54.5 percent (2030) had not been in a crash (Table 4).

Table 4. Characteristics of the sample population. (n = 3654)

Variable	***n***	**%**
Age		
14 and under	698	19.1
15	909	24.9
16	876	24.0
17	915	25.0
18 and older	256	7.0
Gender		
Male	1717	47.0
Female	1937	53.0
Grade Level		
Freshman	903	24.7
Sophomore	1013	27.7
Junior	860	23.5
Senior	878	24.0
Licensure		
Learners/Drivers	1612	44.1
No license	2042	55.9
How Get to School		
Bus	1715	46.9
Walk or Bike	256	7.0
Drive	623	17.0
Ride with Friend	437	12.0
Ride with Parent/Family Member	623	17.0
Have Been In Crash		
Yes	1624	43.6
No	2030	54.5

A measure of reliability and internal consistency was conducted using Cronbach's alpha to determine the consistently of the two personal safety belt use questions. Results indicate .878 (n = 3351) on the standardized items, indicating an acceptable level of internal consistency or reliability for the questions; "Overall, how often do you wear your safety belt in a moving vehicle?" and "In the last 10 driving trip how many times did you wear your safety belt?"

Because of the hierarchical nature of the inquiry, an omnibus table was created to report the results of the regression analysis. On Step One, logistic regression was used to examine the main effects of the following independent variables; parents always using a safety belt (PBUALL), friends always using a safety belt (FBUALL), age (AGE), crash experience (CRASH), and gender (GENDER) on the dependent variable of the student always using a safety belt (SBUALL). Adjusted odds ratios (OR) were reported for each independent variable (Table 5 - Step 1). The dependent variable of SBUALL was found to have a statistically significant relationship with each of the independent variable to varying degrees.

As a Step Two, the interaction of age and parent safety belt use (PBUALL*AGE) and the interaction of age with friends safety belt use (FBUALL*AGE) was added and the analysis rerun (Table 5 - Step 2). This additional analysis will determine the potential overall interaction effects when age was added as a moderating factor. If the effect of the independent variable of parent safety belt use and friend's safety belt use differs on the dependent variable of student's safety belt use, depending on the value of a third moderating variable, in this case the age of the respondent, it can be assumed that an interaction effect exists.

Analysis indicated that when age is included as a moderating variable the likelihood of the high school student always wearing a safety belt (SBUALL) when their parents always wear a safety belt (PBUALL*AGE) is less than equal odds. Comparing this interaction effect with that of friend safety belt use and age (FBUALL*AGE) the odd ratio indicates that students are 1.28 times more likely to always use a safety belt.

Table 5.
Step 1. Adjusted Odds Ratio of Students Overall Safety Belt Use. (n=3654)

Variable	Adjusted OR	Adjusted 95% CI	Wald χ^2
PBUALL	2.88	2.49 - 3.33	202.01**
FBUALL	5.54	4.49 - 6.84	255.61**
AGE	1.11	1.05 - 1.17	12.53**
CRASH	.79	.68 - .91	10.71*
GENDER	1.33	1.15 - 1.53	15.29**

Step 2 Adjusted Odds Ratio With Interaction Effects. (n= 3654)

Variable	Adjusted OR	Adjusted 95% CI	Wald χ^2
PBUALL	2.89	2.49 - 3.35	201.80**
FBUALL	5.39	4.37 - 6.67	243.61**
AGE	1.21	1.09 - 1.34	14.44**
CRASH	.78	.67 - .89	12.14*
GENDER	1.33	1.16 - 1.54	15.81**
PBUALL*AGE	.83	.73 - .93	9.37***
FBUALL*AGE	1.29	1.08 –1.53	7.85****

Note. OR = odds ratio; adjusted OR's predicted always wearing a safety belt, adjusted for other factors in the model. CI = confidence interval.
* $p<0.01$
** $p<0.001$
*** $p<0.002$
**** $p<0.005$

To avoid potential multicolinearity, the continuous predictor variable of AGE was centered before computing the adjusted odds ratio. A high degree of multicolinearity would have the potential to produces unacceptable uncertainty (large variance) in regression coefficient estimates. Specifically, the coefficients may change drastically depending on which terms are in or out of the model and the order they are placed in the model. The resulting deviation score for age (AGE) will act to decrease the potential multicolinearity.

The omnibus analysis using the adjusted odds ratios reported in Table 5 will be used to address the following research hypotheses.

Hypothesis 1: There is a positive correlation between the level of safety belt use by high school students and the level of safety belt use of their parents.

The hypothesis relationship is that the frequency of safety belt use by high school students is a function of the influence of the safety belt use behavior of their parents. The expectation is that the independent variable of parents who always use a safety belt (PBUALL) will be significantly correlated to their teenage child always wearing a safety belt (SBUALL). Based on Lau's enduring family socialization hypothesis that parents influences on preventative health beliefs is the strongest influence and remains so even during adolescence (Lau et al., 1990).

The analysis of the relationship using a Phi (φ) correlation indicates a statistically significant relationship exists between the independent variable PBUALL and the dependent variable SBUALL. Results indicate an overall positive correlation between student safety belt use and parents safety belt use, $r = .251$, $n = 3654$, $p < 0.001$. This indicates a moderate correlation between the variables. This result supports previous

research by Dornbusch et al. (1987) and Bianchi and Summala (2004), indicating parental behavior continues to be a positive influence on health related behaviors such as safety belt use behavior during the high school years.

While the correlation is positive and significant, the result indicates a relationship of only moderate strength. The relationship between the independent variable of parents safety belt use was examined using logistic regression to determine the adjusted odds ratio (OR) to predict the safety belt use of the high school students. The adjusted odds ratios (OR) results indicated a significant relationship, ($OR = 2.88$, $p < 0.001$) (Table 5). This indicated that high school students who have parents who always use a safety belt are 2.88 times more likely to always buckle up as well.

Hypothesis 2: Safety belt use by high school students is positively correlated with the level of safety belt use of their friends.

The hypothesis relationship is that the frequency of safety belt use by high school students is a function of the influence of the safety belt use of their friends. The expectation is that the independent variable of friends who always wear a safety belt (FBUALL) is significantly correlated to the high school student always wearing a safety belt (SBUALL).

The analysis of the relationship using a Phi (φ) correlation indicates a statistically significant relationship exists between the independent variable FBUALL and the dependent variable SBUALL. Results indicated a moderate positive correlation between student safety belt use and friends safety belt use, $r = .301$, $n = 3654$, $p < 0.001$. This result would support the *lifelong openness model* proposed by Lau et al. (1990), which

states that people are always open to persuasion from any influential socializing agents, including peers, and does not give preeminent status to parents.

Analysis of the adjusted odds ratio (OR) from the logistic regression using FBUALL to predict SBUALL indicated a significant positive relationship between the independent variable of friends safety belt use and the dependent variable of safety belt use by the student (OR = 5.39, $p < 0.001$). Therefore, based on the adjusted odds ratio, students who have friends who always wear a safety belt are 5.39 times more likely to always wear a safety belt (Table 5). This result supports research indicating that the influence of peers on driving behaviors (Weinstein, 1993) continues to be a strong influence on safety belt use behavior during the high school years.

While both parent safety belt use and friend safety belt use were positively correlated to the student's safety belt use, results indicated there is a stronger relationship between FBUALL and SBUALL than between PBUALL and SBUALL. The stronger predictor of the high school student always wearing a safety belt was having friends who were always buckled up, based on adjusted odd ratio of the logistic regression.

Hypothesis 3: Safety belt use by friends is more strongly positively correlated to the level of safety belt use of high schools students, as the student grows older. The correlation between the safety belt use of parents and the student weakens as the high school student grows older.

The hypothesized relationship is that frequency of high school students always wearing a safety belt (SBUALL) changes as a function of the interaction effect of the moderating variable AGE with the independent variable PBUALL; as well as the interaction effect of AGE and the independent variable FBUALL. The expectation is that

while the dependent variable SBUALL will be significant related to both independent variables, the odds ratio will change based on the moderating effect of the age of the student. Reviewing the cross tabulation of safety belt use for the three groups: students (SBUALL), parents (PBUALL) and friends (FBUALL) and the ages of the respondents, the frequency of always wearing a safety belt varies somewhat by age (Table 6).

Table 6. Percentage of reported *always wearing a safety belt* within age groups.

Age	SBUALL	PBUALL	FBUALL
Age 14 and under (n = 698)	42.6%	60.5%	13.2%
15 (n = 909)	45.8%	60.3%	14.9%
16 (n = 876)	50.6%	58.2%	20.3%
17 (n =915)	55.6%	62.1%	23.3%
18 and older (n = 256)	47.3%	57.4%	22.3%

Results of a point-biserial correlation analysis between age (AGE) and safety belt use of the student (SBUALL) found a significant relationship (r_{pb} = .076, p < .01) between the age of the respondent and their level of safety belt use. The initial analysis of the interaction between age and influence of parent safety belt use as well as the interaction of age with friends safety belt use using adjusted odds ratio (OR) found a statistically significant relationship in both cases; PBUALL* AGE (OR = .83, p <.002) and for FBUALL * AGE (OR = 1.29, p <.005) (Table 5, Step 2).

While significant, the results do not give an indication of whether these relationships are consistent within each age group of the student. In order to determine if

any specific age is a factor in the strength of influence, a logistic regression was conducted with the independent variables, PBUALL and FBUALL and the dependent variable SBUALL using specific age groups as a selection variable. Comparing the adjusted odds ratio (OR) between parent always using a safety belt (PBUALL) and friend always using a safety belt (FBUALL) for each individual age group separately, it is possible to compare the strength of influence on safety belt use of the high school student (SBUALL) (Table 7).

For students 14 years of age and younger (n = 698) the odds ratio of always wearing a safety belt (SBUALL) if their parents always use one (PBUALL) is (OR = 3.72, $p < 0.001$). The odds if the same group always using a safety belt if their friends always do (FBUALL) is (OR = 3.99, $p < .001$). Both results are significant and these results show little difference in impact on the frequency the student's safety belt use (SBUALL). For both independent variables, PBUALL and FBUALL results indicate an expected increase of approximately 3 times the rate of always wearing a safety belt (SBUALL) if their parents or friends always wear one.

For students 15 years of age (n = 909) the adjusted odds ratio for PBUALL equaled, (OR = 4.77, $p < .001$) and FBUALL increased to (OR = 4.56, $p < .001$) (Table 7). Both independent variables again indicate a positive significant effect on safety belt use (SBUALL) and both increase the odds of the behavior occurring at similar rates. Each indicates that for 15-year-old students whose parents always wear a safety belt they are 4.77 times more like to always wear a safety belt and 15-year-old students whose friends always buckle up, they are 4.56, or slightly less likely to always wear a safety belt. Both independent variables show significant impact on safety belt use.

At sixteen years of age (n = 876) the odds ratio begin to indicate a different trend in the data that for 14 and 15 year old students. The adjusted odds ratio for the student always wearing a safety belt (SBUALL) when parents always buckle up (PBUALL) declines to (OR = 2.15, $p < .001$), this would indicate that 16-year-old students who have parents who always buckle up are two times more likely to always buckle up as well. At the same age the adjusted odds ratio for student safety belt use (SBUALL) who have friends who always wear safety belts (FBUALL) increases to (OR = 4.96, $p < .001$). This would indicate a stronger association for friends safety belt use than for parents. This also, indicates a divergence in the influence levels of parents and friends. The age of 16 appears to be the critical point of change in the level of influence (Figure 1).

The difference in the adjusted odds ratio continues to diverge at the age of 17 (n = 915). Results indicate a decreased effect of parents always wearing a safety belt (PBUALL) on student safety belt use, (OR = 1.95, $p < .001$). At the same time friends always wearing a safety belt (FBUALL) shows an increased effect (OR = 8.01, $p < .001$). The adjusted odds ratio indicates that for 17-year-old students having parents who always use a safety belt the odds for them to always buckle up is 1.95 times as likely. While having friends who always wear a safety belt increases the chances of the student always buckling up by slightly over eight times. While both variables continue to show a significant influence however, there is a strong indication that parental influence on safety belt use diminishes dramatically within the older age groups and the influence of friends who always buckle up is greatly increased.

At the age of 18, the change in adjusted odds ratio increases even more. The odds ratio for the dependent variable of student always wearing a safety belt (SBUALL) in the

18-year-old age group when they indicated that their parents always wear a safety belt (PBUALL) increased to (OR = 3.44, $p < .001$) indicating that these students were 3.44 times more likely to always wear a safety belt when their parents always wore one. However, at this age, friends always wearing a safety belt (FBUALL) resulted in an increase in the adjusted odds ratio of 11.45 (OR = 11.45, $p < .001$). This would indicate that 18 year-old students were eleven times more likely to always use a safety belt if their friends always buckled up. It must be noted that the number of students in this age group ($n = 256$) was significantly less than the other age groups tested , which may have affected the odds ratio. However, the trend in change in the adjusted odds ratio is clear.

Table 7. Logistic Regression Using Age Groups as Selection Variable

	Variable	Adjusted OR	Adjusted 95%	Wald χ^2
14 years old and under				
	PBUALL	3.75	2.65 - 5.31	55.68*
	FBUALL	3.93	2.37 - 6.52	28.11*
	CRASH	.75	.63 - 1.21	.63
	GENDER	1.47	1.06 - 2.05	5.27*
(n = 698)				
15 years old				
	PBUALL	4.77	3.50 - 6.49	98.41*
	FBUALL	4.56	2.92 - 7.12	44.52*
	CRASH	.60	.45 - .80	11.74*
	GENDER	1.35	1.01 - 1.81	4.08**
(n=909)				
16 years old				
	PBUALL	2.15	1.61 - 2.88	26.62*
	FBUALL	4.96	3.25 - 7.25	59.73*
	CRASH	.96	.72 - 1.28	.07
	GENDER	.89	.67 - 1.17	.76
	LICENSE	2.11	1.57 - 2.82	24.65*
(n = 876)				
17 years old				
	PBUALL	1.95	1.45 - 2.63	19.48*
	FBUALL	8.01	5.18 - 12.38	87.96*
	CRASH	.79	.60 - 1.06	2.38
	GENDER	1.84	1.38 - 2.46	17.03*
	LICENSE	1.96	1.41 - 2.73	15.95*
(n = 915)				
18 year old and over				
	PBUALL	3.44	1.89 - 6.25	16.42*
	FBUALL	11.45	4.91 - 26.69	31.88*
	CRASH	.58	.32 - 1.04	3.34
	GENDER	1.36	.76 - 2.43	1.08
	LICENSE	2.50	1.22 - 5.12	6.31**
(n = 256)				

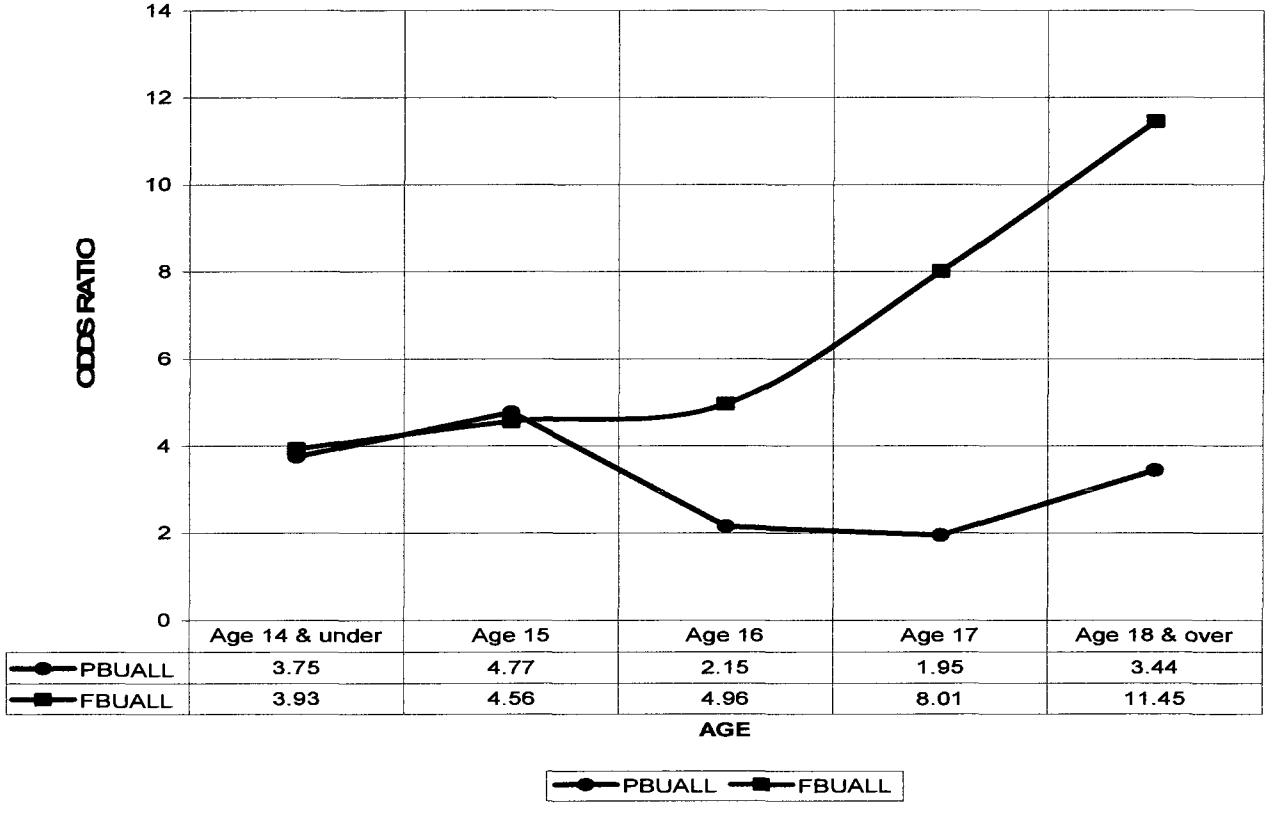
Note. OR = odds ratio; adjusted OR's predicted always wearing a safety belt, adjusted for other factors in the model. CI = confidence interval.

* $p < 0.001$

** $p < 0.05$

Analysis of the hypothesis using logistic regression with age as a selection variable indicates a statistically significant relationship between AGE and effect of parents and friends always wearing a safety belt on the frequency of the high school student always wearing a safety belt. The divergence in odds ratios indicates that as high school students get older they become more influenced by friends than by parents. These results indicate that there is a change in the influence of parents and friends on whether a student always wears a safety belt based on the age of the high school student (Figure 1).

Figure 1. Adjusted Odds Ratio (OR) with AGE as Selection Variable



Hypothesis #4: Experiencing a crash increases the frequency of safety belt use by high school students.

The hypothesis relationship is that the frequency of safety belt use by high school students is a function of crash experience of the student. Specifically, students who have been involved in a motor vehicle crash will be more likely to always wear a safety belt than those who have not experienced a crash.

Initial cross tabulation frequencies indicated that 44.4 percent of all respondent had been involved in a motor vehicle crash. Of those students who had been in a crash (n = 1624), only 41.8 percent of them reported always wearing a seat belt, compared to the overall reported frequency of always wearing a safety belt (48.9%). The frequency of students who had been involved in a crash and reported not always wearing a safety belt was 46.9 percent.

The analysis of the hypothesis relationship using a Phi (φ) correlation indicates a statistically significant relationship (r = .052, n = 3654, $p < .002$) exists between the independent variable of being involved in a crash (CRASH) and the dependent variable student always wears a safety belt (SBUALL). It must be noted that while the result was significant ($p < .002$) the small r indicates a very weak correlation between the variables of crash experience (CRASH) and student safety belt use (SUBALL). Logistic regression analysis of the adjusted odds ratio between crash experience (CRASH) and student always wearing a safety belt (SBUALL) indicates an inverse relationship, (OR = .79, $p < .001$) (Table 5). Results would indicate that the experience of being in a crash reduces the odds of the student always wearing a safety belt. Causes for these results are unknown based on the data available from the survey. Results may be an indication of

higher level of general risk taking due to a reduced level of perceived risk as an influence on adolescent safety belt (Calisir & Lehto, 2002).

Hypothesis #5A: Being male will decrease the level of safety belt use by high school students.

The hypothesized relationship is that the frequency of safety belt use by high school students is a function of the gender of the student. The expectation is that males will have an overall lower frequency of always wearing a safety belt.

Analysis of the cross tabulation results indicated that 45.8 percent of the males indicated that they always wear a safety belt compared to 51.6 percent of the females who reported always wear a safety belt. Results of adjusted odds ratio (OR) from the logistic regression indicated a statistically significant relationship exists between the independent variable GENDER and the dependent variable SBUALL, ($OR = 1.33$, $p < .001$). The adjusted odds ratio indicated that being female increases the odds of the high school student always wearing a safety belt to 1.33 (Table 5). This supports previous research indicating the males tended to wear a safety belt less often than females in the general population as well as specifically within the high school age population. (Calisir & Lehto, 2002; McCartt & Northrup, 2004). Overall, males have shown stronger tendency to engage in risky behaviors such as speeding, drinking and driving and not consistently wearing a safety belt especially when riding with friends (Simons-Morton, Lerner, & Singer, 2005).

Hypothesis #5b: Having a driver's license will increase the level of safety belt use by high school students.

The hypothesis relationship is that the frequency of safety belt use by high school students increases as a function of the high school student being a licensed driver.

The initial frequency analysis indicated that of the students age 16 and above (n=2047), 68.2 percent of them had obtained a driver's license (n=1397). Of those that had a driver's license, 58 percent reported always wearing their safety belt. In comparison, only 40.2 percent of those who do not have a driver's license and were of the age to obtain one stated that they always wear their safety belt. This would indicate an increased frequency of always wearing a safety belt of 18.9 percent in the respondents who were licensed drivers.

Results of a logistic regression using adjusted odds ratio (OR) indicated a statistically significant relationship exists between the independent variable LICENSE and the dependent variable SBUALL, (OR = 2.07, n= 2047, $p < .001$) (Table 8). This would suggest that students who have a driver's license were 2.07 times more likely to always wear a safety belt than those students who did not have a driver's license.

Table 8. Logistic regression using license status to predict student safety belt use.

Variable	Adjusted OR	Adjusted 95% CI	Wald χ^2
LICENSE	2.07	1.71-2.50	56.56*

(n=2047)

Note. OR = odds ratio; adjusted OR's predicted always wearing a safety belt, adjusted for other factors in the model. CI = confidence interval.

* p <0.001

As teenagers initially become drivers, they are very aware of the rules and regulations they are expected to follow in order to initially acquire a driver's license. During the "behind the wheel" portion of driver education, instructors usually mandate that everyone in the vehicle wear safety belts during the training. Novice drivers who want the use of the family vehicle will be very cautious to follow the rules in order to

have access to the car (Simons-Morton, Hartos, & Leaf, 2002). The increased level of safety belt use by students who are licensed drivers may support the addition of a mandatory safety belt requirement to the graduated driver licensing law in Virginia.

CHAPTER 5

DISCUSSION

Overview

The overall purpose of this research was to examine the strength of influence from parents and peers on the behavior of safety belt use by adolescents to use that information to make recommendations to strengthen the current occupant protect and graduated licensing laws in Virginia. The beginning of this chapter summarizes the research. Findings from the study's research questions and a discussion of policy implication follows. Recommendation for future research and limitations of current study are identified.

There has been agreement among theorists in the belief that one's parents become less influential and one's friends become more influential on a person's behavior and beliefs during adolescence. Empirical research supports the fact that in regard to risk taking behavior specifically, peer influences increase as parental influences diminishes. However, there is less agreement of the level of those influences at any specific age during adolescence and there is debate as to when the influence of friends begins to outweigh that of parents, especially in the area of health related behaviors.

The findings from this study suggest that current enforcement levels of occupant protection laws and graduated driver licensing policy in Virginia may not be as effective as needed to be a positive deterrent of fatalities and injuries from motor vehicle crashes in the teen population. Analysis suggests that putting the enforcement of these laws primarily in the hands of parents especially in the early stages of the driving experience may not be the most effective influence for this population.

Summary of Research

The consistent use of safety belts has proven to be highly effective in reducing injuries and fatalities from motor vehicle crashes on the nation's highways. Currently occupant protection laws for adults exist in some form, in 49 states and the District of Columbia. These policies vary in terms of who is included, at what age, in which positions in the vehicle, and the type of enforcement of the law that police officers are allowed to practice.

In the Commonwealth of Virginia the occupant protection laws requiring the use of safety belts is mandatory, however, only secondary enforcement by the police is allowed. A vehicle cannot be stopped for a safety belt use violation as the primary reason for the traffic stop. No citation for a safety belt violation may be issued unless the officer issuing the citation has cause to stop or arrest the driver of the motor vehicle for the violation of some other provision of the motor vehicle code. This secondary level enforcement by police dramatically decreases the potential for safety belt infractions to be ticketed. The legislation only covers persons riding in the front seat of a vehicle who are 16 years-of-age and older. Current occupant protection policies in Virginia put parents in the role of being the enforcement mechanism for the safety belt use of their adolescent child. This enforcement comes at a time when parental influence on this behavior does not appear to be as strong as the influence from peers. This is a critical time of life that has been shown to be a period of increased risk-taking behavior as well. The weakened level of influence may also effect parental enforcement of another critical traffic safety policy, that of graduated driver licensing. Graduated Driver Licensing (GDL) laws require novice drivers to drive initially with adult supervision for a specific

amount of time and then adds restrictions to the initial stages on unsupervised driving to allow the novice driver to gain experience in less risky driving situations. These laws have dramatically reduced the number of fatal crashes and injuries in the adolescent population since implementation. These graduated licensing restrictions are also enforced at one of two levels - primary or secondary. In Virginia, police enforce all GDL policies at the secondary enforcement level. This secondary enforcement level places parents squarely in the role of primary enforcers of the GDL restrictions and requirements.

If parental influence on driving behaviors such as wearing a safety belt are diminished during this critical initial stages of GDL restrictions –enforcement by police may need to be strengthened to primary to allow for the maximum benefit of the graduated licensing system.

The theoretical foundation for the research comes from social learning theory and the work of Lau, Quadrel, and Hartman (1990). The *lifelong openness model* and *enduring family socialization model* are used as the basis for answering the question of the strength of influence from parent vs. peers on health related behaviors such as wearing a safety belt.

The following research questions guided the direction of the inquiry:

(1) Is there a correlation between the level of safety belt use by high school students and the level of safety belt use of their parents?

(2) Is there a correlation between the safety belt use of high school students and their friends?

(3) Is there a difference/change in the strength of influence of parents and friends on the safety belt use of high school students based on the age of the high school student?

(4) Does being involved in a motor vehicle crash affect the level of safety belt use of high school students?

(5a) Does gender affect the level of safety belt use by high school students?

(5b) Does having a license affect the level of safety belt use by high school students who are of age to obtain a drivers license?

Data for the research was obtained from surveys completed by high school students in the Hampton Roads area of Virginia in the fall of 2006. The surveys were administered as part of a traffic safety education initiative under the direction of Drive Safe Hampton Roads, a local traffic safety coalition. This archival survey information, administered to 3654 high school students, comprised the data used for the current research. Specific responses to questions concerning the level of student's use of safety belts as well as the level of safety belt use by their parents and friends were included, additional information related to demographic and behavioral variables including age, gender, crash experience, and level of licensure was part of the overall data examination. The use of archival survey data from this source allowed the researcher to reach a population that is often times difficult if not impossible to access. The use of anonymous surveys allowed students the freedom to be honest with their answers without fear of repercussion.

Analysis of the data included the use of cross tabulation, point-biserial and Phi correlations as well and logistic regression. Findings are summarized by research question and further discussed in the following section.

Discussion

The findings that emerged from the data analysis suggest the following responses to the research questions that guided this study. Hypothesis number one suggested that parental safety belt use behavior was a positive influence on the safety belt use of their adolescent children. A strong correlation was found between frequency of parents who always wear a safety belt and the frequency of their teenage children always wearing a safety belt while in a motor vehicle. Odds ratio results indicated findings that support previous research showing that parents continue to have a strong influence on their child's safety belt use behavior during adolescence. However, results also indicated that the strength of that influence appears to decrease for older teens. This is especially true as teens reach the critical age of obtaining a license and learning to drive a motor vehicle.

Hypothesis number two suggests that peers are a strong influence on safety belt use as well. This was supported in the analysis by the correlation between the frequency of safety belt use by high school students and the frequency of use by their peers. This influence appears to stronger than parental influence and become more pronounced as the age of the teen increases. If peer influence becomes more dominate than the traditional influence of parents as teens get older, enforcement from outside sources may need to be stronger and more consistent to positively affect the safety belt behavior of this population.

The third hypothesis was supported with the strong indication that parental influence diminishes around the same time that teens are acquiring drivers's license and beginning to drive on their own without constant parental supervision required. Results indicated that the odds of the high school student always wearing a safety belt every time

they are in a motor vehicle when their friends wear a safety belt continued to increase as the age of the high school student increased. This finding would strongly support alternative efforts to enforce safety belt laws as well as increase effective educational efforts to reach this high-risk population with the buckle up message.

Analysis of effect of crash experience found that being in a crash did not cause an increase of safety belt use by high school students. This finding appears to support past research that there is an attitude of invincibility among this age group, even taking the influence of parent and peers into account. The variable of gender proved to be significant in determining whether the level of safety belt use. Being female increase the likelihood of always wearing a safety belt that has been found to be the case in previous studies based on crash fatality statistics. Finding also indicated that for students old enough to obtain a drivers license, having a driver's license increases the likelihood of them always wearing a safety belt. This may be due to the effect of being a new driver and wanting to follow the rules in order to keep their newfound driving freedom.

Policy Implications

There has been much research that suggests that a strong graduated driver licensing policy is an effective counter-measure in reducing the involvement of novice drivers in fatal crashes, especially in the youngest and most inexperience drivers. To what extent graduate driver licensing policy positively affects the crash rates of teen drivers is related to the level of compliance by novice drivers to the law. Compliance levels are based on a number of factors including parental restrictions, peer pressure, and consistency of enforcement by police. These factors are both difficult to measure and vary not only by states, but also between jurisdictions within a state.

The literature strongly suggests that parental influences of preventative health behavior decrease during the critical stage of adolescence. Lau, et al., (1990), found a window of vulnerability to occur during adolescence when outside sources, especially peers, become a stronger influence on health related behaviors including safety belt use than the influences of parents. The data in this study also supports those earlier findings. Beginning at age 16 the behavior of parents, while remaining a significant influence, begins to diminish while the influence of friends continues to increase significantly. The figure on page 69 clearly shows this dramatic change in influence on safety belt use by high school students.

The critical point of 16 years of age is important for two reasons. First, this is the age at which drivers and passengers move from the protection of the child passenger safety law which is primarily enforced to the adult safety belt statute in Virginia that only allows for secondary enforcement of the law. This secondary enforcement level as been proven less effective, especially within the teen population, in increasing safety belt use. Secondly, 16 is the age at which most adolescents obtain a drivers license and enter into the Graduated Driver Licensing (GDL) system in Virginia. The restrictions of GDL are also only enforced at a secondary level placing parents in the role of primary enforcers of these rule and restrictions. The data from the current research proves parental influence at this stage is diminishing at this critical phase of driving experience for novice drivers.

The findings of this study support a change in the current policy of secondary enforcement of safety belts use and graduated driver licensing restrictions in the Commonwealth of Virginia to strengthen current laws. There are a number of policy changes that could accomplish the overarching goal of increasing safety belt use in the

adolescent population. This increase in safety belt use is much needed considering the cost to society from non-use of seat belts is well documented in both the unnecessary loss of lives and the economic impact of traffic crashes. If enforcement of Virginia's safety belt law was raised from the current secondary level to a primary level, NHTSA estimates that the percentage of safety belt use would increase at least 10 percent in the first year of enactment (NHTSA, 2007). This policy change would affect not only enforcement of safety belt use in the adolescent population but across all age groups. While this change in enforcement status would positively affect all drivers, legislation proposing such a change has been introduced without success many times over the past ten years in the Virginia General Assembly. Legislators have felt that primary enforcement of safety belt use would infringe on the personal liberty of the Commonwealths constituents.

An additional option that could increase the overall level of safety belt use would be to include all passengers in the vehicle in the law. This would make enforcement of safety belt use primary in all positions in the motor vehicle instead of the current requirement that covers only front seat passengers. The addition of back seat passengers to the law would have the potential to increase safety belt use in the adolescent population due to the increase number of teens who travel together to school functions and social events.

An option that has been recommended by the Virginia Medical Examiners Office would be to increase the age of persons that are covered under the child passenger safety law from 16 up to 18. A recent report by the Chief Medical Examiner reviewed the circumstances of children who lost their lives in 2002, identified several prevention

strategies including the suggestion that the Virginia General Assembly enact new policy in the area of occupant protection. A change in the current law which would increase the age of children included in the child passenger safety section of the Virginia motor vehicle code §46.2-1095 to include 16 and 17 year old persons. This would effectively make safety belt use mandatory as a primary offense until the age of 18 (www.vdh.virginia.gov/medExam/ChildFatality.htm). While strengthening the adult safety belt law to include everyone under primary enforcement would be a more encompassing policy change, making a change to the child passenger safety law would go a long way toward increasing police enforcement of safety belt use during the high school years. This in turn would potentially decrease the number of crashes, injuries, and fatalities in this age group.

Safety belt use could also be specifically addressed through the graduated licensing system in Virginia. Currently there is no provision addressing safety belt use in the requirements of the graduated licensing law. North Carolina requires all occupants in a vehicle driven by a driver who is in the graduated licensing system to be properly restrained or the driver is cited for each infraction. This additional mandate could be added to the current graduated licensing requirements in Virginia. However, given the secondary enforcement of all graduated licensing restrictions and requirements in Virginia adding a safety belt use requirement may have little effect. If enforcement of the graduated licensing regulations were increased to a primary level, it could accomplish a number of things. First, it would raise the perceived level of importance of the specific mandates of the law for both parents and the police officers charged with enforcement of those mandates. In addition, raising required enforcement of the law to a primary status

would support parents in their role of enforcing the statute in the early years of driving for their teenagers. Better compliance with the restrictions and regulations of Virginia's graduated driver licensing law is the key to increasing safety for novice drivers. Strengthening the system by moving to primary enforcement will do little to decrease teen fatal crashes if compliance is low.

Even with changes in the graduated licensing law, parents will continue to be one of the primary influences on the behavior of their novice drivers and they need to be more involved in the process from the beginning. Many parents learn of GDL after their children have received their learner's permit and they are required to complete the 45 hours of practice driving. Educational programs are needed to inform parents about the graduated licensing system and the role they play in the process. However, developing educational programs aimed at parents may be difficult to deploy due to the varied amount of time and the level of motivation a parent may have in participating in the licensing process. If parents are not inclined to participate, due to lack of knowledge of the problem, or lack of concern, making programs available will likely not affect this group.

The current research indicates that while parents remain an important factor in the influence of safety belt use during the high school years, the behavior of one's friends especially around the age of 16, become a dominant factor of influence. If this is true, then peer-to-peer education and programming designed to reach adolescents directly may be the key in increasing safety belt use within this population.

Limitations of the Study

The researcher acknowledges the limitations of the current study. First, the use of archival data collected within the high school settings did not allow the opportunity to direct the questions to a randomized population. The researcher felt that the very large number of surveys (3654) from 24 high schools of various sizes, locations and with diverse populations allowed for a reasonable expectation of randomness.

Another potential limitation is that the data is based on self-reports and therefore may have overestimated actual safety belt use. However, research had found self-reporting of driving behaviors to be relativity reliable and free from social desirability bias when responses are anonymous and individuals could not be singled out (Lajune & Summala, 2003). Questionnaires in the current study were anonymously completed with the name of the high school as the only identifier.

In surveys specifically directed to youth questioning their level of using safety belts, when safety belt use was defined as "always" or "not always", the self-reported use over-estimated actual use by only 2% (Nelson, 1996) suggesting the validity of self-report of safety belt use has improved. Questions on standardized self-administered surveys directed specifically at teens such as the CDC's Youth Risk Behavior Surveillance System (YRBSS) have demonstrated good test-retest reliability. Questions on the survey used in the current research were similar to those used on the YRBSS.

Questionnaires are popular and widely accepted as a tool in traffic safety research, and are often the best method to reach teenagers when direct contact is not feasible. Questionnaires allow for individual-based data that is not possible to study using other methods like observation, interviews, and analysis of national accident statistics alone.

Future Research

The use of surveys to reach the adolescent population has been shown to be effective in the acquisition of information when other contact is not possible. The current survey information was acquired from a local traffic safety organization and used as the data source for the analysis. To be more useful, future surveys should include additional questions concerning demographic and socio-economic data in order to more closely target groups of teens who may be more impacted by peer influences. Future research should populations of teens residing in both states with secondary graduated licensing and secondary safety belt laws and states with primary enforcement of both safety belt and graduated driver licensing. This comparison could add an understanding of the effects of the enforcement level of these policies on the specific population of teens.

Review of programs where parents play a larger role in the graduated driver licensing process to compare the level of influence from parents and friends would offer information to indicate whether the influence of parents is stronger in states with different restrictions, or the amount of time spent on supervised driving differs. One technique that has shown some promise in the early stages is the Checkpoints Program. This program is being tested in a few states and uses behavior change theory to attempt to convince parents to adopt and maintain restrictions on their teen drivers during the first year of licensure. The program has shown some success in changing parental behavior but there has not been a direct effect shown on crash involvement of the newly licensed drivers (Simons-Morton, Hartos, Leaf, and Preusser, 2006).

Conclusion

This study finds a strong indication that parental influence of safety belt use decreases as the age of the high school student increases. This decrease in influence appears to begin around the age of 16. This is a critical age because this is also the age at which many teens obtain their first drivers license. The decrease in influence from parent continues throughout the high school years. At the same time, teens are beginning to drive independently without direct adult supervision and it is the point where safety belt use laws change to a secondary level of enforcement. At the time when occupant protection laws in Virginia decrease in strength, parents – the major influence in a child's life are losing their influence to their adolescent children's peers. This critical time of influence appears to be time when these students are receiving their driver's license and are beginning to driver independently. This inquiry supports a recommendation that both the occupant protection laws as well and the graduated licensing laws in Virginia be examined to determine if a change in enforcement status or other revisions should be proposed to increase the level of safety belt use in the Commonwealth.

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APPENDICES

APPENDIX A

Get It Together
High School Driving Safety Questionnaire – Fall 2006

THANK YOU for completing the following survey. It is completely anonymous. Please mark your answers on this sheet.
If there are multiple choices, please circle your responses. If there is a blank, please write in your response.

1. **What is your gender?** A) Male B) Female
2. **What is your age?** _____
3. **What is your grade level?** A) Freshman B) Sophomore C) Junior D) Senior
4. **Do you presently have a:** A) Learner's Permit B) Driver's License C) Neither
5. **If you presently have a driver's license, how old were you when you received it?** _____
6. **If you have a learner's permit or driver's license, how often do you drive?**
   A) 0 times per week (don't drive / no permit / no license) B) 1 to 3 days per week
   C) 4 to 6 days per week D) Daily
7. **How do you typically get to school? (Please mark only one answer)**
   A) Bus B) Walk or bicycle C) Drive
   D) Ride with friend E) Ride with parent / family member
8. **Think about your last 10 driving trips to any destination (regardless of whether you were the driver or a passenger). For how many of these trips did you wear your safety belt?**_____
9. **Have you ever been involved in a vehicle crash?** A) Yes B) No
10. **If you do not always wear your safety belt, what MAIN reason do you have for not wearing it?**
    A) More comfortable without it B) Safety belts wrinkle clothes
    C) Parents do not wear safety belts D) Friends do not wear safety belts
    E) Forget to wear safety belt F) Other reasons, please specify:
    _____

For the next three items use the following scale. Place the appropriate letter in the space to the LEFT of the item.

A) Always B) Most Times C) Sometimes D) Rarely E) Never

_____**11. Overall, how often do you wear your safety belt while in moving vehicles?**

_____**12. Overall, how often do your parents / guardians wear their safety belts while in moving vehicles?**

_____**13. Overall, how often do your friends wear their safety belts while in moving vehicles?**

14. **What is your home zip code?** _____

Thank You for Participating!!

APPENDIX B

Virginia Motor Vehicle Code for Safety Belts

§ 46.2-1094. Occupants of front seats of motor vehicles required to use safety lap belts and shoulder harnesses; penalty.

A. Each person at least sixteen years of age and occupying the front seat of a motor vehicle equipped or required by the provisions of this title to be equipped with a safety belt system, consisting of lap belts, shoulder harnesses, combinations thereof or similar devices, shall wear the appropriate safety belt system at all times while the motor vehicle is in motion on any public highway. A child under the age of sixteen years, however, shall be protected as required by the provisions of this chapter.

B. This section shall not apply to:

1. Any person for whom a licensed physician determines that the use of such safety belt system would be impractical by reason of such person's physical condition or other medical reason, provided the person so exempted carries on his person or in the vehicle a signed written statement of the physician identifying the exempted person and stating the grounds for the exemption; or

2. Any law-enforcement officer transporting persons in custody or traveling in circumstances which render the wearing of such safety belt system impractical; or

3. Any person while driving a motor vehicle and performing the duties of a rural mail carrier for the United States Postal Service; or

4. Any person driving a motor vehicle and performing the duties of a rural newspaper route carrier, newspaper bundle hauler or newspaper rack carrier; or

5. Drivers of taxicabs; or

6. Personnel of commercial or municipal vehicles while actually engaged in the collection or delivery of goods or services, including but not limited to solid waste, where such collection or delivery requires the personnel to exit and enter the cab of the vehicle with such frequency and regularity so as to render the use of safety belt systems impractical and the safety benefits derived there from insignificant. Such personnel shall resume the use of safety belt systems when actual collection or delivery has ceased or when the vehicle is in transit to or from a point of final disposition or disposal, including but not limited to solid waste facilities, terminals, or other location where the vehicle may be principally garaged; or

7. Any person driving a motor vehicle and performing the duties of a utility meter reader; or

8. Law-enforcement agency personnel driving motor vehicles to enforce laws governing motor vehicle parking.

C. Any person who violates this section shall be subject to a civil penalty of twenty-five dollars to be paid into the state treasury and credited to the Literary Fund. No assignment of demerit points shall be made under Article 19 of Chapter 3 (§ 46.2-489 et seq.) of this title and no court costs shall be assessed for violations of this section.

D. A violation of this section shall not constitute negligence, be considered in mitigation of damages of whatever nature, be admissible in evidence or be the subject of comment by counsel in any action for the recovery of damages arising out of the operation, ownership, or maintenance of a motor vehicle, nor shall anything in this section change any existing law, rule, or procedure pertaining to any such civil action.

E. A violation of this section may be charged on the uniform traffic summons form.

F. No citation for a violation of this section shall be issued unless the officer issuing such citation has cause to stop or arrest the driver of such motor vehicle for the violation of some other provision of this Code or local ordinance relating to the operation, ownership, or maintenance of a motor vehicle or any criminal statute.

G. The governing body of the City of Lynchburg may adopt an ordinance not inconsistent with the provisions of this section, requiring the use of safety belt systems. The penalty for violating any such ordinance shall not exceed a fine or civil penalty of twenty-five dollars.

(1987, c. 538, § 46.1-309.2; 1988, cc. 326, 344; 1989, c. 727; 1993, c. 591; 1997, c. 793; 2007, c. 813.)

APPENDIX C
Virginia Motor Vehicle Code for Graduated Driver Licensing

§ 46.2-334. Conditions and requirements for licensure of persons under 18; requests for cancellation of minor's driver's license; temporary driver's licenses; Board of Education approved programs; home-schooled students; fee.

A. Minors at least 16 years and three months old may be issued driver's licenses under the following conditions:

1. The minor shall submit a proper application and satisfactory evidence that he (i) is a resident of the Commonwealth; (ii) has successfully completed a driver education course approved by either the State Department of Education or, in the case of a course offered by a driver training school licensed under Chapter 17 (§ 46.2-1700 et seq.) of this title, by the Department of Motor Vehicles; and (iii) is mentally, physically, and otherwise qualified to drive a motor vehicle safely.

2. The minor's application for a driver's license must be signed by a parent of the applicant, otherwise by the guardian having custody of him. However, in the event a minor has no parent or guardian, then a driver's license shall not be issued to him unless his application is signed by the judge of the juvenile and domestic relations district court of the city or county in which he resides. If the minor making the application is married or otherwise emancipated, in lieu of any parent's, guardian's or judge's signature, the minor may present proper evidence of the solemnization of the marriage or the order of emancipation.

3. The minor shall be required to state in his application whether or not he has been convicted of an offense triable by, or tried in, a juvenile and domestic relations district court or found by such court to be a child in need of supervision, as defined in § 16.1-228. If it appears that the minor has been adjudged not innocent of the offense alleged or has been found to be a child in need of supervision, the Department shall not issue a license without the written approval of the judge of the juvenile and domestic relations district court making an adjudication as to the minor or the like approval of a similar court of the county or city in which the parent or guardian, respectively, of the minor resides.

4. The application for a permanent driver's license by a minor of the age of persons required to attend school pursuant to § 22.1-254 shall be accompanied by evidence of compliance with the compulsory school attendance law set forth in Article 1 (§ 22.1-254 et seq.) of Chapter 14 of Title 22.1. This evidence shall be provided in writing by the minor's parent. If the minor is unable to provide such evidence, he shall not be granted a driver's license until he reaches the age of 18 or presents proper evidence of the solemnization of his marriage or an order of emancipation, or the parent, as defined in § 22.1-1, or other person standing in loco parentis has provided written authorization for the minor to obtain a driver's license.

A minor may, however, present a high school diploma or its equivalent or a certificate indicating completion of a prescribed course of study as defined by the local school board pursuant to § 22.1-253.13:4 as evidence of compulsory school attendance compliance.

5. The minor applicant shall certify in writing, on a form prescribed by the Commissioner, that he is a resident of the Commonwealth. The applicant's parent or guardian shall also certify that the applicant is a resident by signing the certification. Any minor providing proper evidence of the solemnization of his marriage or a certified copy of a court order of emancipation shall not be required to provide the parent's certification of residence.

B. Any custodial parent or guardian of an unmarried or unemancipated minor may, after the issuance of a permanent driver's license to such minor, file with the Department a written request that the license of the minor be canceled. When such request is filed, the Department shall cancel the license of the minor and the license shall not thereafter be reissued by the Department until a period of six months has elapsed from the date of cancellation or the minor reaches his eighteenth birthday, whichever shall occur sooner. Notwithstanding the foregoing provisions of this subsection, in the case of a minor whose parents have been awarded joint legal custody, a request that the license of the minor be cancelled must be signed by both legal custodians. In the event one parent is not reasonably available or the parents do not agree, one parent may petition the juvenile and domestic relations district court to make a determination that the license of the minor be cancelled.

C. The provisions of subsection A of this section requiring that an application for a driver's license be signed by the parent or guardian shall be waived by the Commissioner if the application is accompanied by proper evidence of the solemnization of the minor's marriage or a certified copy of a court order, issued under the provisions of Article 15 (§ 16.1-331 et seq.) of Chapter 11 of Title 16.1, declaring the applicant to be an emancipated minor.

D. A learner's permit accompanied by documentation verifying the minor's successful completion of an approved driver education course, signed by the minor's parent, guardian, legal custodian or other person standing in loco parentis, shall constitute a temporary driver's license for purposes of driving unaccompanied by a licensed driver as required in § 46.2-335, if all other requirements of this chapter have been met. The temporary license shall only be valid until the permanent license is presented as provided in § 46.2-336.

E. Notwithstanding the provisions of subsection A of this section requiring the successful completion of a driver education course approved by the State Department of Education, the Commissioner, on application therefor by a person at least 16 years and three months old but less than 18 years old, shall issue to the applicant a temporary driver's license valid for six months if he (i) certifies by signing, together with his parent or guardian, on a form prescribed by the Commissioner that he is a resident of the Commonwealth; (ii) is the holder of a valid driver's license from another state; and (iii) has not been found guilty of or otherwise responsible for an offense involving the operation of a motor vehicle. No temporary license issued under this subsection shall be renewed, nor shall any second or subsequent temporary license under this subsection be issued to the same applicant. Any such minor providing proper evidence of the solemnization of his marriage or a certified copy of a court order of emancipation shall not be required to obtain the signature of his parent or guardian for the temporary driver's license.

F. For persons qualifying for a driver's license through driver education courses approved by the Department of Education or courses offered by driver training schools licensed by the Department, the application for the learner's permit shall be used as the application for the driver's license pursuant to § 46.2-335.

G. Driver's licenses shall be issued by the Department to minors successfully completing driver education courses approved by the Department of Education (i) when the Department receives from the school proper certification that the student (a) has successfully completed such course, including a road skills examination and (b) is regularly attending school and is in good academic standing or, if not in such standing or submitting evidence thereof, whose parent or guardian, having custody of such minor, provides written authorization for the minor to obtain a driver's license, which written authorization shall be obtained on forms provided by the Department and indicating the Commonwealth's interest in the good academic standing and regular school

attendance of such minors; and (ii) upon payment of a fee of $2.40 per year, based on the period of the license's validity. For applicants attending public schools, good academic standing may be certified by the public school principal or any of his designees. For applicants attending nonpublic schools, such certification shall be made by the private school principal or any of his designees; for minors receiving home schooling, such certification shall be made by the home schooling parent or tutor. Any minor providing proper evidence of the solemnization of his marriage or a certified copy of a court order of emancipation shall not be required to provide the certification of good academic standing or any written authorization from his parent or guardian to obtain a driver's license.

H. For those home schooled students completing driver education courses approved by the Board of Education and instructed by his own parent or guardian, no driver's license shall be issued until the student has successfully completed the driver's license examination administered by the Department. Furthermore, the Commissioner shall not issue a driver's license for those home schooled students completing driver education courses approved by the Board of Education and instructed by his own parent or guardian if it is determined by the Commissioner that, at the time of such instruction, such parent or guardian had accumulated six or more driver demerit points in the most recently preceding 12 months, had been convicted within the most recent 11 preceding years of driving while intoxicated in violation of § 18.2-266 or a substantially similar law in another state, or had ever been convicted of voluntary or involuntary manslaughter in violation of § 18.2-35 or § 18.2-36 or a substantially similar law in another state.

(Code 1950, §§ 46-353, 46-361, 46-363, 46-364; 1950, p. 249; 1952, c. 396; 1954, c. 123; 1956, c. 665; 1958, c. 541, § 46.1-357; 1960, cc. 110, 424; 1962, cc. 254, 482; 1964, c. 617; 1966, c. 36; 1968, c. 642; 1970, c. 41; 1972, c. 823; 1973, c. 1; 1974, cc. 223, 542; 1976, c. 8; 1977, cc. 548, 552; 1980, c. 165; 1982, c. 287; 1984, c. 780; 1987, cc. 154, 632; 1989, cc. 392, 705, 727; 1991, c. 214; 1993, cc. 471, 501; 1995, c. 535; 1996, cc. 943, 994, 1011, 1022; 1997, c. 841; 1999, cc. 459, 462, 887; 2001, cc. 659, 665, 851; 2003, c. 951.)

APPENDIX D
Safety Belt Use laws in the United States as of September 2009

State	Initial effective date	Primary enforcement?	Who is covered? In what seats?
Alabama	07/18/91	yes; effective 12/09/99	15+ years in front seat
Alaska	09/12/90	yes; effective 05/01/06	16+ years in all seats
Arizona	01/01/91	no	5+ years in front seat; 5 through 15 in all seats
Arkansas	07/15/91	yes, effective 06/30/09	15+ years in front seat
California	01/01/86	yes; effective 01/01/93	16+ years in all seats
Colorado	07/01/87	no	16+ years in front seat
Connecticut	01/01/86	yes	7+ years in front seat
Delaware	01/01/92	yes; effective 06/30/03	16+ years in all seats
District of Columbia	12/12/85	yes; effective 10/01/97	16+ years in all seats
Florida	07/01/86	yes; effective 6/30/09	6+ years in front seat; 6 through 17 years in all seats
Georgia	09/01/88	yes; effective 07/01/96	6 through 17 years in all seats; 18+ years in front seat
Hawaii	12/16/85	yes	8 through 17 years in all seats; 18+ years in front seat
Idaho	07/01/86	no	7+ years in all seats
Illinois	01/01/88	yes; effective 07/03/03	16+ in front seat; 18 and younger in all seats if driver is younger than 18 years
Indiana	07/01/87	yes; effective 07/01/98	16+ years in all seats
Iowa	07/01/86	yes	11+ years in front seat
Kansas	07/01/86	no (yes for children <18; effective 07/01/07)	14 through 17 in all seats; 18+ in front seat
Kentucky	07/15/94	yes; effective 07/20/06	6 and younger and more than 50 inches in all seats; 7+ in all seats
Louisiana	07/01/86	yes; effective 09/01/95	13+ years in all seats
Maine	12/26/95	yes; effective 09/20/07	18+ years in all seats
Maryland	07/01/86	yes; effective 10/01/97	16+ years in front seat
Massachusetts	02/01/94	no	13+ years in all seats
Michigan	07/01/85	yes; effective 04/01/00	16+ years in front seat
Minnesota	08/01/86	yes; effective 06/09/09	7 and younger and more than 57 inches in all seats; 8+ in all seats
Mississippi	07/01/94	yes; effective 05/27/06	7+ years in front seat
Missouri	09/28/85	no (yes for children <16)	16+ years in front seat

Montana	10/01/87	no	6+ years in all seats
Nebraska	01/01/93	no	18+ years in front seat
Nevada	07/01/87	no	6+ years in all seats
New Hampshire	n/a	no law	no law
New Jersey	03/01/85	yes; effective 05/01/00	7 years and younger and more than 80 pounds; 8 through 17 in all seats; 18+ in front seat
New Mexico	01/01/86	yes	18+ years in all seats
New York	12/01/84	yes	16+ years in front seat
North Carolina	10/01/85	yes (secondary for rear seat occupants)	16+ years in all seats
North Dakota	07/14/94	no	18+ years in front seat
Ohio	05/06/86	no	8 through 14 in all seats; 15+ years in front seat (effective 10/07/09)
Oklahoma	02/01/87	yes; effective 11/01/97	13+ years in front seat
Oregon	12/07/90	yes	16+ years in all seats
Pennsylvania	11/23/87	no	8 through 17 years in all seats; 18+ years in front seat
Rhode Island	06/18/91	no (yes for children <18)	18+ years in all seats
South Carolina	07/01/89	Yes; 12/09/05[6]	6+ years in front seat; 6+ years in rear seat with shoulder belt
South Dakota	01/01/95	no	18+ years in front seat
Tennessee	04/21/86	Yes; 07/01/04	16+ years in front seat
Texas	09/01/85	yes	7 years and younger who are 57 inches or taller; 8+ years in all seats
Utah	04/28/86	no (yes for children <19 years)	16+ years in all seats
Vermont	01/01/94	no	16+ years in all seats
Virginia	01/01/88	no	16+ years in front seat
Washington	06/11/86	Yes; 07/01/02	16+ years in all seats
West Virginia	09/01/93	no	8+ years in front seat; 8 through 17 years in all seats
Wisconsin	12/01/87	yes; effective 06/30/09	8+ years in all seats
Wyoming	06/08/89	no	9+ years in all seats

APPENDIX E
US Licensing Systems for Young Drivers
Detail for all states available at www.iihs.org, 2009

New Drivers have elevated crash rates. This is particularly true for drivers younger than 18. Young novice drivers are at significant risk on the road because they lack both the judgment that comes with maturity and the skill that comes with experience. Graduated licensing is a system designed to delay full licensure while allowing beginners to obtain their initial experience under lower risk conditions. There are three stages: a minimum supervised learner's period, an intermediate license (once the driving test is passed) that limits unsupervised driving in high- risk situations, and a full-privilege driver's license available after completion of the first two stages. Beginners must remain in each of the first two stages for set minimum time periods. Although only North Dakota lacks an intermediate stage, US licensing systems vary significantly.

In an optimal system, the minimum age for a learner's permit is 16; the learner's stage lasts at least 6 months, during which parents must certify at least 30 – 50 hours of supervised driving; and the intermediate stage lasts until at least age 18 and includes both a night driving restriction starting at 9 or 10 pm and a strict teenage passenger restriction allowing no teenager passengers, or no more than one teenage passenger.

For information on teenager cell phone and texting restrictions, please see CELLPHONE laws at www.iihs.org/celphonelaws.aspx.

Since the 1990's, most states have improved their licensing systems by enacting some of all of the elements of graduated licensing. Licensing systems differ not only with regard to the number and strength of the elements of graduated licensing they have adopted, but in enforcement. Some states prohibit police from stopping young drivers solely for violating night driving or passenger restrictions (secondary enforcement). The Institute has evaluated state licensing systems using criteria designed to estimate their strength and likely effectiveness in reducing injuries. IN particular, the length of the learner's holding period, the duration and strength of restrictions in the intermediate license phase are credited. No state has an optimum graduated licensing system.

Points were assigned for the key components of graduated licensing. Good systems scored 6 or more points; fair systems scored 4 or 5; marginal systems 2 or 3; and poor ones scored less than 2 points. Regardless of point totals, no state was rated above "marginal" if intermediate license holders could be younger than 16 or if it allowed unrestricted driving before 16 years 6 months. The following schedule was used to assign points.

Learner's entry age:	1 point for learner's entry age $\geq$ 16
Learner's holding period:	2 points for $\geq$ 6 mo; 1 point for 3-5 mo; none for < 3 mo.
Practice driving certification:	1 point for $\geq$30 hr; none for less than 30 hr
Night driving restriction:	2 points for 9 or 10 pm, 1 point for after 10 pm
Passenger restriction:	2 points for $\leq$ 1 underage passenger; 1 point for 2 passengers; none for 3; where supervising driver may be < 21, points values were determined including the supervising driver as a passenger.
Driver education:	Where completion of driver education changed a requirement, point values were determined for the driver education track.
Duration of restrictions:	1 point if difference between minimum unrestricted license age and minimum intermediate license age is 12 or more months; night driving and passenger restrictions were valued independently.