Effects Of Cns Injury Education On High School Students' Knowledge And Attitudes

Felicia Ellison

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EFFECTS OF CNS INJURY EDUCATION ON HIGH SCHOOL STUDENTS' KNOWLEDGE AND ATTITUDES

by

FELICIA ELLISON

A Thesis
Submitted in Partial Fulfillment of the Requirements for the Degree of Master of Science in Nursing in the Division of Nursing Mississippi University for Women

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Effects of CNS Injury Education on High School Students' Knowledge and Attitudes

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Abstract

Central nervous system (CNS) injuries are the leading cause of death and disability among America’s youth. Adolescents’ immaturity, underdeveloped impulse control, lack of judgment, and peer influence put them at risk for acting rashly, thus at higher risk for CNS injury. The purpose of this study was to examine the effects of an educational intervention on high school students’ knowledge and attitudes about CNS injuries. Pender’s Health Promotion Model served as the theoretical framework. Two null hypotheses were utilized, the first concerning high school sophomore students’ knowledge about CNS injury and the second concerning high school sophomore students’ attitudes about injury pre- and post-intervention. A pretest-posttest, one-group design was used. The setting for the research was a public county high school in a southeastern state. The convenience sample consisted of 78 subjects, whose ages ranged from 15 to 16 years. Data analysis revealed that students’ knowledge increased slightly after the intervention but
was not statistically significant. Therefore, the null hypothesis pertaining to knowledge was accepted. Although the overall knowledge was not significantly increased, additional findings revealed that females had a greater percentage of knowledge than male subjects, and participants living with both parents had a greater knowledge level than those living in single-parent homes. Data also revealed that students’ attitude scores increased significantly after the intervention. Therefore, the second null hypothesis was rejected. The findings suggest that CNS injury education is beneficial and warrant further research.
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Chapter I
The Research Problem

Central nervous system (CNS) injuries are the leading causes of death and disability among American youth. Each year approximately 10,000 people in the United States sustain spinal cord injuries and 500,000 suffer traumatic head injuries which could have been prevented. Prevention of neurological injury is especially important for youth since the majority of these injuries occur between the ages of 15 and 24 years. Motor vehicle accidents are the cause of more than 50% of all CNS injuries, followed by falls and sports (Frank, Bouman, Cain, & Watts, 1992). A most alarming trend, however, is the increased incidence of injury because of violence/violent behavior (O'Hare & Hall, 1997).

An estimated 7,000 American youth under the age of 17 die from traumatic brain injury each year, and over 3,000 suffer spinal cord injuries. The emotional, physical, and economic costs associated with these injuries are often devastating (Wright, Rivara, & Ferse, 1995). The National
Pediatric Trauma Registry estimates that more than 30,000 children a year sustain permanent disabilities as the result of brain injuries with an estimated lifetime cost of over $4 million per person. According to the United States Department of Health and Human Services (1998), direct medical costs for traumatic brain injury have been estimated at $48.3 billion per year.

The National Spinal Cord Injury Statistical Center (1997) estimated average expenses of a spinal cord injury for the first year are $251,885 and $30,676 each subsequent year. Estimated lifetime costs for medical treatment and rehabilitation of a spinal cord injury can be as much as $750,000 per individual. In 1996 Alabama Kids Count Data Book (Voices for Alabama Children, 1998) reported that 322 Alabama teens between the ages of 15 and 19 years died as a result of preventable teen deaths. According to the Alabama Trauma Registry (Alabama Department of Public Health, 1999), 259 CNS injuries were recorded for West Alabama alone in 1997. Data gathered at a regional medical center in West Alabama established that 658 CNS injuries in the age range of 15 to 24 years were admitted to the emergency department for 1999, including six fatalities.
Research has implied that most CNS injuries are preventable and that injury prevention education may play a significant role in CNS injury incidence rates. CNS injuries in youth have been correlated with such variables as lack of judgment, poor impulse control, and peer influence. Despite the increasing popularity of prevention programs, the efficacy of such programs is largely unknown. Little information is available in either the medical or educational literature regarding the success of one-time prevention efforts in a classroom setting.

The purpose of this study was to assess the effectiveness of the Think First® education program in (a) increasing knowledge concerning CNS injury among high school sophomore students, (b) influencing attitudinal changes concerning wearing safety belts among high school sophomore students, and (c) influencing attitudinal changes concerning riding in a car with a driver who is under the influence of alcohol among high school sophomore students before and after the education intervention.

Establishment of the Problem

Each year in the United States the incidence of CNS injuries is estimated at 500,000. Murray Goldstein,
Chairman of the Interagency Task Force on Head Injury at the National Institute of Health, "mortality from traumatic brain injury over the past 12 years has exceeded the cumulative number of American battle deaths in all wars since the founding of our country" (Avolio, Ramsey, & Neuwelt, 1992, p. 557).

Adolescents, in particular, are at highest risk for CNS injuries due to their developmental stage, emotional immaturity, underdeveloped impulse control, peer influences, and lack of judgment. Adolescents do not perceive risk in the same way that adults do and are more likely to drive faster, drink while driving, and are less likely to use seatbelts while driving (Neuwelt, Coe, Wilkinson, & Avolio, 1989).

According to 1998 National Highway Traffic Safety Administration studies, young people between the ages of 16 and 20 years make up only 7% of the driving population nationally but are involved in three times as many fatal crashes. Alcohol is a risk behavior involved in 21% of all youth motor vehicle accidents. Sixty percent of youth drivers who died in motor vehicle accidents were not wearing seatbelts. Twenty-two percent of speed-related deaths were young people. Nearly 50% of the fatal motor
vehicle accidents involving 16-year-old drivers were single vehicle crashes.

In response to the magnitude of CNS injuries, the United States Department of Health and Human Services (DHHS) (2000) in its year 2010 health objectives for the nation has called for and encouraged the development and implementation of legislative, community, and school-based programs and approaches which would decrease the incidence of neurological injuries. In 1986 the DHHS called for additional injury prevention strategies. The American Association of Neurological Surgeons and the Congress of Neurological Surgeons together developed Think First℠, a prevention program and curriculum aimed at educating young people concerning brain and spinal cord injuries (Watts & Eyster, 1992).

Prevention messages should be integrated into as many different avenues of communication as possible. Educational programs for youth should be presented in schools and focus on the types of injuries most prevalent at particular ages and developmental stages. Parents, teachers, physicians, nurses, and other professionals should be encouraged to promote prevention interventions. Frank et al. (1992) indicated educational interventions
offer a vital complement to passive injury prevention measures. Passive injury prevention alone cannot be expected to reduce CNS injuries without more active, educational methods. Even when the law mandates seatbelt usage, people will not wear seatbelts until the person internalizes the usefulness of seatbelts. Even brief educational interventions may help to maintain existing safety behaviors and encourage adoption of new safety beliefs and behaviors.

The American public is strongly influenced by television, radio, and other media. Instead of glamorizing primarily injury-free outcomes to extremely high-risk situations, media producers should be encouraged to portray actors engaging in safe behaviors and refusing to participate in risky situations (Frank et al., 1992).

Statement of the Problem

Minimal research studies have been conducted on the effectiveness of CNS injury prevention programs on adolescent school students. While many prevention programs, such as Think First™, a CNS injury prevention program, have made enormous gains, limited data exist on how effective such prevention programs are in changing
behaviors. Without sufficient data to support these injury prevention interventions, funding has become limited in this era of cost containment. Anticipatory guidance and prevention are the main targets of such programs. Primary prevention of CNS injuries is based on averting the behaviors that place an adolescent at risk.

Previous studies conducted on CNS injury prevention programs have not clearly established measurable outcomes such as change in attitudes of the adolescents. The measurement techniques available for evaluating programs intended to change behavior are controversial. As a major health concern, CNS injuries in adolescents have been recognized, yet there are diminishing financial resources to support the development, implementation, and evaluation of such programs. Many CNS injury prevention programs battle to maintain funding for presentations and staffing. Resources that pay for speakers, films, handouts, and staff are limited. Many programs rely on volunteer staff to help reduce some costs; however, substantiation of the effectiveness of a CNS injury prevention program is needed to attract further funding (O’Hare & Hall, 1997).

Middle to late adolescence is the time when youth are having major developmental conflicts over independence.
Adolescents view themselves as invincible or may not be able to deal with peer pressure when confronted with a risky situation (Levy, Levy, Giannotta, & Apuzzo, 1994). CNS injury prevention education provides strategies for the adolescent to use in dealing with at-risk situations in a safe environment. The problem for this study was to evaluate what effect an injury prevention program had on high school students' knowledge and attitude about CNS injuries. Data obtained from this study provided information on the effectiveness of CNS injury education on high school students' knowledge and attitudes.

Theoretical Framework

Pender’s (1996) Health Promotion Model was selected as the theoretical framework to guide this study. Pender attempted to explain the modifying factors for the occurrence of health promotion activities in the presence of a cue to action. Pender's model identifies cognitive-perceptual factors that serve to influence an individual to engage in health-promoting behavior (Tillett, 1999). According to Pender (1996), health promotion is defined as “encouraging healthy lifestyle, creating supportive environments for health, strengthening community action,
Pender (1996) conceptualizes health promotion as being motivated by individual belief that there are benefits to such behavior and the individual’s willingness to change or avoid risk-taking behaviors to promote a healthier lifestyle. The attitude of an individual about CNS injury will be a motivating factor in influence and behavior patterns. Health education is important to assure that individuals have the information they need to protect their own health, by reducing risk-taking behaviors and increasing safety behaviors. The Health Promotion Model is often used as the framework for research aimed at predicting specific health behaviors, as well as predicting healthy lifestyles of individuals or groups. The health promotion framework in this study sought to increase knowledge in teenagers who are at high risk for sustaining CNS injuries. Effective health education is especially important for helping youth to develop the knowledge and skills they need to avoid health risks.

Pender (1996) identified cognitive-perceptual factors for the activities related to health promotion which include,
Within the model's framework, all of these concepts were linked to the likelihood of action, which, in the context of this study, would be participation of high school sophomore students in a CNS injury prevention program.

Some of the assumptions made by Pender (1996) are "health is a positive high level state, and that individuals are motivated to pursue health" (p. 534). Those who define health as a positive and stable state are more likely to participate in health-promoting behavior. If an individual participates in healthy behaviors, he or she must believe that there are benefits of their action and they will receive the benefit of health. The action of a person is determined by unique personal characteristics, and experiences determine the outcome an individual hopes to achieve. Therefore, individuals who value health would seek information that would result in healthy behavior. These assumptions emphasize the active role of the person in molding and maintaining health behavior and in
modifying his or her own risk-taking behavior within the environment.

In addition to the individual’s perceptions, Pender’s (1996) Health Promotion Model identified modifying factors that influence the occurrence of health prevention and promoting action. Modifying factors that influence behaviors include demographic variables, interpersonal variables, and situational variables. Demographic variables include age, sex, ethnicity, educational level, and income of the client. Habits or behaviors developed in adolescence are more likely to persist as an integral part of lifestyle than changes made in health behaviors in later adult years. Primary sources of interpersonal influences on health-promoting behaviors are families, peers, and health care providers. Interpersonal variables affect health-promoting behavior directly and indirectly through social pressures to commit a plan of action. Individuals are likely to undertake behaviors for which they will be admired and socially reinforced. Nurse practitioners play a vital role in educating and motivating adolescents about risk-taking behaviors to influence healthy behaviors. Previous experience with health professionals greatly impacts the health behavior
of a person. Situational variables on promoting behavior include perception of options available and the willingness of the client to participate. Individuals want to feel compatible, related rather than alienated, and safe in an environment.

Based on the concept of the Health Promotion Model, adolescents should place a high value of self and well-being when provided with information on the risk factors of CNS injury. Once the adolescent is given the information and allowed time to process and assimilate the knowledge gained on their sense of vulnerability for CNS injury, then the adolescent may be less likely to engage in risk-taking behaviors. If the adolescent appreciates the personal benefit of participating in actions to prevent CNS injury, they are more likely to participate in preventive behaviors.

In summary, the focus of Pender’s Health Promotion Model is to recognize cognitive and personal factors, as well as behavioral factors, which influence the occurrence of health prevention and promoting healthy behaviors (Tillett, 1999). Pender (1996) states that each individual has a unique health behavior motivation based on individual characteristics and experience. The Health
Promotion Model objective is to incorporate a lifestyle which promotes optimal health and holistic functioning.

Pender's Health Promotion Model guides the nurse practitioner in identifying specific motivational factors of the adolescent. The objective of the current study was to educate adolescents on the prevention of CNS injury, through education, health-promoting behaviors will be adopted, and broader prevention efforts will be developed in an effort to reduce the incidence of CNS injuries.

Significance to Nursing

CNS injuries are seen as a health care issue by the U.S. Department of Health and Human Services (2000). Despite significant advances in medical technology, traumatic brain and spinal cord injuries continue to be incurable, costly, and catastrophic. The treatment of choice, therefore, is prevention. Nurse practitioners, as primary health care providers, emphasize health promotion and injury prevention education in providing nursing and medical services to individuals. Nurse practitioners in various practice settings have unprecedented opportunities to participate in prevention of injuries, especially the devastating CNS injuries.
CNS injury prevention programs might be utilized by the nurse practitioner in primary care tailored to adolescent clients in need of education that empowers them to make good health-related decisions. The most promising opportunities for continued progress lie in education and counseling interventions to change personal health habits that increase risk of CNS injury (Landis & Brykezynski, 1997). Nurse practitioners also can work with school systems and other established community youth agencies to expand current CNS injury prevention programs and develop new programs as part of the school curriculum. Further, nurse practitioners can serve as a resource consultant for government agencies, legislators, and other citizen groups for information relating to CNS injury.

Nursing research is a guide on which nursing interventions are based. Data from this researcher’s study add to the existing body of nursing knowledge about CNS injuries among adolescents and the success or failure of certain interventions on increasing awareness and reducing risk-taking behaviors. This study also has significance by increasing limited data existing on knowledge and attitudes of adolescents concerning CNS injuries in an urban southeastern state.
This particular type of educational intervention was studied to determine if a one-time, 50- to 60-minute presentation taught in a classroom setting could be an effective strategy among adolescents who are at higher risk for CNS injury due to their developmental stage. The effectiveness of this strategy in changing knowledge and attitudes toward CNS injuries in young adolescents could or may potentially be useful adjunct to nurse practitioners' primary prevention programs. The prevalence of CNS injuries documented by the literature mandates assessment of every adolescent for high-risk behavior.

This study also has significance for nursing education. Findings from the study might contribute to the development of different types of reinforcement nursing curriculum that includes a focus on CNS injury prevention. The addition of this subject matter is of particular importance in family nurse practitioner programs since nurse practitioners have the knowledge, training, and expertise to foster education for individuals to influence positive behavior change.
Hypotheses

For the purpose of this study, students' knowledge and attitudes were studied separately; therefore, two null hypotheses were used to guide this study. They were as follows:

$Ho_1$: There will be no significant difference in high school sophomore students' knowledge about CNS injuries before and after attending an educational intervention about CNS injuries as evidenced by the pretest and posttest scores.

$Ho_2$: There will be no significant difference in high school sophomore students' attitude about CNS injuries before and after attending an educational intervention about CNS injuries as evidenced by pretest and posttest scores.

Definition of Terms

For the purpose of this study, the following terms were defined theoretically and operationally:

High school students: Theoretical: Barnhart and Barnhart (1998) define as students in Grades 9 or 10 through 12 who are enrolled in high school regardless of
their age. Operational: males and females who are enrolled in the 10th grade and who are 15 to 16 years old.

Knowledge score: Theoretical: an understanding or awareness, range of information according to Barnhart and Barnhart (1998) reflecting a person's past experience and exposure to various kinds of information about issues. Operational: a specific score derived from an understanding or an awareness of information expressed as knowledge in the Think First Head and Spinal Cord Assessment Questionnaire.

Attitude score: Theoretical: a way of thinking, acting, or feeling, manner, or behavior of a person as defined by Barnhart and Barnhart (1998) toward a situation or cause. Operational: a specific score derived from an understanding or an awareness of information expressed as an attitude in the Think First Head and Spinal Cord Assessment Questionnaire.

Educational intervention: Theoretical: a program relating information to students about causes and consequences of a specific focus area for the purpose of assisting them in developing knowledge and attitudes toward preventive practices and behaviors. Operational: a 55- to 60-minute program of study consisting of a video
"On the Edge," educational presentation about causes and consequences of brain and spinal cord injuries, and a personal account of a permanent CNS injury victim.

CNS injury. Theoretical: Thomas (1997) defines as any injury or trauma to the brain or spinal cord resulting in transient and/or permanent disability. Operational: traumatic injury to the brain and or spinal cord resulting in permanent disability or death.

Assumptions

This study was based on the following assumptions:

1. CNS injuries are preventable.

2. The adolescent is capable of assuming an active role in molding and maintaining health behaviors and in modifying risk-taking behaviors.

3. Adolescents’ knowledge and attitude about CNS injuries are concepts which can be empirically measured.

Summary

CNS injuries continue to be an important health problem among adolescents between the ages of 15 and 24 years. While many CNS prevention programs have made gain in organization and growth, there is only limited documentation on how well these programs work. CNS injury
prevention programs are not a standard part of the public school curriculum in southern states primarily due to the lack of financial resources to support these programs and inconsistencies in existing research. Primary health care providers have an obligation to assess those adolescents at high risk for injury and provide health education to intervene preventively to avert risk-taking behaviors.

In this chapter, the establishment of the problem, significance to nursing, hypotheses, definition of terms, and assumptions were presented. The theoretical framework which guided this study was Pender's Health Promotion Theory.

With minimal research data available in southeastern states on the effectiveness of CNS injury prevention programs on adolescent knowledge and attitudes and with limited funding to continue current existing programs within the school and in the clinic setting, the necessity for this study emerged.
Chapter II

Review of the Literature

A review of the literature was conducted to determine the status of current research regarding the effectiveness of education programs on adolescent school students' knowledge and attitudes. Seven research articles were reviewed for this study. The following review of the literature will support the current research endeavor and contains information on the effects of injury and disease prevention education on adolescent knowledge and attitudes and the success of various educational program interventions.

Neuwelt, Coe, Wilkinson, and Avolio (1989) studied the relationship between education presented in an assembly program and students' knowledge, attitude, and behavior. The purpose of the research was to evaluate the effectiveness of a one-hour assembly program in (a) increasing knowledge concerning neurological injury among teenagers, influencing attitudinal changes concerning wearing seatbelts among teenagers, and (c) behavioral...
changes, i.e., wearing seatbelts related to participation in the program. The researchers hypothesized that a positive relationship existed among the variables of education, knowledge, attitude, and behavior among high school students regarding CNS injuries.

A quasi-experimental pretest-posttest control design was used in this study to determine the strength of the relationship between education, knowledge, attitude, and behavior among high school students regarding CNS injuries. The setting in this particular study included seven high schools (4 experimental, 3 control) in Portland, Oregon. The population was students in Grades 9 to 12, except in one school in which only students in 11th and 12th grades attended the head and spinal cord injury prevention program. In a nonrandom sample 15% of the students were selected to participate in the pretest and posttest written survey. The sample was representative of the class size and consisted of individual classrooms chosen by the curriculum vice president.

The first component of the program evaluation was observation of shoulder belt restraint usage among high school students. The researchers identified two experimental and two control schools. Observations were
conducted at the two experimental and two control schools. For 2 days observations were made on whether or not student drivers were wearing shoulder belts at each entrance of the school’s parking facility 2 weeks prior to the program assembly and again 2 weeks after intervention. The two control schools were observed in the same manner observing whether or not student drivers were wearing shoulder belts. The second component of the program was a student survey. All experimental and control pretest surveys were completed one week before the programs were presented, and the posttest was distributed approximately 2 weeks after presentation to the same classroom (Neuwelt et al., 1989).

The researcher used four instrumentation components for this study: (a) award-winning film about the cases and result of CNS injuries, (b) young speakers who had sustained CNS injuries, (c) paramedic presentations about appropriate bystander actions, and (d) wheelchair obstacle course.

The participants completed a 35-item questionnaire to determine if knowledge was gained, there was a reported attitude change, and the reported behavioral change occurred as a result of exposure to the head and spinal
cord injury prevention program. Criteria for the questionnaire content were (a) relevant head and spinal cord injury knowledge, attitude, and behavior, (b) understandable language, (c) administration time of 10 minutes, and (d) optical scan-coded responses. Surveys were pilot tested among a few students in private schools, and refinements were incorporated into the final instrument. The pretest and posttest were identical except in the posttest respondents were asked if they had attended the head and spinal cord injury prevention program.

Neuwelt et al. (1989) discovered students did not increase the use of seatbelts following the program. Pre-surveys were matched to post-surveys by student name, resulting in 626 matches out of 1,331 student surveys that were randomly distributed. The experimental schools demonstrated a statistically significant increase in knowledge about CNS injury prevention (\( p < .01 \)). However, there were no significant differences in the mean scores for reported attitude and behavior in either group. "Results from a comparison of matched to nonmatched group indicated that there was a homogenous, nonselective
response pattern and reduced the likelihood of systematic bias” (Neuwelt et al., 1989, p. 456).

The researchers concluded from the findings that the presentation of the head and spinal cord injury prevention program to an assembly of high school students has positive knowledge consequences. The researchers suggested the outcome of the study justified continuing a CNS educational program from an ethical as well as a learning perspective. The program, with modest administrative costs, could potentially reduce the tragic waste among youth who sustain CNS injuries.

Recommendations for additional research were suggested by Neuwelt et al. (1989) such as instrument refinement and establishing validity of the Oregon Head and Spinal Cord Injury Prevention Tool. Secondly, Neuwelt et al. suggested that longitudinal studies be conducted over 3 to 4 years to investigate the type of reinforcement factor students value. Lastly, the authors identified the need for studies to investigate the difference between middle school and high school education programs in transmitting knowledge.

The study conducted by Neuwelt et al. (1989) provided direction for the current researcher to target a specific
age group at risk for CNS injury and present education
program in a smaller group setting which facilitated an
environment for interaction. Previous research was
conducted using assembly focused large groups for general
high school students to increase knowledge about head and
spinal cord injuries.

Frank, Bouman, Cain, and Watts (1992) studied the
long-term relationship between education presented in a
one-time assembly program and the impact on students’
knowledge, attitude, and behavior. The purpose of the
research was to evaluate the long-term efficacy of a five-
component spinal cord injury prevention program in
assessing safety knowledge, attitudes, and self-reported
behaviors 3 years after exposure to a spinal cord injury
prevention program. The researchers hypothesized that a
positive correlation existed among the variables of
education, knowledge, attitude, and behavior in students 3
years after exposure to a spinal cord injury prevention
education program.

A longitudinal design was used to determine the
impact of a spinal cord injury prevention program on the
knowledge, attitude, and behavior among students who had
attended the program. The 3-year follow-up study examined
the differences between junior high students post-program attendance and a control group of spinal cord injury prevention program shown to junior high students. The setting included two comparable community high schools in a mid-sized Missouri City. The population was students in Grades 10, 11, and 12. A sample of 445 students who attended a junior high school in which an educational intervention was presented 3 years earlier and a control group of 379 students who had not been exposed to the intervention was selected to participate in the written questionnaire (Frank et al., 1992).

The participants completed a 66-item, self-report questionnaire. The questionnaire used a dichotomous and 5-point multiple-choice response format and took about 15 minutes to complete. Fourteen items including topics directly related to the program content were selected to create a "total score" for data analysis. The maximum possible total score was 70. The reliability coefficient alpha was 0.68 for the entire sample. Coefficient alpha for the treatment group was 0.69 and 0.65 for the control group. The researchers found this to be adequate, since the questionnaire was a heterogeneous measure of several domains of information (Frank et al., 1992).
The researchers discovered a significant difference in the total scores between the treatment and control group when compared using the Hotelling's T-square, $F(6, 1,456) = 7.04, p < .001$. Mean total score for the program group was 56.13 while the total score for the control group was 52.96, $F(1, 1,760) = 38.88, p < .001$. The program group had higher scores for each of the subsets measuring knowledge ($p < .004$), attitude ($p < .004$), and behavior ($p < .001$).

The researchers concluded from the findings that the junior high school students who attended the prevention presentation had significantly higher scores for knowledge, attitudes, and behaviors related to spinal cord injuries than junior high school students who had no exposure. Recognizing the promising results of this study suggests that such interventions are effective and warrant further research (Frank et al., 1992).

Recommendations for further studies of prevention program outcomes were suggested by the researchers to test how programs are perceived and recalled by subjects. Secondly, Frank et al. (1992) suggest further investigation about specific characteristics of adolescents at highest risk of injury is needed to advance
educators’ abilities to successfully target prevention efforts to high-risk age group.

The study conducted by Frank et al. (1992) provided direction for the current researcher to take the first step by educating high school sophomore students on injury prevention. The baseline data obtained in the current study could possibly be used in a future longitudinal study to measure the efficacy of this program over the next 2 years. This is relevant to the current study and supports the need for additional research to support the effectiveness of education and reinforcement.

Wright, Rivara, and Ferse (1995) studied the relationship between education presented in a one-hour assembly program and students’ knowledge, attitude, and behavior toward injury risks and preventive strategies. The purpose of the research was to evaluate the impact of the Think First™ head and spinal cord injury prevention program on increasing students’ knowledge, attitude, and behavior toward injury risks and preventive measures related to participation in the Think First™ education program. The researchers hypothesized that there would be no significant difference in students’ knowledge, attitudes, and behavior about injury risks and preventive
strategies after attending the Think First™ educational intervention about CNS injuries.

A pre-post questionnaire control design was used to determine the strength of the relationship between education, knowledge, and attitude and self-report behavior change among students regarding CNS injuries before intervention, 2 weeks, and 3 months after intervention. Observations were also conducted of students as they left school property that recorded bicycle helmet and seatbelt use. The setting for the study included three junior high and three high schools in rural, suburban, and urban areas of Washington State. The population included Grades 6 to 12. A convenience sample of 663 students was selected to participate in the questionnaire (372 middle school and 291 high school students) for the experimental group. The control was a small rural high school (230 students) who agreed to take the questionnaire twice with no intervention (Wright et al., 1995).

The theoretical framework for this study was based on the Health Belief Model and consisted of four instrumentation components: (a) short film about the devastating effects of CNS injury, (b) medical speaker who presents an educational presentation explaining the causes
and consequences of CNS injuries, (c) a young speaker who has survived a traumatic brain or spinal cord injury who shares the effects on his or her life, and (d) question-and-answer session (Wright et al., 1995).

The participants completed a 39-item questionnaire which consisted of multiple-choice, true-false statements on a Likert-type scale to measure knowledge, attitude, and self-report behavior prior to and after participation in the Think First head and spinal cord injury prevention program. For middle school use, questions concerning driving were omitted. The control group completed a shortened version of the survey twice, 2 weeks apart. This allowed the researchers to assess whether completing the questionnaire itself could alone lead to changes in the responses (Wright et al., 1995).

Altogether 609 questionnaires (360 middle school and 249 high school) were completed at the 2 weeks follow-up and 248 (202 middle school and 46 high school) at the 3-month follow-up. The 3-month follow-up was only completed in three (2 middle and 1 high) schools. The control had 78 students complete the measure at both assessments. Direct observations were made at one middle school, one high
school, and the control school for recording of seatbelt and bike helmet use.

Wright et al. (1995) found no significant changes in the attitude scores between baseline and the two follow-up assessments in the intervention schools nor between the two assessments in the control school. The researchers found no significant change in knowledge scores (p < .05) for the middle school, high school, or control school students at both 2 weeks and 3 months after assembly compared with baseline values. There appeared to be minimal consistent pattern change in self-report behaviors from baseline (p < .001). There was no significant change in helmet use for any of the schools; too few students rode bicycles to accurately assess helmet use through direct observation. No significant change was noted in seatbelt use for control school, while junior and high school experimental groups had small increase 2 weeks post-intervention (p < .03) and 3 months post-intervention (p < .05) (Wright et al., 1995).

Wright et al. (1995) concluded that the Think First™ program appears to have a small effect on knowledge and no effect on attitude, self-reported behavior, or observed behavior. This finding by Wright et al. suggests that
prevention of injuries to this age group must rely more on regulation and legislation and educational efforts in order to have an impact (1995).

Limitations of this study were lack of randomization of schools, only one control group who completed a shortened questionnaire and too few observations of bike helmet use. There is controversy in the literature regarding the success of a one-time education intervention regarding injury prevention on students’ knowledge, attitude, and behavior change. Given the scarcity of resources, injury prevention programs should be rigorously evaluated for their impact on prevention of injuries to children and adolescents. This is relevant to the current study and supports the need for additional research to determine the efficacy of the Think First™ head and spinal cord injury prevention program.

In another study which underscored the enormity of trauma deaths and CNS injuries among teenagers, Kuthy, Grap, Penn, and Henderson (1995) sought to raise public awareness and promote safer driving behavior. The researchers studied the relationship between education presented in driver’s education class and students’ behavior related to drinking and driving. The purpose of
the research was to evaluate the effectiveness of "After the Party's Over" drinking and driving injury prevention program on changing adolescents reported drinking and driving behaviors related to participation in the program.

The setting in the study included four different high schools, all of which served as experimental schools with no control group. The population was sophomore students. A convenience sample of students (N = 274) who were enrolled in driver's education classes one semester were asked to participate in the pre- and post-behavior survey.

Kuthy et al. (1995) used three instrumentation components for this study: (a) introductory overview about the nurses presenting the program and most frequent causes of CNS injury, (b) 20-minute slide presentation with contemporary music and narration that portrayed actual CNS injury patients, and (c) open discussion between the nurse researchers and students that included brainstorming about injury prevention strategies.

The participants completed a 10-item Driving Behavior Scale immediately prior to and after the program as well as one month later to determine if self-report behavior change occurred as a result of exposure to the After the Party's Over program. Each statement had a Likert format
for responses. The pre- and post-surveys were identical except in the posttest the respondents were asked two open-ended questions: What was most helpful and least helpful about the program. The Driving Behavior Scale was developed by the neonatal intensive care unit (NICU) nurse researcher and pilot tested with refinements made to enhance clarity and ease of administration.

Kuthy et al. (1995) discovered significant change in reported driving behavior of students who participated in the prevention program, $F(2, 520) = 22.57, p < .0001$. The researchers discovered significant lower baseline (pre-program) scores than the post-program scores, $F(1, 260) = 47.77, p < .0001$, and the one-month follow-up scores, $F(1, 260) = 30.81, p < .001$. There was no significant increase in behavior scores between the immediate post-program and the one-month post-program scores ($p = .80$).

The researchers concluded from the findings that the After the Party’s Over program had a positive effect on changes in students’ self-reported behavior. Kuthy et al. (1995) suggest that clinical nurses and their experiences can make valuable contributions to injury prevention programs.
Recommendations for further studies were suggested by Kuthy et al. (1995) to evaluate the efficacy of programs directed toward the prevention of CNS injuries. Secondly, Kuthy et al. suggested studies to help youth identify risk-taking behaviors and to develop problem-solving skills to avert risky behaviors and situations.

The Kuthy et al. (1995) research offered information regarding which adolescent group might be at greatest risk for CNS injury. This is relevant to the current research since 16-year-old drivers are responsible for more crashes per mile driven than any other age group. The target population for the current research was 10th-grade students, ages 15 and 16 years, enrolled in health classes during the spring semester of the 1999-2000 school year.

Martinez, Levine, Martin, and Altman (1996) added a new dimension to education in a school setting. The researchers focused on injuries as being the result of uncontrolled energy, emphasizing that high school science courses provide an excellent environment for introducing the concepts of energy and injury control and prevention. The purpose of the study was to evaluate the effectiveness of a one-week course of injury control education integrated into a high school physics curriculum on
students' knowledge, risk-taking attitudes, and self-reported behaviors at 2 weeks and 6 months after exposure to the program.

The setting in this study included two high schools (experimental and control) that were matched for socioeconomic factors and geographically separated to avoid cross-contamination of the control group students. The population consisted of students in Grades 10-12 enrolled in four sections of a physics class. A convenience sample of 203 students was selected to participate in the questionnaire (n = 129 intervention high school and n = 74 control high school students). There was a significant difference in grade level of students between the two groups. The intervention school group had 82.4% of 12th-grade students, 17.6% of 11th graders, and no 10th graders. The control group consisted of 21.5% of 12th graders, 75.4% of 11th graders, and 3.1% of 10th graders (Martinez et al., 1996).

The researchers' one-week intervention program consisted of five one-hour periods of education as follows. Day 1 students were introduced to the concept of injury prevention and basic form of energy. Day 2 included an evaluation of automobile safety features in modern
vehicles in comparison with older models and focused on how energy is released during a car crash. Emphasis was placed on safety belt use to prevent injuries. Day 3 included a discussion of occupant kinematics and the concept of forces. Emphasis was placed on air bags and the proper use of safety belts. Day 4 was a review of the first 3 days, "a rollover demonstration that graphically illustrated the centrifugal forces acting on occupants during a rollover" (Martinez et al., 1996, p. 213). Day 5 included a demonstration of student-designed crash vehicles being dropped from a six-story height to evaluate the success or failure of their designs, stressing the basic concepts of crash safety that had been taught (Martinez et al., 1996).

The participants completed a questionnaire to determine if knowledge was gained. There was a reported attitude change, and the reported behavior change occurred as a result of exposure to a one-week course of injury control and crash safety information incorporated within a high school physics course. The attitude section consisted of 10 Likert-type items that were obtained from the Young Driver Attitude Scale. Cronbach alphas for internal consistency ranged from .86 to .87 for each variable.
subset. The researchers only measured the three that related to the intervention in this study. The knowledge section consisted of seven items (four true-false, three multiple-choice). The self-reported behavior section consisted of six questions pertaining to seatbelt usage, speeding, and drinking and driving behavior.

Martinez et al. (1996) found there was no significant difference between the control and intervention group regarding attitudes toward speeding, safety belt use, and drinking and driving. The researchers noted that the means for seatbelt use and for drinking and driving were on the low end of the scale, denoting that there was only minimal room for improvement. In comparison, the speeding subscale scores were much farther from the lower end of the scale. There was no significant difference between the group on the self-reported behavior questions. Students in the intervention group at the 2-week posttest had a positive change in attitude for the speeding and the seatbelt subscales. The speeding subscale unadjusted mean for the intervention group was 23.29, compared with a mean of 25.7 for the control group, \( F(1, 154) = 12.20, p = .001, \) \( MS_{\text{residual}} = 12.08. \) The attitude subscale posttest unadjusted mean for the intervention group was 13.9
compared with a mean of 16.98 in the control group, \( F(1, 1,666) = 37.28, p < .000, \) MS residual = 6.06. There was no significant difference between the two groups on the drinking and driving subscale means. The unadjusted mean score for the intervention group was higher than that of the control group (.94 and .77, respectively), \( F(1, 181) = 110.2, p = .00 \) on the analysis of the knowledge questions.

At the 6-month posttest the intervention group had a positive change in attitude for the speeding subscale. The unadjusted mean on the 6-month posttest speeding subscale for the intervention group was 23.4 compared with the mean of 25.0 for the control group, \( F(1, 142) = 10.19, p = .002, \) MS residual = 11.65. There was no significant difference between the groups on the seatbelt subscale at the 2-week and 6-month posttest, \( F(1, 147) = .32, p = .56, \) MS residual = 9.92. There was no significant difference in attitudes between the two groups on the 2-week and 6-month posttest, \( F(1, 142) = .381, p = .538, \) MS residual = 7.79. Knowledge scores for the intervention group were higher than that of the control group on the 6-month posttest.

Evidence indicates that knowledge gain remained from the 2-week to 6-month follow-up for the intervention
group. The most significant and persistent change was that students in the intervention group reported increase in safety belt use when riding as a passenger. Seatbelt use as a driver was high for both groups (Martinez et al., 1996).

The researchers in this study concluded that the education program to students in high school science classes had positive effects on knowledge and attitudes. The researchers hypothesized that the intervention would be effective for three reasons:

1. Present injury prevention in a unique, creative approach would enable students to be more attentive to the information presented.

2. Presenting injury prevention in the context of a physics course would allow students to comprehend the ramifications of risky behavior.

3. Presenting education about injuries, how they occur, and ways to prevent them in a graphic fashion would lead to more favorable attitudes about engaging in health behaviors and to ensuing changes in self-reported behaviors (Martinez et al., 1996).

Recommendations for additional research were suggested by the authors to include measures that
discriminate finer levels of knowledge, attitudes, and behavior. Secondly, Martinez et al. (1996) suggest future research examine actual observed behaviors. Lastly, future research may need to be modified for integration into other high school science courses to capture the general high school population.

The study conducted by Martinez et al. (1996) provided direction for the current researcher to bolster that nontraditional creative education programs can provide important ripple effects in increasing awareness and changing behaviors. It is important for adolescents to understand the risk-taking behaviors and the ramifications involved. The adolescent has to be taught the risks since often they do not perceive risks the same as an adult before they can begin to make behavior changes.

Tenn and Dewis (1996) sought to measure the relationship between education developed and presented by an adolescent peer group and high-risk adolescents’ knowledge, attitudes, and behavior intent. The purpose of the research was to evaluate the effectiveness of a 6-hour injury prevention program presented by an adolescent peer group in (a) increasing knowledge concerning adolescent injury statistics, age-related developmental factors,
consequences of severe trauma, and increasing risk of serious injury among high-risk adolescents, (b) influencing attitudinal changes regarding risk-taking behaviors and self-efficacy concerning decision making, judgment, and reinforcements for health-related behaviors among high-risk adolescents, and (c) behavioral intent, i.e., wearing safety belts and helmets, related to participation in the program. The researchers hypothesized that a positive relationship existed among the variables of peer group education, knowledge, attitude, and risk-taking behavior among high-risk adolescent students regarding serious trauma.

An experimental pretest-posttest control design was used in this study to determine the strength of the relationship between peer group education, knowledge, attitude, and behavior intent among the high risk-taker adolescents regarding CNS injuries before intervention, one month, and 4 months after intervention. The setting in this study included seven alternative education program schools in Vancouver, Canada. These students often have poor school achievement and lack of basic skills which are characteristic of high-risk youth but did not have a severe conduct disorder or learning disability. The
population included Grades 9 to 11. A sample of 106 students participated in the study (63 males and 43 females). The small sample size was justified by targeting a more homogenous high-risk group rather than the general adolescent population.

The components of this program study included (a) safety lecture and group sharing experiences, (b) an obstacle course to understand the difficulties associated with being permanently injured, (c) sports star visitor who spoke on sports and risks, (d) video that depicted risk-taking behavior taken by individuals and the consequences of this type behavior, and (e) interacting and working through various scenarios.

Tenn and Dewis (1996) identified two experimental groups and one control group. The first experimental group (n = 32) received the 6-hour peer program, and the second experimental group (n = 46) received a one-hour didactic presentation by a health care professional. Control group (n = 28) participants received no intervention. All three groups received the pretest before either of the two treatment groups participated in the injury prevention presentations. One month and again 4 months after completion of the intervention programs the posttest was
administered to both experimental groups and the control group.

The participants of each group completed a questionnaire that consisted of multiple-choice, risk-taking inventory, 18-item multidimensional health locus of control scale, 45-item self-efficacy scale, and 22-item behavioral intent scale to measure knowledge, attitudes, and behaviors prior to and after participation in the Canadian peer-driving injury prevention program. Pre- and post-questionnaires were identical except that two open-ended questions were added to the posttest questionnaires for the two experimental groups. The questionnaire was pilot tested for content and face validity prior to administration (Tenn & Dewis, 1996).

The researchers found no significant differences between experimental and comparison group members from pretest to one-month posttest or pretest to 4-month follow-up on students' knowledge, locus of control, sense of self-efficacy, or on behavior intent related to injury prevention. More encouraging findings were seen in response to the open-ended questions. Fifty-four percent of participants in the peer group intervention program indicated at posttest that the intervention had a positive
influence in relation to injury prevention. At follow-up 45% of the group continued to provide positive responses. Significantly less positive responses was obtained from the group receiving the lecture intervention by a health care professional. Only 13% of the participants at one-month (posttest) and 12% of the participants at 4-month (follow-up) indicated that the intervention had influenced them positively in relation to injury prevention. Only 8.5% at one-month posttest and 4-month follow-up were able to identify any change in their risk-taking behaviors.

The researchers concluded from the findings in this study that a peer-driven program did not result in statistically significant improvements in knowledge, attitude, and behavior intent at one-month posttest or at 4-month follow-up posttest. Recommendations for replication of this program study were suggested by Tenn and Dewis (1996) suggesting future studies focus on intervention of longer duration and magnification of qualitative measures, such as individual post-intervention interviews and case study analysis focusing on behavior intent to demonstrate the program effects.

Limitations of this study were the instrument measures used might not have been sensitive enough to pick
up subtle changes in students’ attitude and behavior changes. The questionnaire was too long (45 minutes). Visual review of completed questionnaires revealed a probable “fatigue factor” (Tenn & Dewis, 1996, p. 336). The researchers also identified that follow-up testing was delayed due to a teacher’s strike which occurred on the final school day of the year when students placed little emphasis on their responses to the questions.

The Tenn and Dewis (1996) research offered information regarding which adolescent might be at higher risk, depending on social or academic problems. The information could be of value to the family practitioner in educating the adolescent on injury prevention and educating the community and schools to develop more creative programs to communicate injury prevention messages.

Harvey, Stuart, and Swan (2000) gave statistical evidence on the problem of human immunodeficiency virus (HIV) infection in adolescents which is increased by a lifestyle that often involves a greater degree of exploration, experimentation, and rebellion. These traits contribute to early onset of sexual activity, multiple sex partners, and low incidence of protection use. The
researchers undertook a randomized trial to compare changes in knowledge, attitudes, and behavior in schools receiving drama-based education program intervention with schools receiving written information alone on HIV prevention measures.

An experimental pretest-posttest randomized design was used in the study to determine the strength of the relationship between drama-based education, knowledge, attitude, and behavior among teenage students regarding acquired immunodeficiency syndrome (AIDS) awareness. The setting in this study included five districts of KwaZulu, Africa. Two pairs of schools with similar socioeconomic conditions were selected within each district. All schools were > 10 km apart to reduce chance of informal contact among students who participated in the program. The target population was Standard 8 students because this group is midway through secondary education, containing a wide age range of teenagers. The paired schools were randomized to receive the Drama Aide program intervention or the booklet intervention. The students in the booklet intervention group received a 10-page booklet in Zulu about AIDS, HIV, and methods of transmission and prevention.
The researchers used two instrumentation components for this study. The Drama Approach to AIDS Education (Drama Aide intervention) which included a three-phase intervention was the first component. First phase teams consisting of teachers/actors and a nurse presented a play incorporating issues surrounding HIV and AIDS to the school. The second phase involved team members operating drama workshops in the schools with teachers and students using participatory techniques such as role play. The third phase, which was the highest point of the program, was a celebratory school open day focusing on HIV and AIDS through drama, song, dance, poetry, and posters, all prepared and presented by the students.

The second instrumentation component consisted of booklet education intervention schools participating in this study group. The intervention schools received a 10-page booklet about HIV, AIDS, modes of transmission and prevention (Harvey et al., 2000).

The participants completed a pre-intervention survey, and 6 months after completion of the program a post-intervention survey was conducted on the same students to determine if knowledge was gained. There was reported attitude change, and the reported behavior change occurred
as a result of exposure to drama education intervention compared to the schools receiving the written information alone. The questionnaires were administered during school time and supervised by the same reaching in all groups. The pre- and post-questionnaires were identical for each group. The questionnaires were pilot tested on two groups of Standard 8 pupils who were not participating in the study.

Harvey et al. (2000) excluded three pairs of schools from the study for various reasons. In the seven pairs of schools remaining, 1,080 of 1,083 selected students agreed to participate in the study. Participants had a mean age of 17.6 years. Females comprised 58.6% of the sample, and males comprised 41.4% of sample. Both intervention groups were comparable in response rate, age, and gender distributions. Only 699 (64.7%) of the participants from the pre-questionnaire were present for the post-questionnaire for various reasons, such as students had changed schools, quit school, or were absent. Pre-surveys were matched with post-surveys resulting in 691 matches out of 1,080 student surveys that were randomly distributed.
Harvey et al. (2000) selected five questions on knowledge and 12 questions on attitudes, excluding behavior questions since there was doubt about the validity of responses during data analysis. All responses to the questions were “yes” or “no,” apart from the behavior questions. Analysis of three questions on behavior was done for an assessment of this section.

Harvey et al. (2000) discovered that there were no significant differences between the scores of the two intervention groups in pre-questionnaire survey except in two questions that related to knowing people with AIDS. The seven schools receiving the drama program had an increase in mean knowledge scores ($p = .0002$) and mean attitudes ($p < .00001$) about HIV/AIDS when compared to schools receiving written information alone. These changes were independent of age, gender, school, or previous sexual experiences. There were no overall significant differences in the mean score for the reported behavior changes between the two groups. The researchers emphasized that it should be noted that in the schools receiving the drama program sexually active pupils reported an increase in condom use ($p < .01$).
Harvey et al. (2000) concluded from the findings that the drama education program presented to high school students had a positive effect on knowledge, attitudes, and increased condom use among the sexually active. This contrasted with evidence of minimal impact from traditional educational literature alone. The researchers suggested the outcome of the study provided insight for more unique methods of education to be implemented in schools, which are convenient in capturing large population of students to offer AIDS preventive work.

The reviewed study linked directly to the researcher's study as Harvey et al. (2000) recommended that more novel education prevention strategies be offered in school settings. The current researcher focused on a dynamic school-based prevention program with multiple creative components to impact students' knowledge and attitudes about CNS injuries. If injury prevention education and the counseling which emerge from such a program could modify risk-taking behaviors in adolescents, then such education and counseling should receive high priority in family practice clinics, school health clinics, and other educational programs as a reinforcement to injury prevention as health promotion.
Chapter III
The Method

The purpose of this study was to ascertain the knowledge and attitudes of high school sophomore students about CNS injuries before and after attending an educational intervention about CNS injury. In this chapter, methods used to study the variables of interest are identified. The research design, setting, population, and sample are described. The instrument utilized for measurement is discussed as well as the procedure for data collection. Finally, the methods of data analysis are identified.

Design of the Study

A pre-post, one-group design was utilized in this study to determine the effect of health promotion education on high school students' knowledge and attitudes about CNS injuries. The design was appropriate because the study involved the manipulation of an independent
variable, and the sample served as its own control but lacked randomization (Polit & Hungler, 1999).

Variables

The dependent variables for the study were attitudes and knowledge. The independent variable was the educational intervention. Controlled variables were the geographical location and the age of the students. Intervening variables may have included student honesty in answering the questions, understanding the questions, the size of the groups who received the intervention, the environment in which the pretest and posttest were taken, and the environment in which the intervention was performed. Extraneous variables assessed by questionnaire were whether a subject had ever been in a car crash or knew someone personally who has been in a car crash, whether or not subject knows someone personally who has been killed or permanently injured. Extraneous variables assessed by the demographic data were subjects' socioeconomic status, grade average, living arrangements, whether a subject had completed driver's education, whether or not subject had a driver's license or permit, and also the type vehicle subject most often rides/drives.
Setting, Population, and Sample

The setting for this study was a county public high school in a large economically advantaged town in an urban southeastern state. The target population for this study was 10th grade students, ages 15 and 16 years, at this public school. The sample was all 10th grade students who met the criteria for inclusion, agreed to participate, received parental consent to participate in this study, and were present in class on the day of data collection. The study sample (N = 78) was one of convenience drawn from all 10th grade students, male and female, enrolled in health classes at the time the study was conducted.

Methods of Data Collection

Techniques and instrumentation. The instrument utilized for measuring the variables of this study and for collecting data was the Think First Head and Spinal Cord Assessment Questionnaire, a 30-item questionnaire (see Appendix A). The researcher-developed questionnaire was derived from the National Think First Head and Spinal Cord Injury Prevention Organization with permission and was adapted for this study by deleting the questions from the study that were not relevant to the geographical
location. The research also added three questions to the demographics which included two questions regarding subjects’ socioeconomic status and one question on grade average.

The questionnaire was divided into four major categories: Nine demographic questions, 11 self-report behavior questions with one question having three responses which measure risk-taking behavior, seven questions which measured attitudes about CNS injury, eight questions which measured knowledge about CNS injury. The questionnaire also included four dichotomous extraneous variable questions with “yes” or “no” response regarding whether or not subject had ever been in a motor vehicle accident/crash or knew someone personally who had been in an accident/crash and if they know someone personally who had become permanently injured as a result of CNS injury or been killed. The demographic questions were used to gather data concerning subject’s age, gender, race, living arrangements, socioeconomic status, and grade average. Additionally, participants were asked about type of vehicle most often rides/drives, whether they had a driver’s license/permit, and whether they had completed driver’s education.
A total knowledge score was obtained by totaling correct responses to the knowledge section about CNS injury. Answer options for knowledge questions were six multiple-choice and two true-false questions. Correct answers on the multiple choice were given a score of 1 for four of the questions and 4 for two of the questions. True-false questions were given a score of 1; therefore, the range of possible scores was 0 to 16 for this knowledge section.

The Likert-type attitudes section consisted of seven statements concerning the students' opinion how they perceive certain risk-taking behaviors related to CNS injury. This section focused on the students' opinions of how likely they are to be injured in a motor vehicle accident and how important it is to wear a safety belt. The students were asked to mark one response that best (very likely, likely, unlikely, very unlikely, or will not be injured in one of the questions) reflected their opinion about each statement. Number values from 1 through 5 were assigned to the options, with 4 corresponding to the ideal answer in those statements with 4 options and 5 corresponding to the ideal answer in statement with five options. The remaining attitude section consisted of five
statements on a Likert scale. The students were instructed to mark one response (strongly agree, agree, disagree, or strongly disagree) that best reflected their attitude about each statement. Number values from 1 through 4 were assigned to the options with 4 corresponding to the ideal answer. For example, if the ideal answer was strongly agree, then strongly agree = 4 points, agree = 3 points, disagree = 2 points, and strongly disagree = 1 point and conversely. The range of possible scores for the attitude section was 7 to 30.

The behavior section of the questionnaire focused on risk-taking behaviors of the students. This section included six questions about safety belt practices, two questions about helmet usage practice with one question that included three responses, and two questions about diving/riding behavior. In this section the subjects were asked to report the frequency of the behavior (always, sometimes, never, and I don’t ride--used only in one question with the three responses pertaining to helmet usage and I don’t dive used only in one question pertaining to diving). These responses were assigned numbers from 1 to 3 in which 3 corresponded to the ideal answer, and 1 corresponded to an incorrect answer. For
example, if the ideal answer was always, then always = 3 points, sometimes = 2 points, never = 1 point, and I don’t ride is not counted and conversely. This section also included two multiple-choice questions that asked students’ primary reason he or she would not wear a safety belt or helmet. Correct answer was given a score of 1 for each question.

Procedures. Approval to conduct the study was first obtained from the Mississippi University for Women’s Committee on the Use of Human Subjects in Experimentation (see Appendix B). The researcher obtained permission from the superintendent after sending a letter that explained and described the study. The researcher appeared in person before the principal of the school where the study was conducted to explain and describe the study. The video entitled “On the Edge,” which was used as part of the intervention and was obtained from the National Think First Organization (see Appendix C), was viewed and approved by the principal. Permission was granted also by the principal to conduct the study (see Appendices D and E).

As the next step, the researcher contacted the three 10th grade health teachers at the high school in order to
set a date to teach the program, arrange a meeting with their students, inform the students about the study, and distribute the student/parental consent form (see Appendix F). The consent form described the study and described measures which would be taken to protect confidentiality.

The consent forms were distributed one week prior to the scheduled pretest. The three teachers were instrumental in getting students to return the signed forms to class. Student/parental consent forms were collected prior to administering the pretest. Only those students who wished to participate and who had parental consent were given a pretest. Students who did not participate in the study were given an alternative activity to work on during the data collection. The researcher explained the written instructions to the students and answered questions. The researcher remained in the room during the pretest to answer any questions and ensure the consistency in the amount of information given to each participant. Students were instructed not to put their name on the questionnaire to ensure anonymity. Students were instructed to put the last four digits of their home phone number at the top of the questionnaire in the identification space. This allowed for the researcher
to match pretest and posttest questionnaires so scores could be analyzed. A box was provided in each classroom for students to place their questionnaires, face down, after completion. The researcher was the only person other than the students who handled the questionnaires.

Immediately after the pretest was given, the researcher presented a 55- to 60-minute teaching prevention program. The program was taught in a classroom setting. Two classes of participating 10th graders came per session; therefore, the researcher presented the program four times. There was an average of 35 to 45 students who attended each setting. The researcher trained the guest speaker prior to the program on the study and the information to be addressed during the program. The guest speaker had prior experience with the Think First™ program so he was instrumental in delivering appropriate content in an open discussion with the students. The guest speaker was not involved with any of the data collection process.

One month later, the posttest, which was identical to the pretest, was given to students who had taken the pretest and attended the intervention program. After all the questionnaires had been sorted and incomplete questionnaires discarded, the final sample size was 78.
Methods of Data Analysis

Descriptive statistics, such as frequency distributions and percentages, were utilized to identify the characteristics of the students in the study. The paired t-test was utilized to test the research hypotheses and assess whether significant change in knowledge and attitude existed between the pretest and posttest questionnaires.

Summary

In this chapter, the design of the current study was discussed. The variables, limitations, setting, population, and instrumentation were presented as well as the methods of data collection. Finally, the methods of data analysis were identified in order to establish the empiricalization of the current study.
Chapter IV
The Findings

The purpose of this study was to assess the knowledge and attitudes of sophomore high school students regarding CNS injury before and after an educational intervention. The design was a pretest-posttest, one-group design with two null hypotheses. In this chapter, a description of the sample and analysis of the data in relation to the hypotheses are presented. Additional findings are also included.

Description of the Sample

Convenience sampling was utilized to collect the statistical data from sophomore students. The participants attended a school in a large town in an urban southeastern state. The study sample was drawn from four 10th-grade health classes, according to convenience and appropriateness. One hundred forty-two students took the pretest and attended the educational intervention. In the posttest distribution, 110 students returned the
questionnaire. The final sample consisted of 78 students who turned in their parental/student consent form, completed the pretest, attended the education intervention, and completed the posttest.

Demographic Data

Demographic data were collected for all participants: gender, age, race, socioeconomic status, grade average, living arrangements, whether a subject had completed driver’s education, possession of a driver’s license or permit, and also the type of vehicle most often used by the subject. The students, all enrolled in the 10th grade, ranged in age from 15 to 16 years. Forty percent were 15 years old and 60% were 16 years old. Table 1 represents the remainder of the sample demographic data.

Table 1

Demographic Characteristics of the Sample by Frequency and Percentage

<table>
<thead>
<tr>
<th>Demographic characteristic</th>
<th>n</th>
<th>f</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>46</td>
<td>46</td>
<td>59.7</td>
</tr>
<tr>
<td>16</td>
<td>31</td>
<td>31</td>
<td>40.3</td>
</tr>
</tbody>
</table>

(table continues)
<table>
<thead>
<tr>
<th>Demographic characteristic</th>
<th>n</th>
<th>f</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>77</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>21</td>
<td>27.3</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>56</td>
<td>72.7</td>
<td></td>
</tr>
<tr>
<td>Ethnic origin</td>
<td>76</td>
<td></td>
<td></td>
</tr>
<tr>
<td>African American</td>
<td>19</td>
<td>25.0</td>
<td></td>
</tr>
<tr>
<td>Hispanic</td>
<td>2</td>
<td>2.6</td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>55</td>
<td>72.4</td>
<td></td>
</tr>
<tr>
<td>Free meal</td>
<td>76</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>62</td>
<td>81.6</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>14</td>
<td>18.4</td>
<td></td>
</tr>
<tr>
<td>Living arrangements</td>
<td>76</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Both parents</td>
<td>52</td>
<td>68.4</td>
<td></td>
</tr>
<tr>
<td>Father only</td>
<td>3</td>
<td>3.9</td>
<td></td>
</tr>
<tr>
<td>Mother only</td>
<td>19</td>
<td>25.0</td>
<td></td>
</tr>
<tr>
<td>Grade average</td>
<td>77</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>15</td>
<td>19.5</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>45</td>
<td>58.4</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>15</td>
<td>19.5</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>2</td>
<td>2.6</td>
<td></td>
</tr>
<tr>
<td>Type of vehicle most often ride/drive</td>
<td>71</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Car</td>
<td>44</td>
<td>57.1</td>
<td></td>
</tr>
<tr>
<td>Truck</td>
<td>18</td>
<td>23.1</td>
<td></td>
</tr>
<tr>
<td>Sports utility</td>
<td>9</td>
<td>11.9</td>
<td></td>
</tr>
<tr>
<td>Have a driver’s permit</td>
<td>71</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>22</td>
<td>31.0</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>49</td>
<td>69.0</td>
<td></td>
</tr>
</tbody>
</table>

(table continues)
Table 1 (continued)

<table>
<thead>
<tr>
<th>Demographic characteristic</th>
<th>n</th>
<th>f</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Have a driver’s license</td>
<td>74</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>32</td>
<td></td>
<td>43.2</td>
</tr>
<tr>
<td>Yes</td>
<td>42</td>
<td></td>
<td>56.8</td>
</tr>
<tr>
<td>Have motorcycle license</td>
<td>66</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>62</td>
<td></td>
<td>93.9</td>
</tr>
<tr>
<td>Yes</td>
<td>4</td>
<td></td>
<td>6.1</td>
</tr>
<tr>
<td>Completed driver’s education</td>
<td>77</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>9</td>
<td></td>
<td>11.7</td>
</tr>
<tr>
<td>Yes</td>
<td>24</td>
<td></td>
<td>31.2</td>
</tr>
<tr>
<td>Taking now</td>
<td>44</td>
<td></td>
<td>57.1</td>
</tr>
</tbody>
</table>

Note. Not all participants answered all items. Percentages were founded to the nearest 10th place.

Differences Among Demographic Variables

To further explicate sample demographics, chi-square analysis was conducted. Only those differences which emerged as statistically significant were presented.

Differences in subjects’ gender and use of seatbelts resulted in significantly different rates. As indicated in Table 2, on pretest 53% of male students and 79% of female students reported that they always wear their safety belt when others do not. However, after the Think First presentation, this rate increased to 60% of male students.
and 86% of female students who reported that they always wear their safety belt when others do not ($p < .02$).

Table 2

Significant Gender Differences and Safety Belt Behavior

<table>
<thead>
<tr>
<th>Safety belt behavior</th>
<th>Sex</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
<td>$\chi^2$</td>
</tr>
<tr>
<td>Always wear safety belt when others don’t</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pretest</td>
<td>53%</td>
<td>79%</td>
<td>4.73</td>
</tr>
<tr>
<td>Posttest</td>
<td>60%</td>
<td>86%</td>
<td>5.66</td>
</tr>
</tbody>
</table>

*p < .05.

Similarly, as indicated in Table 3, on pretest 79% of students living with both parents, as compared to 68% of students living with only one parent (mother), reported that they always wear their safety belt. After the presentation, the safety belt behavior response rate decreased to 61% for those living with only their mother, as compared to students living with both parents whose self-report safety belt behavior rate increased to 86% ($p < .02$).
Finally, as indicated in Table 4, there were differences in safety belt behavior responses among students according to their grade average. On pretest, 80% of students who had an “A” grade average reported always wearing their seatbelt, as compared to 82% of students with a “B” grade average and 60% students with a “C” grade average. This percentage increased after the presentation for those students with an “A” and “B” grade, while the behavior response for “C” average students decreased to 43% (p < .001).
Table 4

Significant Grade Average Differences and Safety Belt Behavior

<table>
<thead>
<tr>
<th>Safety belt behavior</th>
<th>Grade average</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
</tr>
<tr>
<td>Always wear safety belt</td>
<td></td>
</tr>
<tr>
<td>Pretest</td>
<td>80%</td>
</tr>
<tr>
<td>Posttest</td>
<td>93%</td>
</tr>
</tbody>
</table>

*p < .05.

Knowledge

In this study, knowledge and attitudes were evaluated separately. Two research hypotheses were used to guide this study. The first significant difference existed in high school sophomore students' knowledge about CNS injuries before and after attending an educational intervention about CNS injuries as evidenced by pretest and posttest scores. As illustrated in Table 5, the mean knowledge score on the pretest was 13.14 (SD = 2.9). After the intervention, the mean posttest score was 13.8 (SD = 3.4) (absolute range: Low = 0, High = 16). This finding
demonstrates a minimal increase in the students' knowledge. However, the mean knowledge scores were very close to the higher end of the scale on pretest scores, indicating minimal room for improvement in this group. The knowledge increase was not statistically significant, $t(69) = 1.500, p > .05$; therefore, the researcher retained the null hypothesis.

Table 5

Means, Standard Deviations, and $t$ Test and Pretest-Posttest Questions Related CNS Injury

<table>
<thead>
<tr>
<th>CNS injury</th>
<th>df</th>
<th>M</th>
<th>SD</th>
<th>$t$</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge of neurological injury</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pretest</td>
<td>69</td>
<td>13.1</td>
<td>2.94</td>
<td>-1.500</td>
<td>.138</td>
</tr>
<tr>
<td>Posttest</td>
<td>69</td>
<td>13.8</td>
<td>3.43</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*p < .05.

Because of the high face validity, individual items from the knowledge subscale were evaluated. Data regarding knowledge scores were compared among selected demographic variables. Information regarding differences in knowledge scores and gender can be seen in Table 6.
Table 6
Significant Gender Differences on Select CNS Injury Knowledge Questions

<table>
<thead>
<tr>
<th>Knowledge question</th>
<th>Pretest</th>
<th></th>
<th>Posttest</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sex</td>
<td></td>
<td>Sex</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
<td>Male</td>
<td>Female</td>
</tr>
<tr>
<td></td>
<td>x²</td>
<td>p</td>
<td>x²</td>
<td>p</td>
</tr>
<tr>
<td>MVA is leading cause of CNS injuries</td>
<td>80%</td>
<td>76%</td>
<td>.137</td>
<td>.711</td>
</tr>
<tr>
<td></td>
<td>53%</td>
<td>80%</td>
<td>5.36</td>
<td>.020*</td>
</tr>
<tr>
<td>Spinal cord injury affects</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bowel/bladder</td>
<td>67%</td>
<td>68%</td>
<td>.010</td>
<td>.921</td>
</tr>
<tr>
<td></td>
<td>67%</td>
<td>91%</td>
<td>11.82</td>
<td>.001*</td>
</tr>
<tr>
<td>Sexual function</td>
<td>71%</td>
<td>75%</td>
<td>.101</td>
<td>.750</td>
</tr>
<tr>
<td></td>
<td>57%</td>
<td>88%</td>
<td>4.46</td>
<td>.004*</td>
</tr>
<tr>
<td>Sense of touch</td>
<td>76%</td>
<td>80%</td>
<td>.161</td>
<td>.668</td>
</tr>
<tr>
<td></td>
<td>52%</td>
<td>88%</td>
<td>10.95</td>
<td>.001*</td>
</tr>
<tr>
<td>Breathing</td>
<td>57%</td>
<td>79%</td>
<td>3.530</td>
<td>.060</td>
</tr>
<tr>
<td></td>
<td>52%</td>
<td>95%</td>
<td>19.44</td>
<td>&lt;.001*</td>
</tr>
<tr>
<td>Moving</td>
<td>86%</td>
<td>95%</td>
<td>1.690</td>
<td>.193</td>
</tr>
<tr>
<td></td>
<td>52%</td>
<td>95%</td>
<td>11.82</td>
<td>.001*</td>
</tr>
<tr>
<td>Severe brain injuries affect</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Walking</td>
<td>81%</td>
<td>91%</td>
<td>1.510</td>
<td>.218</td>
</tr>
<tr>
<td></td>
<td>71%</td>
<td>95%</td>
<td>7.97</td>
<td>.005*</td>
</tr>
<tr>
<td>Talking</td>
<td>71%</td>
<td>96%</td>
<td>10.250</td>
<td>&lt;.001*</td>
</tr>
<tr>
<td></td>
<td>67%</td>
<td>96%</td>
<td>13.10</td>
<td>&lt;.001*</td>
</tr>
<tr>
<td>Remembering</td>
<td>71%</td>
<td>95%</td>
<td>7.970</td>
<td>.005</td>
</tr>
<tr>
<td></td>
<td>62%</td>
<td>95%</td>
<td>13.30</td>
<td>&lt;.001*</td>
</tr>
<tr>
<td>Emotions</td>
<td>62%</td>
<td>88%</td>
<td>6.370</td>
<td>&lt;.001*</td>
</tr>
<tr>
<td></td>
<td>57%</td>
<td>91%</td>
<td>11.82</td>
<td>.001*</td>
</tr>
<tr>
<td>Spinal cord injury most frequently results in paralysis</td>
<td>91%</td>
<td>91%</td>
<td>.007</td>
<td>.936</td>
</tr>
<tr>
<td></td>
<td>67%</td>
<td>91%</td>
<td>8.56</td>
<td>.003*</td>
</tr>
<tr>
<td>Do not move MVA victim, get professional help</td>
<td>71%</td>
<td>84%</td>
<td>1.520</td>
<td>.217</td>
</tr>
<tr>
<td></td>
<td>72%</td>
<td>93%</td>
<td>5.43</td>
<td>.020*</td>
</tr>
</tbody>
</table>

Note. MVA = Motor vehicle accident.
*p < .05.
These findings reflect a considerable difference in responses to select knowledge questions between male and female subjects. Females had a significantly greater percentage of knowledge relating to the bodily functions affected by a CNS injury, permanence of a spinal cord injury, and treatment of people injured in motor vehicle accidents. In contrast, male subjects' knowledge about CNS injury actually dropped after the intervention.

Table 7 reflects a significant difference in responses to select knowledge questions between African-American and Caucasian subjects. In comparison to Caucasian subjects, African Americans had a substantially lower percentage of correct responses to knowledge relating to bodily functions affected by a CNS injury. African-American subjects' knowledge about CNS injury either remained the same or lowered after the intervention, as compared to Caucasian subjects who demonstrated an increased percentage in knowledge.
Table 7

**Significant Race Differences on Select CNS Injury Knowledge Questions**

<table>
<thead>
<tr>
<th>Knowledge question</th>
<th>Pretest</th>
<th></th>
<th></th>
<th></th>
<th>Posttest</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Race</td>
<td>African American</td>
<td>Caucasian</td>
<td>χ²</td>
<td>p</td>
<td>Race</td>
<td>African American</td>
<td>Caucasian</td>
</tr>
<tr>
<td>Spinal cord injury affects</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bowel/bladder</td>
<td></td>
<td>53%</td>
<td>71%</td>
<td>2.10</td>
<td>.146</td>
<td>53%</td>
<td>98%</td>
<td>25.07</td>
</tr>
<tr>
<td>Sexual function</td>
<td></td>
<td>68%</td>
<td>75%</td>
<td>2.69</td>
<td>.604</td>
<td>63%</td>
<td>91%</td>
<td>8.00</td>
</tr>
<tr>
<td>Moving</td>
<td></td>
<td>68%</td>
<td>82%</td>
<td>1.49</td>
<td>.221</td>
<td>68%</td>
<td>91%</td>
<td>5.64</td>
</tr>
<tr>
<td>Severe brain injuries affect</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Talking</td>
<td></td>
<td>79%</td>
<td>92%</td>
<td>2.78</td>
<td>.095</td>
<td>79%</td>
<td>94%</td>
<td>4.01</td>
</tr>
<tr>
<td>Remembering</td>
<td></td>
<td>84%</td>
<td>89%</td>
<td>.315</td>
<td>.575</td>
<td>74%</td>
<td>93%</td>
<td>4.79</td>
</tr>
<tr>
<td>Emotions</td>
<td></td>
<td>63%</td>
<td>87%</td>
<td>5.35</td>
<td>.021*</td>
<td>63%</td>
<td>91%</td>
<td>8.00</td>
</tr>
</tbody>
</table>

*p < .005.
Findings in Table 8 reflect a significant difference in responses to select knowledge questions between those students who live with only their mother in comparison to students who live with both parents. Students living with both parents had a significantly greater percentage of correct responses to knowledge questions than related to bodily functions affected by a CNS injury and the permanence of spinal cord injury than those living in a single-parent home. After the intervention, single-parent students had a decrease or no change in CNS injury knowledge, as compared to students who lived with both parents, who demonstrated an increase in knowledge.

Attitudes

The second null hypothesis was as follows: There will be no significant difference in high school sophomore students' attitude about CNS injuries before and after attending an education intervention about CNS injuries, as evidenced by pretest and posttest scores. Attitudes about CNS injuries were assessed and analyzed.
Table 8

Significant Living Arrangement Differences on Select CNS Injury Knowledge Questions

<table>
<thead>
<tr>
<th>Knowledge question</th>
<th>Pretest Living Arrangement</th>
<th>Posttest Living Arrangement</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mom</td>
<td>Both</td>
</tr>
<tr>
<td>Spinal cord injury affects</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bowel/bladder</td>
<td>63%</td>
<td>69%</td>
</tr>
<tr>
<td>Breathing</td>
<td>63%</td>
<td>77%</td>
</tr>
<tr>
<td>Moving</td>
<td>95%</td>
<td>92%</td>
</tr>
<tr>
<td>Severe brain injuries affect</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Talking</td>
<td>90%</td>
<td>92%</td>
</tr>
<tr>
<td>Remembering</td>
<td>90%</td>
<td>90%</td>
</tr>
<tr>
<td>Emotions</td>
<td>74%</td>
<td>85%</td>
</tr>
<tr>
<td>Spinal cord injury most frequently results in paralysis</td>
<td>90%</td>
<td>92%</td>
</tr>
</tbody>
</table>

*p < .005.
There were seven attitude questions. Each question was assessed independently in addition to obtaining a total attitude score. Possible answers ranged on a Likert scale from "Strongly agree" (equal to 4 points) to "Strongly disagree" (equal to 1 point).

Paired t test was utilized to derive an overall attitude score. As illustrated in Table 9, the mean attitude score on the pretest was 24.63 (SD = 2.28). After the intervention, the mean posttest score was 25.67 (SD = 2.83) (absolute range: Low = 7, High = 30). There was a statistically significant increase in students' attitude score from pretest to posttest, $t(72) = -3.516, p = .001$; therefore, the researcher rejected the null hypothesis.

Table 9
Means, Standard Deviations, and t Test and Pretest-Posttest Questions Related to CNS Injury

<table>
<thead>
<tr>
<th>CNS injury</th>
<th>df</th>
<th>M</th>
<th>SD</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Survey of attitude about CNS injury</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pretest</td>
<td>72</td>
<td>24.63</td>
<td>2.28</td>
<td>-3.516</td>
<td>.001</td>
</tr>
<tr>
<td>Posttest</td>
<td>72</td>
<td>25.67</td>
<td>2.83</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*p < .05.
Data regarding attitude scores were subjected to further statistical analysis in order to assess the impact of selected demographic variables. Information regarding differences in attitude scores according to students' grade average is illustrated in Table 10.

Table 10

Significant Grade Average Differences and Students' Attitudes

| Grades to attitude | Grade average |  |  | \( \chi^2 \) |  \\
|--------------------|---------------|---|---|-------------|---|
| My lifestyles would change with a CNS injury | A | B | C | \( \chi^2 \) | p | \\
| Pretest | 73% | 76% | 71% | 1.76 | .778 |
| Posttest | 93% | 78% | 54% | 6.15 | .050* |

*p < .05.

These findings indicate that students with a higher grade average had a greater desired attitude response to an understanding that their lifestyle would change with a CNS injury. Results indicate that after the intervention students with an A or B grade average changed their
attitudes in the desired direction, believing their lifestyle would change with a CNS injury.

Attitudes changed toward a desired decrease in risk-taking behavior overall when asked about speed of escape from a crashed car if not wearing a seatbelt. The attitude increased in a positive direction with 36% of subjects agreeing with this statement on pretest and only 23% agreeing on posttest.

Additional Findings

Because of the high face validity, individual items of special interest from the three subscales were evaluated. Students exposed to the program had significantly higher water safety behavior after the intervention. On pretest, 24% of students reported that they always check water before diving as compared to 44% posttest, \( \chi^2(1, N = 41) = 6.12, p < .01 \).

Posttest scores did not differ by number of students who had driver's licenses or by number of students who had a close friend or relative who had been injured or killed in an accident. Knowing someone with a CNS injury had no relationship on knowledge or attitude scores. There was no significant difference between age and total attitude and
knowledge scores. One interesting finding was that there was no difference in responses to the attitude or behavior questions between those students who reported having been involved in a motor vehicle accident as compared to those who had not been involved in a motor vehicle accident.

Summary

Chapter IV included the sample as well as the data collection and analysis for the study. Statistical findings revealed no significant change in mean knowledge scores from pretest to posttest; however, there was a significant positive change in attitude scores. In Chapter V outcomes of the findings will be presented, including discussion, conclusions, implications, and recommendations for nursing science.
Chapter V
The Outcomes

Central nervous system injuries are the leading causes of death and disability among American youth. Adolescents, due to their developmental stage, emotional immaturity, underdeveloped impulse control, peer influences, and lack of judgment, are at risk of acting rashly, thus at higher risk for central nervous system (CNS) injury. This significant public health problem is a preventive objective of Healthy People 2010. The purpose of this study was to examine the effects of an educational intervention on high school sophomore students' knowledge and attitudes about CNS injury. The nurse practitioner in a school or family health clinic is in a unique position to educationally intervene with adolescent clients. Pender's Health Promotion Model was the theoretical framework for the study. Pender (1996) asserted that each individual has a unique health behavior based on individual characteristics and experience. Through identification of specific individual motivational
factors, appropriate educational intervention can be offered, resulting in the adoption of health-promoting behaviors and the development of broader prevention efforts.

The researcher utilized two research null hypotheses, the first concerning sophomore high school students' knowledge about CNS injury pre- and post-intervention and the second concerning high school sophomore students' attitudes about CNS injury pre- and post-intervention. A pre-post one-group design was used.

The setting for the research was a county public high school in a large, economically advantaged town in an urban southeastern state. The ages of the subjects ranged from 15 to 16 years.

In this chapter, the findings will be discussed and conclusions made. Additionally, implications for nursing science will be addressed, and recommendations for future research will be set forth.

Summary and Discussion of Findings

Findings from this study, regarding knowledge of high school sophomore students before and after an educational intervention, showed no significant change in overall
knowledge score from pretest to posttest. However, students had a greater mean level of knowledge on the pretest, indicating minimal room for improvement. This suggests most respondents already had a strong knowledge about CNS injury prior to the intervention. However, correlating knowledge change scores with demographic data obtained several interesting results. Females had a significant increase in knowledge scores about leading cause of CNS injury and the bodily functions affected with a CNS injury, as compared to males who had a drop in knowledge scores on these items. This finding indicates an apparent decline in knowledge scores among male students after the intervention. Both male and female subjects had an increase in knowledge about not moving a victim who had been involved in a motor vehicle accident, with female subjects testing significantly higher than male subjects on the level of knowledge posttest. As anticipated, females who are at lower risk of CNS injuries were more receptive to the program than males. The statistical significance of this decline indicates that it is unlikely to have occurred by chance. One potential explanation was that male students became sensitized by the pretest and developed a reactive effect to the sensitive material.
Another explanation is that male students who are at highest risk may have been less attentive than female students and, therefore, developed a different interpretation of the information presented. Additionally, female students, who are usually most influenced by authority figures, would respond more favorably to a prevention program than male students. This researcher speculates that male students at highest risk use negative cognition to avoid internalizing prevention messages.

Current findings were consistent with the findings of a study conducted by Tenn and Dewis (1996), who discovered that students' knowledge about CNS injury deteriorated from pretest to posttest to follow-up. Overall, 62% of students answered knowledge questions correctly on pretest and only 58% correctly on the posttest. In the Tenn and Davis (1996) study, decrease in knowledge scores was associated with fatigue factor. The questionnaire was lengthy (45 minutes) and a formidable challenge for students with limited academic ability. Additionally, follow-up testing occurred on the last day of the school year, a time when the students probably had little interest in the quality of their responses. Tenn and Davis’ findings were also similar to the findings of
Wright et al. (1995), who discovered no significant increase in knowledge scores for the high school students 2 weeks after the program intervention and a small, but statistically significant, decrease in scores at the 3-month follow-up. In contrast, Neuwelt et al. (1989) discovered that the Think First program significantly increased knowledge in a sample of high school students, respectively, suggesting that CNS injury prevention programs in high school students have positive knowledge consequences. One explanation for the differences in the findings between the current study and the study conducted by Neuwelt et al. (1989) is the recent increase in awareness of CNS injury due to an alarming incidence rate among teenagers. Education has been implemented in a variety of ways and initiated at a younger age than in the past. The researcher suspects that students in the current study may have been exposed to prior CNS injury education, contributing to their significant baseline level of knowledge as compared to students who participated in Neuwelt et al. (1989). Subjects in the Neuwelt et al. study may have had no prior exposure to CNS injury prevention, resulting in greater opportunity for knowledge score improvement.
Also discovered were data regarding significant race difference in responses to select knowledge questions. In comparison to African-American students, Caucasian students had a higher percentage of correct responses on posttest to the questions that relate to the bodily functions affected by a CNS injury. Caucasians also had an increased percentage in knowledge on these questions from pretest to posttest, while African-American students’ knowledge percent either remained the same or decreased.

Further analysis was conducted assessing socioeconomic status, based on whether or not students received free lunch meals. An explanation for this finding may be attributed to the socioeconomic status indicating a strong relationship with those students who qualify and receive free lunch and those who do not in response to knowledge level. It was discovered that 56% of African-American students receive free lunch meals as compared to only 5% of Caucasians, $\chi^2(1, N = 73) = 23.26, p < .001$.

The researcher also compared the living arrangements among the races and discovered no significant difference among African Americans and Caucasians in relation to single- or two-parent living arrangements.
Similarly, notable differences in response to three individual knowledge questions were discovered among those students who lived with both parents as compared to those living with single parent (mother). Students living with both parents had a significantly higher percentage of correct responses to questions relating to bodily functions affected by a CNS injury and permanence of spinal cord injury. Further analysis was also conducted to assess living arrangements among students and socioeconomic status. It was discovered that 37% of single-parent students received free lunch meals as compared to 12% who lived with both parents, $\chi^2(1, N = 71) = 5.96, p < .015$. A possible explanation is that students who live in two-parent homes have more opportunities from exposure to two individuals who influence their knowledge. This researcher also suspects that students living in two-parent homes may have a higher socioeconomic status from combined income in comparison to a single-income parent.

The findings from the attitude section of the questionnaire discovered a significant increase in students’ attitude score from pretest to posttest. These current findings were consistent with the findings conducted by Harvey et al. (2000), who discovered that
student preventive behavior relating to HIV/AIDS sexual practices showed large positive changes following an education/awareness prevention program.

In review of select attitude questions, the majority of students (99%) in this current study validated their awareness of importance in checking the depth of water before diving. The researcher suspects that the geographical location from which the school was drawn, near a large lake where water sports are popular, may reflect the high level of positive water safety knowledge.

Furthermore, in the attitude section of the questionnaire, 99% of the students had a positive response toward the importance of wearing safety belts. An explanation for this finding could be attributed to the heightened information about safety belt usage and safety belt legislation, conceivably acting as an unplanned series of reminders. In addition, 79% of students indicated that a CNS injury would change their lifestyle. Only 8% reported that they would drive after drinking. Overall, the significant increase in the attitude score from pretest to posttest may be attributed to the students’ high level of knowledge at baseline and with the intervention the knowledge was translated to an
attitudinal change (a change in the positive direction to alter risk-taking behavior).

Specific data regarding significant grade average differences and students attitudes were analyzed. The findings indicate that students who held a higher grade average had a higher desired attitude response to understanding that their lifestyle would change with a CNS injury. Results also indicated the post-intervention students with an A or B average had an increased percentage in attitude responses in the desired direction, as compared to students with C grade average who had an apparent decline in attitude. One explanation for this discovery was that these students became sensitized by the pretest and developed a reactive effect to the sensitive material. This researcher suspects that students who have a lower grade average may not have been as attentive to the program intervention, possibly interpreting the content information incorrectly. In addition, the questionnaire was lengthy and these students may not have had the academic ability to interpret the Likert scale questionnaire as easily as those students with a higher grade average.
Additional Findings

Students exposed to the program had a significantly higher water safety behavior after the intervention. On pretest, 24% of students reported that they always check water before diving as compared to 44% posttest, $\chi^2(1, N = 41) = 6.23$, $p < .01$. The researcher suspects that because 99% of the students had a positive attitudinal response to diving safety on both pretest and posttest could have translated into a behavior change.

Posttest scores did not differ by number of students who had drivers licenses or by number of students who had a close friend or relative who had been injured or killed in an accident. Knowing someone with a CNS injury had no relationship on knowledge or attitude scores. This current finding was consistent with the findings of a study conducted by Avolio et al. (1992) in which 54% answered yes at pretest that they knew someone with a CNS injury but had no relationship on knowledge or attitude scores. The researcher suspects that this question may have been interpreted in a broad sense by the students and probably very few of those answering yes have a close family member with a CNS injury.
There was no significant difference between age and total attitude and knowledge scores. An explanation for this might be that all participants were either age 15 or 16, leaving little difference between age inferring that the participants may have the same perception of possible risk-taking behavior and consequences.

An interesting, yet disturbing, finding was that there was no difference in responses to the attitude behavior questions between those students who reported having been in a motor vehicle accident as compared to those who had never been involved in an accident. The researcher suspects that these adolescents do not perceive their accident as being preventable; until the adolescent perceives risk-taking behavior as a threat to him or her then there will be no desire to change behavior. Current findings were similar with the findings of a study conducted by Frank et al. (1992), who discovered students who had been involved in fewer accidents had a higher total score than those involved in more accidents. Specifically, subjects who reported two or fewer accidents had a higher mean total score (55.25) than those who had accidents in three or four vehicles (M = 51.06), F(1, 757) = 31.18, p < .0001.
In reviewing the statistical data, the researcher discovered that with specific knowledge items (permanence of spinal cord injury, bodily functions affected by CNS injury, and highest age risk), subjects demonstrated an increased knowledge percent on items that the guest speaker emphasized in interacting with the students. This finding suggests that students may have been more receptive to the interaction with a guest speaker sharing personal experiences than to the health professional providing content in a lecture format presentation. Focusing on the realities of the long-lasting effect of trauma appear to have hit home with these students.

The current study revealed some interesting findings when comparing demographic variables with CNS injury knowledge, attitude, and self-report behaviors. There have been several similar studies conducted that have compared group data between control and experimental groups. While these studies have had some interesting discoveries, they neglected some of the same variables that the current researcher studied, implicating the uniqueness of this current research.
Conclusions

Based on the findings of this study, the following conclusions were drawn:

1. Overall knowledge about CNS injury was not significantly improved after the educational intervention, although baseline knowledge scores were on the upper end of the scale, indicating minimal room for student improvement. The first step of initiating change involves education.

2. Students living with both parents and those who had a higher grade average were positively impacted by the intervention.

3. Female students had a higher percentage of correct responses to select knowledge questions than male students.

4. Caucasian students had a significantly higher percentage of correct responses to select knowledge questions than African Americans.

5. Students living with both parents had a significantly higher percentage of correct responses to select knowledge questions than students living with one parent.
6. Overall attitude about CNS injury was significantly improved after the educational intervention, which suggests that the CNS injury prevention education on 10th-grade high school students has positive attitude consequences. This "success" justifies continuing the educational program from an ethical as well as a learning perspective.

7. Students with A and B averages changed their attitudes and had a higher percentage in the desired direction for the belief that their lifestyle would change with a CNS injury, as compared to those students with a C grade average.

8. After the intervention, subjects were more likely to know how to respond to a person thrown from a vehicle and the treatment for those individuals involved in a motor vehicle accident.

9. After the intervention, subjects had a change in self-report behavior in the desired direction concerning water safety behavior.
Implications for Nursing

A number of implications for nursing science were derived from the study. Implications for nursing practice, nursing education, and nursing research are addressed.

Practice. Findings indicate that increased time and effort need to be incorporated into prevention. In order to change knowledge and attitudes, adolescents need periodic reinforcement of desired behavior to maximize maintenance of safety habits. Modeling of safety behaviors is particularly important among adolescents who already have high risk-taking behavior. Educational interventions may increase receptivity to future injury prevention messages and to legislation regarding safety behaviors.

Nurse practitioners are recognized for the ability to teach and educate individuals about CNS prevention, not just in the clinical setting, but also in schools, churches, and other established community youth agencies. Nurse practitioners can provide primary prevention by consistently assessing youth clients' knowledge and attitudes toward high-risk behavior and by emphasizing health promotion and injury prevention education, thus empowering these clients to make good health-related decisions and avoid risky behaviors.
Nurse practitioners are provided with the opportunity to teach, role model, and reinforce injury prevention behaviors. Nurse practitioners must take a comprehensive approach to injury prevention and address both acquisition and maintenance of safety behaviors across developmental levels. Since head injuries represent a significant health problem for both the adolescent and the younger school-age child, safety interventions need to be targeted at an earlier age before unhealthy behaviors develop. Younger students are often more easily influenced by adults, in particular health care professionals, thus may be more receptive to intervention efforts and begin to incorporate healthy behaviors at an early age.

Education. Schools of nursing, at the baccalaureate and graduate levels, need to include preventive education on CNS injury in their curricula and emphasize the importance of CNS injury as a health care issue. Because nurses will be working with all types of populations, it is important that they explore, early in the educational process, their own knowledge and attitudes about CNS injury. To influence positive behavior change in high-risk populations, student nurses, graduate nurses, and even experienced nurses need educational opportunities to stay
abreast of current issues and statistics surrounding this public health care concern.

Research. Findings from this study, compiled with conclusions from previous studies, indicate that additional research needs to be conducted to evaluate long-term effects, which are clearly the most difficult to determine, yet the most suggestive of beneficial efforts. Although this study intervention was not enough to significantly affect level of knowledge about CNS injury, other similar studies conducted by Frank et al. (1992), Neuwelt et al. (1989), and Wright et al. (1995) have demonstrated significant increases in knowledge. Attitudes, however, reflected more promising changes in the education intervention and environment utilized for this study. This suggest many areas of focus for future research. Small increments of attitude change may provide a catalyst for overcoming illogical resistance and establishing more enduring attitude change. Once cognitive change is transformed into attitudinal change, the foundation has been laid for behavior change. More longitudinal studies are needed to determine whether knowledge and attitude changes are maintained or increased over time and whether or not a longer interactive setting
would have a significant impact on either knowledge or attitudes. This researcher also recommends a peer-driven injury prevention program, including interaction with a young spinal cord or head injury victim and engagement in rehearsal regarding avoidance of risky situations and decision-making, followed by empirical studies to assess the significance of such opportunities on knowledge and attitudes about CNS injury.

Limitations

The design of the study and the experimental treatment imposed a number of threats to the external and internal validity of the current study. Considerable publicity was given to the mandatory seatbelt law that passed in the state 4 months prior to the study program, which may have confounded the effect of the intervention.

The county school system block scheduling was another limitation since the researcher was only able to capture 50% of the high school sophomore population. This resulted in a less than desired sample size with an unequal gender and race distribution.
The questionnaire was lengthy and may have contributed to fatigue factor for those students with limited academic ability or short attention span.

One additional variable, that of the timing of the pretest and the intervention program, is believed to have significantly impacted the internal validity of the current study. The pretest and intervention were conducted during the spring semester. One day before the presentation, sophomore students had just completed a pilot study with the exit exam testing. On the day of the pretest and intervention, classes were cut short due to an extended home room period to answer a school questionnaire and inform students about the exit exam. The students' time allowed to answer the questionnaire was reduced to allow for the full presentation time. The posttest was conducted one month later, within a few days of students having completed a week of SAT testing. By this time, students were exhausted with test taking and eager for school to end. Their interest had withered considerably, and participants potentially had little interest in the quality of their responses.

Furthermore, the sample consisted of 78 tenth-grade students from one public county in a large, economically
advantaged town in an urban southeastern state, which may limit generalization to lower socioeconomic rural schools or to other grade levels. The sample was one of convenience, which contributed to a weaker design than if a random sample had been used. A researcher-developed questionnaire, derived from the National Think First organization and adapted to this study, was utilized, which may have been less useful as originally expected because the items required careful contemplation by subjects. Students may have been confused by some of the Likert scale items and how to respond since some items were reversed.

Recommendations for Future Research

Based on the findings from this study, the researcher makes the following recommendations for future research:

1. Conduction of a longitudinal study from the current study over the next 2 years to evaluate a decline or gain in knowledge, attitude, and behavior over time. Before any behavioral change can take place, the participants must be given enough time to incorporate the idea that change can make a personal difference.
2. Replication of the study with a refinement of the instrument to assess knowledge and attitudes and self-reporting behavior.

3. Conduction of peer-driven injury prevention program for high-risk adolescents in which a similar intervention is presented by peers in a classroom setting. Program would allow for interaction with CNS injury victim, peer interaction, and behavioral rehearsal.

4. Conduction of qualitative, in-depth research exploring male attitudes, since they are at highest risk of injury and often less receptive to injury prevention interventions.

5. Conduction of studies specifically looking at demographic variables, such as socioeconomic status and living arrangements of students and how those variables affect students' desire toward positive knowledge, attitude, and behavior change about high-risk injury behavior.

6. Initiation of an age-specific injury prevention curricula in elementary, middle, and high schools so that reinforcement of CNS injury prevention can be taught and emphasized at different levels of development.
References


information into a high school physics course. Annals of Emergency Medicine, 27(2), 216-224.


APPENDIX A

THINK FIRST AND SPINAL CORD ASSESSMENT QUESTIONNAIRE
Pretest Questionnaire

Please read each question carefully and choose one response (unless otherwise noted) which best describes your answer.

1. Have you ever been in a motor vehicle accident/crash of any sort?
   - a. Yes   - b. No

2. Do you personally know someone (friend, family member, classmate) who has been in a motor vehicle accident/crash?
   - a. Yes   - b. No

3. Do you personally know someone (friend, family member, classmate) who has been killed as a result of an injury?
   - a. Yes   - b. No
   
   If yes, how (check all that apply)?
   - a. car crash
   - b. gunshot wound
   - c. diving or jumping into water
   - d. pedestrian injury
   - e. fall
   - f. sports or recreation injury
   - g. stab wound
   - h. Other. Please specify:

4. Do you personally know someone (friend, family member, classmate) who has become permanently injured as a result of a brain or spinal cord injury?
   - a. Yes   - b. No

   If yes, how (check all that apply)?
   - a. car crash
   - b. gunshot wound
   - c. diving or jumping into water
   - d. pedestrian injury
   - e. fall
   - f. sports or recreation injury
   - g. stab wound
   - h. Other. Please specify:

5. How often do you wear a safety belt (lap or shoulder harness)?

6. How often do most of your family members wear their safety belts?
7. How often do most of your friends wear their safety belts?
   a. Always   b. Sometimes   c. Never

8. How often do you wear your safety belt when others do not?
   a. Always   b. Sometimes   c. Never

9. How often do you wear your safety belt when you are in the back seat?
   a. Always   b. Sometimes   c. Never

10. Which one of the following is the primary reason why you do not wear your safety belt? (Please check only one)
    a. I always wear a safety belt.
    b. I’m a safe driver, it’s not necessary.
    c. I am safer without it.
    d. My safety belt is uncomfortable.
    e. My clothes get wrinkled when I wear my safety belt.
    f. My friends would make fun of me.
    g. I don’t like the way I look when I wear my safety belt.
    h. I forget to wear my safety belt.
    i. I don’t want other people to think I don’t trust their driving.

11. How often do you wear a helmet when you
    a. Ride a bicycle?
       a. Always   b. Sometimes   c. Never   c. I don’t ride
    b. Drive or ride a motorcycle?
       a. Always   b. Sometimes   c. Never   c. I don’t ride
    c. Drive or ride an ATV (3-wheeler, 4-wheeler or all-terrain vehicle?)
       a. Always   b. Sometimes   c. Never   c. I don’t ride

12. Which one of the following is the main reason why you don’t wear a helmet if you are on bicycle, ATV, or a motorcycle? (Please check only one)
    a. I always wear a helmet
    b. Helmets are too expensive.
    c. I don’t like the way I look in a helmet.
    d. A helmet makes my head too hot.
    e. It’s a hassle to keep up with my helmet.
    f. A helmet just doesn’t look cool.
    g. I can’t see or hear well with a helmet.
    h. A helmet doesn’t reduce my chances of serious injury.
    i. My friends don’t wear a helmet.
    j. There’s not always a helmet around when I want to go for a ride.
13. How often do you check below the surface of the water before you dive at lakes or ponds?
   a. Always  
   b. Sometimes  
   c. Never  
   C. I don’t dive

14. Compared to other people your age, how likely are you to be injured in a motor vehicle accident?
   a. Certainly will be injured  
   b. Very likely  
   c. Likely  
   d. Very unlikely  
   e. Will not be injured

15. How important for your safety do you think it is to wear a safety belt?
   a. Not important  
   b. Mildly important  
   c. Moderately important  
   d. Important  
   e. Very important

16. How likely is it that you would drive after drinking?
   a. Very likely  
   b. Likely  
   c. Unlikely  
   d. Very unlikely

17. How likely is it that you would ride with a friend who has been drinking and then wants to drive?
   a. Very likely  
   b. Likely  
   c. Unlikely  
   d. Very unlikely

18. If my brain or spinal cord is injured, my lifestyle would change.
   a. Strongly agree  
   b. Agree  
   c. Disagree  
   d. Strongly disagree

19. I am more likely to be hurt when I drink and/or take drugs.
   a. Strongly agree  
   b. Agree  
   c. Disagree  
   d. Strongly disagree

20. I am safer when I wear my safety belt.
   a. Strongly agree  
   b. Agree  
   c. Disagree  
   d. Strongly disagree

21. It is important to check the depth of water (pool, river, lake, etc.) before diving.
   a. Strongly agree  
   b. Agree  
   c. Disagree  
   d. Strongly disagree

22. I believe you can escape from a crashed car faster if you do not wear a seatbelt.
   a. Strongly agree  
   b. Agree  
   c. Disagree  
   d. Strongly disagree
Please answer the following questions to the best of your knowledge.

23. What is the leading cause of head and spinal cord injuries?
   - a. Diving or jumping in the water
   - b. Gunshot wounds or acts of violence
   - c. Falls
   - d. Motor vehicle crashes
   - e. Sports or recreational activities

24. What age group is at highest risk for having a brain or spinal cord injury?
   - a. 0 to 14 years
   - b. 15 to 24 years
   - c. 25 to 44 years
   - d. 45 to 64 years
   - e. Over 65 years

25. Paralysis due to spinal cord injury occurs only when the spinal cord is completely cut through.
   - a. True
   - b. False

26. Nearly all driving injuries are preventable.
   - a. True
   - b. False

27. Spinal cord injury can cause changes in (Check all that apply):
   - a. Bowel and bladder control
   - b. Sexual function
   - c. Sense of touch
   - d. Breathing
   - e. Moving
   - f. None of the above

28. Severe brain injuries can cause difficulties with (Check all that apply):
   - a. Walking
   - b. Talking
   - c. Thinking
   - d. Remembering
   - e. Emotions
   - f. None of the above

29. Spinal cord injury most frequently results in
   - a. paralysis.
   - b. back pain.
   - c. minor headaches.
   - d. no physical damage.
   - e. None of the above

30. If you come upon a car crash where a person has been thrown about in a car and is complaining of numbness in the toes, what should you do?
   - a. Do not move the victims at all--Get professional help.
   - b. Make the victim as comfortable as possible, then get professional help.
   - c. Get the person out of the car, then get professional help.
   - d. Don’t wait for help, get the person to the hospital immediately.
   - e. Help the person to his feet and see if he can walk with your support.
Demographic Data

Please provide the following information:

1. Age: ________

2. Gender
   - a. Male
   - b. Female

3. Race
   - a. African American
   - b. Asian or Pacific Islander
   - c. Hispanic
   - d. Native American
   - e. White
   - f. Other

4. Do you receive free or reduced cost school meals?
   - a. Yes
   - b. No

5. Who do you live with?
   - a. Father only
   - b. Mother only
   - c. Both parents
   - d. Other

6. What would you consider your overall grade average to be for the last semester? (Check only one)
   - a. Grade A
   - b. Grade B
   - c. Grade C
   - d. Grade D

7. In what type of vehicle do you most often ride/drive?
   - a. car
   - b. pickup truck
   - c. sports utility vehicle
   - d. Jeep
   - e. motorcycle
   - f. bus

8. Do you have a
   - a. driver’s permit
   - b. driver’s license
   - c. motorcycle license
   - a. Yes
   - b. No

9. Have you completed driver’s education?
   - a. Yes
   - b. No
   - c. Taking now

Thank you for your participation. Please place your completed questionnaire in the box provided.
Posttest Questionnaire

Please read each question carefully and choose one response (unless otherwise noted) which best describes your answer.

1. Have you ever been in a motor vehicle accident/crash of any sort?
   □ a. Yes    □ b. No

2. Do you personally know someone (friend, family member, classmate) who has been in a motor vehicle accident/crash?
   □ a. Yes    □ b. No

3. Do you personally know someone (friend, family member, classmate) who has been killed as a result of an injury?
   □ a. Yes    □ b. No
   If yes, how (check all that apply)?
   □ a. car crash
   □ b. gunshot wound
   □ c. diving or jumping into water
   □ d. pedestrian injury
   □ e. fall
   □ f. sports or recreation injury
   □ g. stab wound
   □ h. Other. Please specify:

4. Do you personally know someone (friend, family member, classmate) who has become permanently injured as a result of a brain or spinal cord injury?
   □ a. Yes    □ b. No
   If yes, how (check all that apply)?
   □ a. car crash
   □ b. gunshot wound
   □ c. diving or jumping into water
   □ d. pedestrian injury
   □ e. fall
   □ f. sports or recreation injury
   □ g. stab wound
   □ h. Other. Please specify:

5. How often do you wear a safety belt (lap or shoulder harness)?
   □ a. Always    □ b. Sometimes    □ c. Never

6. How often do most of your family members wear their safety belts?
   □ a. Always    □ b. Sometimes    □ c. Never
7. How often do most of your friends wear their safety belts?
   a. Always   b. Sometimes   c. Never

8. How often do you wear your safety belt when others do not?
   a. Always   b. Sometimes   c. Never

9. How often do you wear your safety belt when you are in the back seat?
   a. Always   b. Sometimes   c. Never

10. Which one of the following is the primary reason why you do not wear your safety belt? (Please check only one)
    a. I always wear a safety belt.
    b. I’m a safe driver, it’s not necessary.
    c. I am safer without it.
    d. My safety belt is uncomfortable.
    e. My clothes get wrinkled when I wear my safety belt.
    f. My friends would make fun of me.
    g. I don’t like the way I look when I wear my safety belt.
    h. I forget to wear my safety belt.
    i. I don’t want other people to think I don’t trust their driving.

11. How often do you wear a helmet when you
    a. Ride a bicycle?
       a. Always   b. Sometimes   c. Never   c. I don’t ride
    b. Drive or ride a motorcycle?
       a. Always   b. Sometimes   c. Never   c. I don’t ride
    c. Drive or ride an ATV (3-wheeler, 4-wheeler or all-terrain vehicle?)
       a. Always   b. Sometimes   c. Never   c. I don’t ride

12. Which one of the following is the main reason why you don’t wear a helmet if you are on bicycle, ATV, or a motorcycle? (Please check only one)
    a. I always wear a helmet
    b. Helmets are too expensive.
    c. I don’t like the way I look in a helmet.
    d. A helmet makes my head too hot.
    e. It’s a hassle to keep up with my helmet.
    f. A helmet just doesn’t look cool.
    g. I can’t see or hear well with a helmet.
    h. A helmet doesn’t reduce my chances of serious injury.
    i. My friends don’t wear a helmet.
    j. There’s not always a helmet around when I want to go for a ride.
13. How often do you check below the surface of the water before you dive at lakes or ponds?
   □ a. Always  □ b. Sometimes  □ c. Never  □ C. I don’t dive

14. Compared to other people your age, how likely are you to be injured in a motor vehicle accident?
   □ a. Certainly will be injured  □ d. Very unlikely
   □ b. Very likely  □ e. Will not be injured
   □ c. Likely

15. How important for your safety do you think it is to wear a safety belt?
   □ a. Not important  □ d. Important
   □ b. Mildly important  □ e. Very important
   □ c. Moderately important

16. How likely is it that you would drive after drinking?
   □ a. Very likely  □ c. Unlikely
   □ b. Likely  □ d. Very unlikely

17. How likely is it that you would ride with a friend who has been drinking and then wants to drive?
   □ a. Very likely  □ c. Unlikely
   □ b. Likely  □ d. Very unlikely

Please mark how much you agree or disagree with each statement below. Mark ONLY ONE response for each item.

18. If my brain or spinal cord is injured, my lifestyle would change.
   □ a. Strongly agree  □ b. Agree  □ c. Disagree  □ d. Strongly disagree

19. I am more likely to be hurt when I drink and/or take drugs.
   □ a. Strongly agree  □ b. Agree  □ c. Disagree  □ d. Strongly disagree

20. I am safer when I wear my safety belt.
   □ a. Strongly agree  □ b. Agree  □ c. Disagree  □ d. Strongly disagree

21. It is important to check the depth of water (pool, river, lake, etc.) before diving.
   □ a. Strongly agree  □ b. Agree  □ c. Disagree  □ d. Strongly disagree

22. I believe you can escape from a crashed car faster if you do not wear a seatbelt.
   □ a. Strongly agree  □ b. Agree  □ c. Disagree  □ d. Strongly disagree
Please answer the following questions to the best of your knowledge.

23. What is the leading cause of head and spinal cord injuries?
   - a. Diving or jumping in the water
   - b. Gunshot wounds or acts of violence
   - c. Falls
   - d. Motor vehicle crashes
   - e. Sports or recreational activities

24. What age group is at highest risk for having a brain or spinal cord injury?
   - a. 0 to 14 years
   - b. 15 to 24 years
   - c. 25 to 44 years
   - d. 45 to 64 years
   - e. Over 65 years

25. Paralysis due to spinal cord injury occurs only when the spinal cord is completely cut through.
   - a. True
   - b. False

26. Nearly all driving injuries are preventable.
   - a. True
   - b. False

27. Spinal cord injury can cause changes in (Check all that apply):
   - a. Bowel and bladder control
   - b. Sexual function
   - c. Sense of touch
   - d. Breathing
   - e. Moving
   - f. None of the above

28. Severe brain injuries can cause difficulties with (Check all that apply):
   - a. Walking
   - b. Talking
   - c. Thinking
   - d. Remembering
   - e. Emotions
   - f. None of the above

29. Spinal cord injury most frequently results in
   - a. paralysis.
   - b. back pain.
   - c. minor headaches.
   - d. no physical damage.
   - e. None of the above

30. If you come upon a car crash where a person has been thrown about in a car and is complaining of numbness in the toes, what should you do?
   - a. Do not move the victims at all--Get professional help.
   - b. Make the victim as comfortable as possible, then get professional help.
   - c. Get the person out of the car, then get professional help.
   - d. Don’t wait for help, get the person to the hospital immediately.
   - e. Help the person to his feet and see if he can walk with your support.
APPENDIX B

APPROVAL OF MISSISSIPPI UNIVERSITY FOR WOMEN'S COMMITTEE ON USE OF HUMAN SUBJECTS IN EXPERIMENTATION
April 26, 2000

Ms. Felicia Ellison
P. O. Box W-910
Campus

Dear Ms. Ellison:

I am pleased to inform you that the members of the Committee on Human Subjects in Experimentation have approved your proposed research provided you amend the consent form to add the words "if you still wish to participate" after one month later at the end of the first paragraph. The Committee also would recommend that the proposed plan be submitted to the superintendent with the superintendent's consent letter. Finally, the Committee requests that you explain how research assistants will be trained to ensure confidentiality.

I wish you much success in your research.

Sincerely,

Sheila V. Adams
Interim Vice President for Academic Affairs

SA: wr

CC: Mr. Jim Davidson
    Dr. Patsy Smyth
APPENDIX C

LETTER GRANTING PERMISSION TO USE TOOL
March 27, 2000

Felicia Ellison  
8300 Coleman Drive  
Northport, AL 35473

Dear Felicia:

We have received your request to use a pretest and posttest for a study using the Think First For Teens program. Per our phone conversations, it is our understanding that you have had previous training in administering the Think First For Teens presentations. We approve the use of the tests in accordance with the guidelines of the Teens program. However, I am sending a camera ready slick with the new Think First logo. The tagline above the logo should read - “National Injury Prevention Programs.” Please use the new logo on your tests.

Please send us a copy of the results of your study when it is completed and prior to publication of results. Thank you for your injury prevention efforts using Think First programs. Please let us know if there is anything else that we can do to assist you.

Sincerely,

THINK FIRST FOUNDATION

Deb Johnson  
Program Coordinator

Enclosure
APPENDIX D

LETTER TO SUPERINTENDENT AND CONSENT FORM
April 26, 2000

Dr. Joyce Sellers, Superintendent
Tuscaloosa County Board of Education
2314 9th Street
Tuscaloosa, AL 35401

Dear Mrs. Sellers:

My name is Felicia Ellison. I am a registered nurse and a graduate student at Mississippi University for Women in Columbus, Mississippi. I am conducting a research study concerning the effects of the Think First educational program on the knowledge and attitudes of high school students regarding central nervous system injuries.

The questionnaire, teaching plan, and consent forms for the research study have been reviewed and accepted by the Committee on Use of Human Subjects in Experimentation at Mississippi University for Women. The study participants will be involved in a 50-minute educational program consisting of an action-packed 18-minute film entitled "On the Edge," the testimony of a young speaker who has survived a traumatic brain or spinal cord injury, and a brief overview of basic information about the mechanisms of injury and ages at highest risk. The goal of the program is to increase awareness and understanding of the causes and consequences of central nervous system injuries and to help students learn how to take the time to "think first."

The participants will voluntarily complete a questionnaire prior to and one month after the 50-minute Think First teaching program if they still wish to participate. They will be informed of their rights as research subjects and will be assured of confidentiality and anonymity. Parental and subject consent will be obtained prior to completing the questionnaire. I have included the questionnaire, consent forms, and a description of the Think First program for your review.

If you have any questions or concerns, please call me at my home telephone number (205) 345-0549 or my cellular phone (205) 799-6715. Please leave a message if I am not available, and I will return your call promptly.

Thank you for your time and assistance in this matter.

Sincerely,

Felicia P. Ellison, RN, BSN, COHN-S
Consent of Superintendent

I understand that Felicia P. Ellison, a registered nurse and a graduate nursing student at Mississippi University for Women in Columbus, Mississippi, will be conducting a research study in Tuscaloosa County High School. I understand that the participants (10th graders) will complete a questionnaire prior to and one month after the Think First education program assessing their knowledge and attitudes concerning risks of central nervous system injuries. The teaching program will be an educational intervention which consists of an 18-minute action-packed film entitled "On the Edge," the testimony of a young speaker who has survived a traumatic brain or spinal cord injury, and a brief overview of basic information about mechanisms of injury and ages at highest risk. I understand that participants will be informed that participation in the study is voluntarily and nonparticipation will have no effect on their grades or status at school. I understand also that the participation in the study will require both parental and student consent from each student.

I understand the above information and give my consent for Felicia P. Ellison to conduct the described study in Tuscaloosa County High School.

Superintendent’s Signature:
School System:
Date:
March 22, 2000

Ms. Felicia Ellison
8300 Coleman Drive
Northport, AL 35473

Dear Ms. Ellison:

Your request to conduct a study in the Tuscaloosa County School System is granted. Your proposal is clearly written and you have complied with the requirements of our system. You are approved to begin your study for the spring of 2000.

I have contacted Mr. Benson at Tuscaloosa County High and made him aware of your needs and asked him to consider your request. Since there are many researchers requesting studies at any given time, we leave the final decision to participate to the building principal.

I wish you continued success with your project.

Sincerely,

Marcia Burke
Assistant Superintendent for Curriculum, Instruction, and Staff Development

c Steve Benson – Tuscaloosa County High
April 26, 2000

Mr. Steve Benson, Principal
Tuscaloosa County High School
2200 24th Street
Tuscaloosa, AL 35476

Dear Mr. Benson:

My name is Felicia Ellison. I am a registered nurse and a graduate student at Mississippi University for Women in Columbus, Mississippi. I am conducting a research study concerning the effects of the Think First educational program on the knowledge and attitudes of high school students regarding central nervous system injuries.

The questionnaire, teaching plan, and consent forms for the research study have been reviewed and accepted by the Committee on Use of Human Subjects in Experimentation at Mississippi University for Women. The study participants will be involved in a 50-minute educational program consisting of an action-packed 18-minute film entitled "On the Edge," the testimony of a young speaker who has survived a traumatic brain or spinal cord injury, and a brief overview of basic information about the mechanisms of injury and ages at highest risk. The goal of the program is to increase awareness and understanding of the causes and consequences of central nervous system injuries and to help students learn how to take the time to "think first."

The participants will voluntarily complete a questionnaire prior to and one month after the 50-minute Think First teaching program. They will be informed of their rights as research subjects and will be assured of confidentiality and anonymity. Parental and subject consent will be obtained prior to completing the questionnaire. I have included the questionnaire, consent forms, and a description of the Think First program for your review.

If you have any questions or concerns, please call me at my home telephone number (205) 345-0549 or my cellular phone (205) 799-6715. Please leave a message if I am not available, and I will return your call promptly.

Thank you for your time and assistance in this matter.

Sincerely,

Felicia P. Ellison, RN, BSN, COHN-S
Consent of Principal

I understand that Felicia P. Ellison, a registered nurse and a graduate nursing student at Mississippi University for Women in Columbus, Mississippi, will be conducting a research study in Tuscaloosa County High School. I understand that the participants (10th graders) will complete a questionnaire prior to and one-month after the Think First education program assessing their knowledge and attitudes concerning risks of Central Nervous System injuries. The teaching program will be an educational intervention which consists of a 18 min action packed film entitled “On the Edge,” the testimony of a young speaker who has survived a traumatic brain or spinal cord injury, and a brief overview of basic information about mechanisms of injury and ages at highest risk. I understand that participants will be informed that participation in the study is voluntarily and confidentiality will be assured. Participants will also be informed that participation or nonparticipation will have no effect on their grades or status at school. I understand also that the participation in the study will require both parental and student consent from each student.

I understand the above information and give my consent to Felicia P. Ellison to conduct the described study in Tuscaloosa County High School.

Principal’s Signature: ______________________

School System: ____________________________

Date: ____________________________
APPENDIX F

CONSENT FOR PARTICIPATION
(STUDENT/PARENT)
Think First™

Consent for Participation

To the Student:

Hello, my name is Felicia P. Ellison. I am a registered nurse and a graduate nursing student at Mississippi University for Women in Columbus, Mississippi. I am conducting a research study on the knowledge and attitudes of high school students about central nervous system injuries. I would like to ask you to participate in my study. As part of my study your school was chosen as one of the schools in Alabama to participate in this study. The study will require completing a 30-item questionnaire just before attending the Think First™ head and spinal cord injury prevention program. One month later you will answer another questionnaire if you still wish to participate.

It is important that you answer the questions honestly as the questions are evaluating your knowledge and attitude before the presentation (pretest) and after the presentation (posttest). They both will be testing your knowledge and or attitudes about injuries and how to prevent them. The questionnaire is not a test and there is no pass or fail. The questionnaire will not have any effect on your school grade or status in school. The choice to participate is voluntary and you will not be penalized in any manner if you elect not to participate in the study. You may withdraw from the study at any time up to the time you turn in the questionnaire.

To ensure that confidentiality is maintained throughout this study and afterwards, no names will be put on the questionnaires. The answers to either of the questionnaires will not be shared with any of your teachers, fellow students, or anyone else within or outside your school. All the answers on each participant’s questionnaires will be grouped together into general answers so no one person’s answers will be known. The information from the questionnaires will be used to evaluate the effectiveness of the current program and help provide direction for future programs about brain and spinal cord injuries to help educate people your age about high risk and injury prevention.

I have read the above statements and understand that this study will not have any effect on my school grades. I understand that any answers and information that I provide will be kept strictly
confidential. In addition, I understand that I have the right to withdraw my participation in this study at any time.

1. Completing a questionnaire before (immediately prior) the Think First™ program is presented.
2. Participating and attending the Think First™ program.
3. Completing a questionnaire after (4 weeks) the Think First™ program is presented.

Yes, I will participate in the study.

No, I do not wish to participate in the study.

Signature of Student ___________________________ Date __________

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To the Parent:

I have read the above statements and understand that this study will have no effect on my child’s school grades. I understand that all the answers and information my child provides will be kept strictly confidential. In addition, I understand that my child has the right to withdraw his or her participation in this study at any time.

1. Completing a pretest before (immediately prior) the Think First™ program is presented.
2. Participating and attending the Think First™ program.
3. Completing a posttest after (4 weeks) the Think First™ program is presented.

Yes, I will participate in the study.

No, I do not wish to participate in the study.

Signature of Parent/Guardian ___________________________ Date __________