# UNIVERSITY OF CINCINNATI

August 8 , 2003

I, Sheryl Elaine Allen Bracey ,

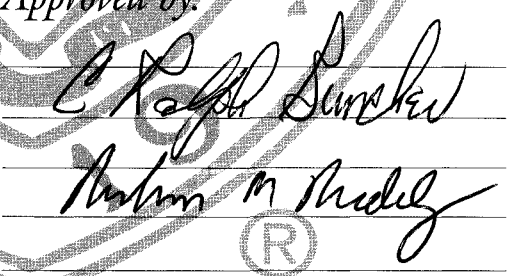
*hereby submit this as part of the requirements for the degree of:*

Master of Science

*in* the Department of Environmental Health

*It is entitled* Are Children Wearing Less Protective Gear While Riding a Scooter Versus Riding a Bicycle?

*Approved by:*



# ARE CHILDREN WEARING LESS PROTECTIVE GEAR WHILE RIDING A SCOOTER VERSUS RIDING A BICYCLE?

A thesis submitted to the

Division of Research and Advanced Studies
of the University of Cincinnati

in partial fulfillment of the
requirements for the degree of

**MASTER OF SCIENCE**

in the Department of Environmental Health
of the College of Medicine

**2003**

by

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## ABSTRACT

**Objectives:** The purpose of this study was to describe the reported use of protective gear worn by injured children presenting to the emergency department.

**Design/Methods:** Persons bringing injured children to the emergency room were asked to participate in a survey.

**Results:** There were 399 surveys completed in this younger population. The mean age for riding a bicycle was 4 years and 8 years for a scooter. Of the 189 persons with a bicycle and scooter, 29.6% reported never wearing a helmet on a bicycle and 49.2% reported never wearing a helmet while riding a scooter. Patients were more likely to report wearing a helmet on a scooter if they reported wearing a helmet on a bicycle.

**Conclusions:** In our study, children who presented to this emergency department and ride scooters or bicycles do not use the proper gear. Future interventions should include teaching parents about protective equipment.

## ACKNOWLEDGEMENTS

I would like to acknowledge and thank my Thesis Advisory Committee of C. Ralph Buncher, Sc.D., and Richard M. Ruddy, M.D., for their support and encouragement during graduate school and during the completion of this project.

I would like to thank Melinda Mahabee-Gittens, M.D., M.S., for all of her mentorship and guidance with this project. I would also like to thank Kate Berz, research coordinator for emergency medicine, for her statistical support and guidance. I would also like to recognize Jareen Meinzen-Derr, M.P.H., for her mentorship and guidance with the statistics.

I would also like to thank Ronald C. Bracey and the Allen family for their support during graduate school and during the completion of this project.

I thank all of the participants who gave their time to help complete this study.

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## INTRODUCTION

Unintentional injury is the leading cause of death and hospitalizations for all children in the United States. May through August account for almost half (42%) of all injury related childhood deaths.[1] During the summer, many children are playing outside, which increases their risk for unintentional injury. As the popularity of scooters has continued to rise since 1999, the injuries have also continued to rise. Abbott (2001) collected data on 14 children, with all 14 children suffering from either a fracture (n=11), large abrasion (n=1), a laceration (n=1), or a septic knee (n=1).[2] Abbott's study concluded that most injuries occurred shortly after children began scooter use; and, younger children had the most severe injuries.[2] In a press release in September 2000, the Consumer Product Safety Commission estimated that there were about 8,600 scooter-related injuries seen in the United States Emergency Departments, which was an increase by 700%. [3] The Morbidity and Mortality Weekly Report in November 2000, stated there were almost 30,000 emergency department visits for scooter injuries from January to October, with the majority of injuries occurring to those children under 15 years old.[4] Since most of the injuries reported were fractures or dislocations, wearing protective gear could possibly decrease those injuries. [5] The American Academy of Pediatrics recommends that children less than eight years old should not ride scooters without supervision; and, children riding scooters should wear helmets, knee and elbow pads. [5] It has long been established that bicycle helmets decrease the rate and severity of a head injury. It has been estimated that helmet use may prevent up to 88% of serious brain injuries. [6,7] Other protective gear has not been calculated to show the estimated degree of prevention. In my opinion, unfortunately, most children do not wear protective gear, even though, the protective gear will decrease the chance and severity of injury.

In a study by Levine, 15 patient's charts were reviewed for age, place of injury, use of protective gear, adult supervision, injury sustained, medical management, and disposition. Most (13/15; 87%) injuries occurred from falling off of the scooter. Adult supervision was present in only half of the cases. Two children were wearing a helmet at the time of injury; none of the children wore protective padding. The conclusion from the Levine study stated that scooter use by children may result in serious injury. These injuries may be preventable with both the proper use of protective gear and supervision.[8]

Mankovsky reviewed 156 charts with a diagnosis of "scooter related trauma".[9] Thirty-one percent of these patients had fractures, with 31% of those fractures needing surgical treatment. The conclusions stated that research on scooter injury prevention needs to be improved; the authors recommend head, face, wrist, and ankle protections.

The purpose of the current survey was to describe the reported use, of those children brought to an urban emergency department, of protective gear by children when riding a bicycle and when riding a scooter, to determine which patients wear protective gear, to determine parent's knowledge about scooter injuries and to determine the epidemiology of bicycle versus scooter and bicycles injuries.

## MATERIALS AND METHODS

**Study Design**. This was a cross-sectional prevalence study of parents or legal guardians of children with an injury presenting to a pediatric emergency department. The Institutional

Review Board at Cincinnati Children's Hospital Medical Center approved the protocol prior to study initiation.

**Study Setting and Population.** This study was conducted in Cincinnati Children's Hospital Medical Center emergency department in Cincinnati, Ohio. All parents, caretakers, or legal guardians of children between 2 and 18 years of age who were given a diagnosis of injury, fall, laceration, or possible fracture regardless of the mechanism or use of safety equipment were eligible for inclusion in the study. The family member who chose to participate was surveyed. Consent for the study was obtained verbally by trained research assistants. After it was determined that the patient qualified for the study, a trained research assistant approached the family. A standard script, written with the help of Kate Berz, the research coordinator for emergency medicine, was used which consisted of the following: "Hi, my name is ..... and I am the research assistant here in the emergency department. We are talking to all of the parents of children who are here today with an injury. We want to ask you some questions about bicycles and scooters. In addition, we will be collecting some demographic information and information about your child's injury. Does this sound like something you would like to participate in today?" If the family agreed to participate, the research assistant would read each question to the caretaker and record the answers. Persons were excluded from the study if the child was less than 24 months of age, the child was critically ill, or they had a with chronic disease—such as sickle cell, cystic fibrosis, osteogenic imperfecta, mental retardation, or congenital heart disease.

**Survey Content and Administration.** A closed-question, written survey was administered to a convenience sample of eligible parents (parents will be used to include: parents, caretakers, or

legal guardians) from August 1, 2001 to March 31, 2002. The survey was conducted only during hours when a dedicated trained research associate was available. There were both daytime and evening hours, during the weekdays between eight o'clock in the morning and midnight. The questionnaire was completed during that current emergency room visit. The survey contained 46 items including—name, date of birth, date of visit, sex, time of visit, primary physician, insurance, age of patient, age of caregiver, sex of caregiver, race of caregiver, highest level of education of the caregiver, marital status of the caregiver, employment status of the caregiver, household income, does your child have a bicycle and/or scooter, age of patient when they started riding a bicycle or scooter, does your child wear a helmet/knee pads/elbow pads/wrist pads when they ride a bicycle and/or scooter, does your child ride the bicycle and/or scooter at night, does your child ride the bicycle and/or scooter in their street, is riding a scooter safer than riding a bicycle, what body part was injured, how was the body part injured, where did the injury happen, what type of injury occurred, what time of day did the injury occur. It was recorded if x-rays were taken and if the patient was hospitalized. (Appendix A) The use of protective gear, such as: helmet; knee, elbow, and wrist pads, was compared in those participants who owned only a bicycle and those participants who owned both a bicycle and a scooter. Participants were dichotomized into those who were reported to wear protective gear versus those participants who were reported to not wear protective gear according to the parent.

**Data Analysis.** The data were gathered by the research assistants and entered into a data base for analysis. The research coordinator for emergency medicine, Kate Berz, trained and supervised the research assistants. Sheryl E. Allen Bracey, M.D., Melinda Mahabee-Gittens, M.D., M.S., and Kate Berz, cleaned the data base. There were two errors found and they were

corrected in the data base. The errors were in the transference of the data—a category change had been made and was corrected. Chi square was used to determine if there was a difference between the reported use of protective gear in those participants who owned both a bicycle and a scooter, while riding a bicycle or a scooter. Results were considered statistically significant if the $p<0.05$. Data was analyzed using the Statistical Software Package for the Social Sciences (SPSS) 10.00 for Windows and SAS version 8.1 (SAS Institute Inc., Cary, NC.)

## RESULTS

**Sample Characteristics.** There were 399 surveys collected. Table one shows the entire population sample characteristics. For analytical purposes, two subgroups were especially studied: the patients owning bicycles only (n=181, 45.4%); and the patients owning both a bicycle and a scooter (n=189, 47.4%). There were 19 patients (4.8%) that did not own a bicycle or a scooter. Ten patients (2.5%) owned only a scooter. The mean age (±SD) in the total sample population was 8.8 (±3.4) years. There were 255 male patients in the study (63.9%). Three hundred thirty-three parents were females (83.5%). Two hundred seventeen parents were married (54.4%). Two hundred forty-three parents were white (60.9%), 141 (35.3%) were black, 1 (0.3%) was hispanic, 1 (0.3%) was asian, and 13 (3.3%) reported themselves as not fitting into any of the above categories. (In Table One hispanic, asian, and other were all categorized as other) Two hundred fifteen of the parents were educated beyond a high school level (53.9%). Two hundred sixty-eight parents were employed (67.2%). One hundred forty-one, the largest group, had an annual income of $25,000-62,000 (35.3%). Three hundred seventy-nine patients had insurance (95%). When the parents were asked if during any prior emergency department

visit did the physician discuss injury risk with them, they reported that the emergency department physician had discussed injury risk with 94 parents (23.6%); and during the primary care visit their physician had discussed injury risk with two hundred twenty-seven parents (56.9%). There was one patient hospitalized, from the bicycle only group, a 12 year old female whose injury was the result of a dog bite.

**Description of injuries from the total survey population in the males and females.** Table two categorizes the body part that was injured in males versus females. Only the primary injury complaint was categorized. Of the 255 males in the study, the top four body parts that were injured in the primary complaint category: head 61 (23.9%), finger 33 (12.9%), face 23 (9.0%), and ankle 21 (8.2%). Of the 144 females in the study, the top four body parts that were injured in the primary complaint category: finger 21 (14.6%), wrist 15 (10.4%), face 13 (9.0%), and head and ankle both with 12 (8.3%).

**Description of the mechanism of injury from the entire survey population.** Figure one shows the distribution of the mechanism of injury. Most injuries occurred while the patients were playing sports 167 (41.9%). There were 23 people that did not answer this question. There were not many injuries while on a bicycle 14 (3.5%) or injuries while on a scooter 3 (0.8%) in our sample.

**The bicycle only group.** Table three shows the sample characteristics of the bicycle only group versus the bicycle and scooter group. The bicycle only group consisted of 181 patients, with 108 males (59.7%). The bicycle only group was composed of 110 whites (60.8%). The mean

age (±SD) in the bicycle only population was 8.5 (±3.9) years. The mean age (±SD) of starting to ride bicycle in the bicycle only population was 3.8 (±1.7) years. Figure two shows the injured body parts; the upper extremity was the most commonly reported injured body part.

Table four illustrates the relationship between when patients reported starting to ride a bicycle versus how long patients reported riding a bicycle, in the bicycle only group. Remembering that all patients were injured, eight patients reported riding a bicycle for less than one year. Thirty-four patients reported riding a bicycle for one year. Twenty-six patients reported riding a bicycle for two years. Sixteen patients reported riding a bicycle for three years. Twenty patients reported riding a bicycle for four years. This group composes 57.5% of the total bicycle only population; most of the injuries occurred with those less experienced bicycle riders.

Table seven shows the distribution of the males and females in the bicycle only group who reported to wear protective equipment. In the questionnaire, there were four categories: always, sometimes, occasionally, and never. We grouped answers into yes, which included the always, sometimes, and occasionally responses, and no, which included the never response group. When comparing males in this bicycle only group, with the total of 108, 67 (62.0%) males were said to wear a helmet while riding a bicycle, and 41 (38%) males were said to never wear a helmet while riding a bicycle. In this same group, 93 (86.1%) males were said to never wear knee pads; 97 (89.8%) were said to never wear elbow pads; and 101 (93.5%) were said to never wear wrist pads while riding a bicycle.

For the 73 females in this bicycle only group, 46 (63.0%) females were said to wear a helmet while riding a bicycle, and 27 (37%) females were reported to never wear a helmet. In this same group, 58 (79.5%) females were said to never wear knee pads; 59 (80.8%) were said to never wear elbow pads; and 68 (93.2%) were said to never wear wrist pads while riding a bicycle. In Table seven, none of the p values, when comparing males and females, in this bicycle only category, were significant.

Table nine shows the income of the bicycle only group versus wearing a helmet; 22 people did not answer this question. When looking at the income in this category, 63 (34.8%) of the parents reported to be in the income range of $25,000-62,000, with 53 (29.3%) in the $0-25,000 income category. In the $0-25,000 income, 22 (41.5%) patients were said to never wear their helmets while riding a bicycle. In the $25,000-62,000 income, 25 (39.7%) patients were said to never wear their helmets while riding a bicycle. In the $62,000-130,000 income, 10 (28.6%) patients were said to never wear their helmets while riding a bicycle. In the income group, $130,000-280,000, all 7 patients were said to always wear their helmets while riding a bicycle. In the last income group, $>280,000, of a total of one, the one patient was said to always wear a helmet while riding a bicycle.

The low income group, the reference group, was compared to all of the other income levels. When looking at the statistical calculations, there was one significant p value, comparing $0-25,000 reported income group with $130,000-280,000. The trend is the patients are more likely to wear helmets in the higher income level in this population.

**The bicycle and scooter group.** Table three shows that the bicycle and scooter group consisted of 189 patients, with 126 (66.7%) males. The bicycle and scooter group included 124 (65.6%) whites. The mean age (±SD) in the bicycle and scooter group was 9.1 (±2.7). The mean age (±SD) for starting to ride a bicycle in the bicycle and scooter owners was 4.0 (±1.3) years. The mean age for riding a scooter in the bicycle and scooter owners was (±SD) was7.9 (±2.7) years. Figure two shows the injured body parts; the upper extremity was the most commonly reported injured body part.

Table five illustrates the relationship between when patients reported starting to ride a bicycle versus how long patients reported riding a bicycle, in the bicycle and scooter group. Remembering that all patients were injured, five patients reported riding a bicycle for less than one year. Five patients reported riding a bicycle for one year. Twenty-five patients reported riding a bicycle for two years. Twenty reported riding a bicycle for three years. Twenty-seven patients reported riding a bicycle for four years. This group composes 43.4% of the total bicycle and scooter population; less than half of the injuries occurred with those less experienced bicycle riders.

Table six illustrates the relationship between when patients reported starting to ride a scooter versus how long patients reported riding a scooter, in the bicycle and scooter group. Remembering that all patients were injured, twenty-one patients reported riding a scooter for less than one year. Fifty-six patients reported riding a scooter for one year. Nineteen patients reported riding a scooter for two years. Four reported riding a scooter for three years. One

patient reported riding a scooter for four years. This group composes 55% of the total bicycle and scooter population; most of the injuries occurred with those less experienced scooter riders.

Table eight shows the bicycle and scooter group and the percent of patients who were said to wear protective equipment. When comparing the males in this bicycle and scooter group, with the total of 126, 39 (31.0%) males were said to never wear a helmet while riding a bicycle, with 87 (69.0%) were said to wear a helmet while riding a bicycle. Less males were said to wear a helmet while riding a scooter; 62 (49.2%) were said to never wear a helmet. In this same group, 105 (83.3%) males were said to never wear knee pads on a bicycle, and 16 (12.7%) were said to never wear knee pads while on a scooter. Elbow pads were said to never be worn by 107 (84.9%) males on a bicycle and 106 (84.1%) elbow pads were said to never be worn by the males while riding a scooter. Wrist pads were said to never be worn by 118 (93.7%) of males while riding a bicycle and 115 (91.3%) wrist pads were said to never be worn by the males while riding a scooter.

When comparing the 63 females in this bicycle and scooter group, 45 (71.4%) females were said to wear a helmet while riding a bicycle, with 17 (27%) said to never wear a helmet. One (1.6%) parent did not report whether their child wore a helmet while on a bicycle. Helmet use was reported to be lower in females while riding a scooter, with 31 (49.2%) said to never wear a helmet. In this same group, 53 (84.1%) females were said to never wear knee pads while riding a bicycle and 51 (81.0%) were said to never wear knee pads while riding a scooter. Elbow pads were said to never be worn by 51 (81.0%) females on a bicycle and 51 (81.0%) were said to

never wear elbow pads while riding a scooter. Wrist pads were said to never be worn by 54 (85.7%) females while riding a bicycle, and 55 (87.3%) were said to never be worn while riding a scooter.

When looking at the statistical calculations, there are two significant p values. When comparing the males and whether they reported wearing a helmet while riding a bicycle or scooter, in the bicycle and scooter group, the males were 2 times more likely to wear a helmet on a bicycle than a scooter. When comparing the females and whether they reported wearing a helmet while riding a bicycle or scooter, in this same group, the females were almost 3 times more likely to wear a helmet on a bicycle than a scooter.

Table ten shows the income of the bicycle and scooter group versus wearing a helmet. When looking at the bicycle and scooter category, one person did not answer this question. When looking at the income in this category, 70 (37.0%) parents were in the income range of $25,000-62,000, with 43 (22.8%) in the $0-25,000 income category. In the $0-25,000 income, 19 (44.2%) were said to never wear their helmets while riding a bicycle, and 29 (67.4%) were said to never wear their helmet while riding a scooter. In the $25,000-62,000 income category, 26 (37.1%) were said to never wear their helmet while riding a bicycle, and 40 (57.1%) were said to never wear their helmet while riding a scooter. In the $62,000-130,000 income, 5 (11.9%) were said to never wear a helmet on a bicycle, with 37 (88.1%) were said to wear a helmet on a bicycle; 13 (31%) were said to never wear a helmet while riding a scooter and 29 (69.0%) were said to wear a helmet while riding a scooter. In the income group, $130,000-280,000, all 12 of the patients were said to wear their helmets while on a bicycle, and only 2 (16.7%) were said to

not wear their helmets on a scooter. In the last income group, $<280,000, with a total of three, 2 (66.7%) were said to always wear their helmet while on a bicycle and on a scooter; and 1 (33.3%) was said to never wear their helmet while on a bicycle or on a scooter.

When looking at the statistical calculations, there were two groups with significant p values. The low income group, the reference group, was compared to all of the other income levels. In the bicycle and scooter group, there is a trend toward wearing a helmet on both a bicycle and a scooter, if the parents are in a high income group in this population. In the bicycle and scooter group, the patient is 6 times more likely to report wearing a helmet on a bicycle in the $62,000-130,000 income group versus the $0-25,000 income group; and 21 times more likely in the >$280,000 income group. Similarly, the patient is 5 times more likely to report wearing a helmet on a scooter in the $62,000-130,000 income group versus the $0-25,000 income group; and 10 times more likely in the >$280,000 income group.

**Parent's opinion.** Table eleven illustrates the parent's opinion about riding bicycles and scooters—regarding adult supervision, riding at night, and riding in the street. There were 30 people that did not answer this section. When looking at the entire group of 399 patients minus the group of 30, 234 (58.7%) parents said they supervised their children while they were riding a bicycle; and 135 (33.8%) said they did not supervise their children. The group of riding a scooter consisted of only 199 surveys, which excludes those with a bicycle only (n=181), and those without a bicycle or a scooter (n=19). While riding a scooter, 71 (17.8%) parents said they supervised their children while riding a scooter; and 63 (15.8%) said they did not supervise their children. In this same group, 335 (84%) said they did not let their child ride their bicycle at

night; and 180 (45.1%) said they did not let their child ride a scooter at night. There were 211(52.9%) said they did not let their child ride their bicycle in the street; and 122 (30.6%) said they did not let their child ride their scooter in the street.

Figure three shows the results of whether parents thought that "riding a scooter was safer than riding a bicycle". (Appendix A; Question #42) In the bicycle only group, most parents (146; 80.7%) stated that a scooter is sometimes safer than a bicycle, with 19 (10.5%) stating that a scooter is always safer than a bicycle. In the group, five parents did not answer whether a scooter is safer than a bicycle. Similarly, in the bicycle and scooter group, (150; 79.4%) said sometimes a scooter is safer than a bicycle, with 28 (14.8%) answering always.

**Children with head injuries.** Figure four shows the total number of head injuries versus those patients who reported wearing a helmet on a bicycle. Of the 73 children with head injuries in the bicycle only group, 28 (38.4%) said they always wear a helmet while riding their bicycle. Figure five shows the total number of head injuries versus those patients who reported wearing a helmet on a scooter. Of the 73 children with head injuries, 9 (12.3%) said they always wear a helmet while riding their scooter. Twenty (27.4%) patients said they never wear their helmet while riding a bicycle and 12 (16.4%) said they never wear their helmet while riding a scooter.

**Scooter only group.** There were only 10 patients who owned a scooter and not a bicycle. When comparing this group to the bicycle only group: the scooter only group was in a lower income category. One patient said they wear a helmet while riding a scooter.

**Discussion**

Injuries continue to plague our society. Miller stated the increased costs that are a result of childhood injury make it a leading health problem in our children.[10] Almost half, about 40%, of emergency department visits by children are because of some type of injury.[11] It is important for the public to understand that unintentional injuries are a major cause of both morbidity and mortality in the pediatric population.

The study population was composed of a convenience sample. Therefore, not all injuries that presented to the emergency department during the study were sampled. This sample was a young population. Older children may have had injuries, but did not come to the emergency department to have those injuries treated. This population may also be considered high risk because all patients had injuries. There were 399 surveys collected. This and prior studies were retrospective although the number of patients in those studies was smaller. All of the patients had an injury. However, this injury did not occur while riding a bicycle or a scooter, except for a small number. In order the increase the population, the survey was given parents of all injury patients so more information about injuries and the use of protective equipment could be gathered.

Table one represents the sample characteristics of the total survey population. Females were the prodominant parent. Most parents were married, white, had a college or graduate school education, employed, an income level $25,000-62,000, and had insurance. In our study, the emergency department staff had discussed injury risk in a prior visit with about 25% of the

parents. It may be concluded that the parent did not remember the discussion, but even with that factor, the number is still low. The primary care physicians did discuss injury risk in a visit with more parents, just over 50%; again this number can also be improved. We assumed that there was a prior visit. There were two parents that did not answer the question regarding the emergency physicians; and five parents that did not answer the question regarding the primary care physician. These parents may not have had a prior visit to the emergency department or the primary care physician. It may have been more appropriate for us to first ask the parents if they had been to the emergency department or to the primary care physician prior to the date of this visit. The physicians may not be informing the parents that injuries are a large problem; therefore, we cannot expect the parents to be as concerned about this issue as they should be.

We decided to compare patients who owned a bicycle to those patients who owned a bicycle and a scooter. We wanted to find out which group reported using their protective gear more often and if those persons who owned both a scooter and a bicycle used protective gear differently while riding each. The comparison groups had a similar number of patients, 181 versus 189, with similar mean ages for the two groups, 8.5 versus 9.0. The mean ages for starting to ride a bicycle in each group were also similar, 3.8 versus 4.0. Thus, the two groups were similar and comparable. When looking at the data, we chose to look at the categories where the parent/patient reported that the patient never wore protective equipment. This answer was probably more believable. Many persons in surveys answer positively because they think the positive answer is the "correct answer" or the answer that the people in charge want to hear. In my opinion, chances are the negative answers are more likely to be valid.

Table two shows the top injury body part for males was the head; and, for females was the finger. Head injuries continue to occur. Less that half of all children always wear helmets, with only one-third wearing them while using scooters.[12] Children are not wearing their helmets; even though, it has been proven that helmets may prevent up to 88% of head injuries while riding a bicycle.[6] In our study, males who owned only a bicycle were wearing their helmets at about the same rate as those who had both a bicycle and scooter. The males and females in the bicycle and scooter group were wearing their helmets less often while riding a scooter than while riding a bicycle. Most children do not wear knee/elbow/wrist pads while riding a bicycle or a scooter. In our study, most patients who had a head injury wore a helmet while on a bicycle, but did not wear a helmet while on a scooter. The more concerning point is injuries occurring while riding a scooter are increasing.[13, 14] The *Morbidity and Mortality Weekly Report* found the most common injury to be fractures or dislocations to the arm or to the hand.[13,14] The parents may be requesting that the children wear their helmets on a bicycle, but not necessarily on a scooter.

Table four demonstrates that the less experienced bicycle riders, those who rode $\leq 4$ years, in this population, had more injuries. Table six demonstrates similar results for those scooter riders. Experience may play a role in those patients that are being injured. The focus may also need to include those less experienced riders, even though, they may be older.

Table seven demonstrates that there is not a statistically significant difference between males and females wearing protective equipment in the bicycle only group. Most males and females, in the bicycle only group, reported wearing their helmets while riding their bicycle.

Table eight shows that there is a statistically significant difference between males and females reporting to wear a helmet on a bicycle versus a scooter.

The lower income patients were reported to be wearing their helmets less often in the bicycle only group and the bicycle and scooter group. Also, the patients were said to not wear their helmets, in the lower income category, on their scooters. The significant p values in both groups, the bicycle only and the bicycle and scooter, were reflected in the comparison of the low income group and the $130,000-280,000. Although, the relative risk increases in both groups, this is still a small sample size, so the confidence intervals are extremely wide. It may be argued that this group may not be able to afford helmets, thus, their children do not own a helmet to wear. Another alternative is wealthier parents may know what the "right answer" is and give this answer more often than poor parents. This would account for most of the wealthy income, >$130,000, including the 8 of 8 people in the bicycle only, stating they wear a helmet on a bicycle. In the bicycle and scooter group, at the same income level, 14 of 15 reported to wear a helmet while riding a bicycle; and 12 of 15 reported to wear a helmet while riding a scooter. It is important to make sure these lower income families have access to the equipment available for the safety of their children.

Several questions were directed to the opinions of the parents. Many parents were said to supervise their children while riding a bicycle, but said the children were not supervised while they were riding a scooter. Reassuringly, most parents did not let their children ride a bicycle or a scooter at night or in the street. Parents thought that riding a scooter was safer than riding a

bicycle, almost 80% agreed. Parents may not be aware of the dangers of riding a scooter; and therefore, they may think of a scooter as a toy.

Scooters are light, usually weighing less than 10 pounds, and are inexpensive, costing as low as $39. The Canada Safety Council states that the small wheels of the scooter can get caught in potholes or cracks in the street. They suggest riders need skill, proper equipment, and adult supervision.[15] The New York State Attorney General Eliot Spitzer's consumer tips suggest that a child should not ride their scooter at night.[16] In the St. Petersburg Times, Dr. Gregory Gaar stated that most of the scooter injuries he sees are in children who do not have total protection.[17] He feels the children are not paying attention and get easily distracted. In this same article, Mark Ross, a spokesman for the Consumer Product Safety Commission, stated the recommendations include wearing a helmet, and knee and elbow pads, which will prevent a lot of the injuries. Scooters are harder to maneuver and require balance; therefore, many people fall off the scooters relatively easily.

There was only one hospitalization. She was 12 years old and her injury was the result of a dog bite. She was not on a scooter or a bicycle at the time.

Our study, as previous studies, did show that the few injuries observed from scooters and bicycles are not life threatening. The risk of most of these injuries, although not life threatening, may be lowered by wearing protective gear, especially a helmet.

## Limitations

This study was based on a convenience sample; thus parents surveyed may not be a representative of all caretakers of children with injuries. Another limitation, with surveys, is there may be some recall bias. Hopefully, the parents were honest in their answers and able to remember if their children were using protective equipment. Unfortunately, parents may insist their children wear a helmet at home, but parents may not be aware of what their children are doing when they are not at home. Since this is an urban, hospital-based emergency department, the survey population may not be generalizable to other populations.

## Conclusions

The emergency department may be an appropriate setting for future educational interventions about wearing protective gear. The emphasis on education should continue to include bicycle safety and scooter safety in the emergency department.

**Future studies.** Abbott concluded that additional studies are needed to determine how scooter-related injuries can be prevented or minimized.[2] A study including those children that were injured while riding a bicycle versus those that were injured while riding a scooter, may give us a better idea about the injuries that are occurring; therefore, giving us more information so we can educate to help prevent these injuries.

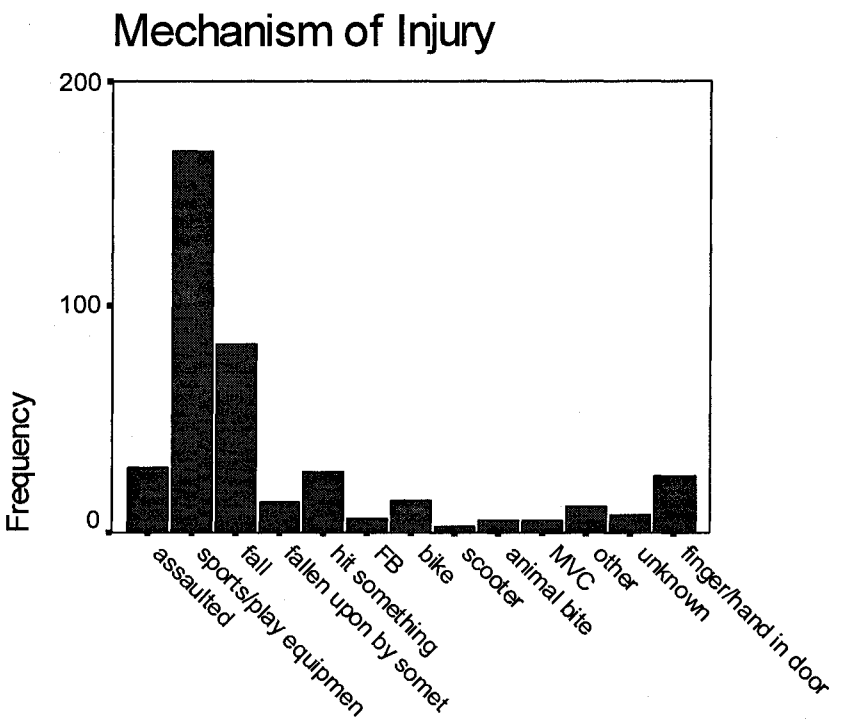
| TABLE ONE | | |
|---|---|---|
| **Sample Characteristics (N=399)** | | |
| | **n** | **%** |
| **Current Age (mean ±SD years) 8.82±3.4** | 399 | 100.0 |
| **Gender of the patient-male** | 255 | 63.9 |
| **Gender of the caretaker-female** | 333 | 83.5 |
| **Marital Status** | | |
| **Single** | 116 | 29.1 |
| **Married** | 217 | 54.4 |
| **Divorced/separated/widowed** | 66 | 16.6 |
| **Race** | | |
| **White** | 243 | 60.9 |
| **Black** | 141 | 35.3 |
| **Other** | 15 | 3.9 |
| **Education (n=398) *** | | |
| **≤High School Education** | 183 | 45.9 |
| **College or Graduate School** | 215 | 53.9 |
| **Employment (n=398) *** | | |
| **Employed** | 268 | 67.2 |
| **Unemployed** | 130 | 32.6 |
| **Income Level** | | |
| **$0-25,000** | 112 | 28.1 |
| **$25,000-62,000** | 141 | 35.3 |
| **≥$62,000** | 101 | 25.3 |
| **Other** | 45 | 11.3 |
| **Insurance (n=398) *** | | |
| **Yes** | 379 | 95.0 |
| **No** | 19 | 4.8 |
| **Has a physician in the ED ever discussed injury risk? (n=397) **** | | |
| **Yes** | 94 | 23.6 |
| **No** | 303 | 75.9 |
| **Has your doctor ever discussed injury risk? (n=394) ***** | | |
| **Yes** | 227 | 56.9 |
| **No** | 167 | 41.9 |

* one respondent did not answer **two respondents did not answer
***five respondents did not answer

**TABLE TWO: INJURIES IN MALES AND FEMALES**

| | MALES (n=255) n (%) | FEMALES (n=144) n (%) |
|---|---|---|
| **HEAD** | 61 (23.9%) | 12 (8.3%) |
| **FACE** | 23 (9.0%) | 13 (9.0%) |
| **FINGER** | 33 (12.9%) | 21 (14.6%) |
| **HAND** | 10 (3.9%) | 8 (5.6%) |
| **WRIST** | 17 (6.7%) | 15 (10.4%) |
| **ELBOW** | 8 (3.1%) | 4 (2.8%) |
| **FOREARM** | 9 (3.5%) | 8 (5.6%) |
| **UPPER ARM** | 2 (0.8%) | 1 (0.7%) |
| **SHOULDER** | 6 (2.4%) | 4 (2.8%) |
| **CHEST** | 0 | 0 |
| **ABDOMEN** | 3 (1.2%) | 3 (2.1%) |
| **THIGH** | 0 | 2 (1.4%) |
| **KNEE** | 19 (7.5%) | 11 (7.6%) |
| **CHIN** | 4 (1.6%) | 4 (2.8%) |
| **LOWER LEG** | 11 (4.3%) | 3 (2.1%) |
| **ANKLE** | 21 (8.2%) | 12 (8.3%) |
| **FOOT** | 15 (5.9%) | 11 (7.6%) |
| **TOE** | 2 (0.8%) | 1 (0.7%) |
| **OTHER** | 11 (4.3%) | 11 (7.6%) |

**FIGURE ONE: DISTRIBUTION OF MECHANISM OF INJURY (n=399) ***



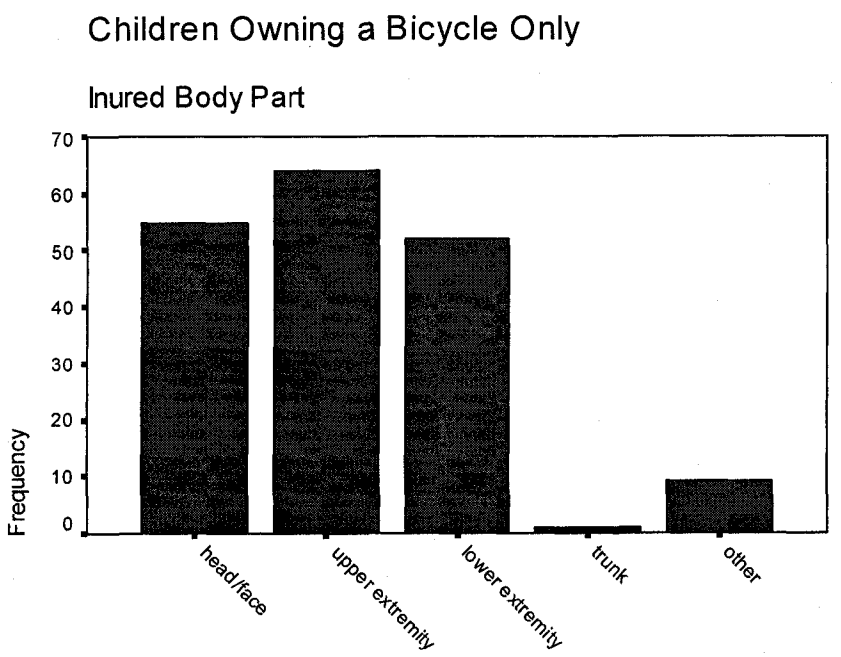

***23 people did not answer this question**

**TABLE THREE: SAMPLE CHARACTERISTICS—
BICYCLE ONLY VERSUS BICYCLE AND SCOOTER**

| | BICYCLE ONLY (n=181) | BICYCLE AND SCOOTER (n=189) |
|---|---|---|
| **MALES** | 108 (59.7%) | 126 (66.7%) |
| **WHITES** | 110 (60.8%) | 124 (65.6%) |
| **BLACKS** | 64 (35.4%) | 60 (31.7%) |
| **AGE—STARTING TO RIDE A BICYCLE (years)** | | |
| **1** | 7 (3.9%) | 3 (1.6%) |
| **2** | 36 (19.9%) | 21 (11.1%) |
| **3** | 48 (26.5%) | 49 (25.9%) |
| **4** | 34 (18.8%) | 43 (22.8%) |
| **5** | 23 (12.7%) | 49 (25.9%) |
| **6** | 18 (9.9%) | 20 (10.6%) |
| **7** | 10 (5.5%) | 3 (1.6%) |
| **8** | 5 (2.8%) | 1 (0.5%) |
| **AGE—STARTING TO RIDE A SCOOTER (years)** | | |
| **1** | N/A | 1 (0.5%) |
| **2** | | 4 (2.1%) |
| **3** | | 6 (3.2%) |
| **4** | | 9 (4.8%) |
| **5** | | 19 (10.1%) |
| **6** | | 22 (11.6%) |
| **7** | | 16 (8.5%) |
| **8** | | 26 (13.8%) |
| **9** | | 25 (13.2%) |
| **10** | | 30 (15.9%) |
| **11** | | 15 (7.9%) |
| **12** | | 11 (5.8%) |
| **13** | | 4 (2.1%) |
| **14** | | 1 (0.5%) |

**FIGURE TWO: DISTRIBUTION OF INJURED BODY PART**

**Bicycle Only (n=181)** **Bicycle and Scooter (n=189)**



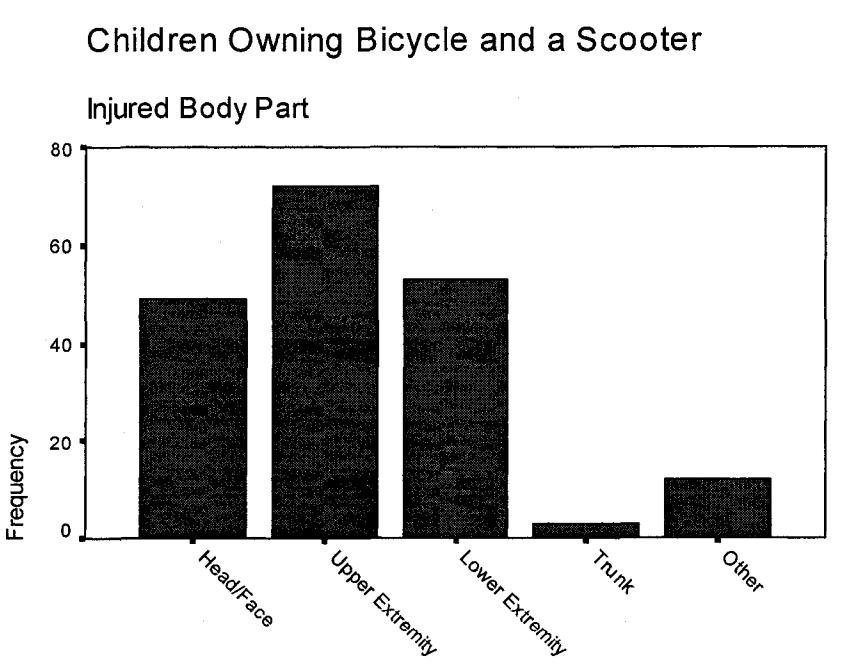



**TABLE FOUR: WHEN PATIENTS REPORTED STARTING TO RIDE A BICYCLE VERSUS HOW LONG PATIENTS REPORTED RIDING A BICYCLE— BICYCLE ONLY GROUP (n=104 of 181; 57.5%)**

| HOW LONG RIDING | AGE ONE | AGE TWO | AGE THREE | AGE FOUR |
|---|---|---|---|---|
| **0** | 0 (0.0%) | 1 (0.6%) | 6 (3.3%) | 1 (0.6%) |
| **1** | 0 (0.0%) | 10 (5.5%) | 11 (6.1%) | 6 (3.3%) |
| **2** | 2 (1.1%) | 5 (2.76%) | 7 (3.9%) | 3 (1.7%) |
| **3** | 3 (1.7%) | 0 (0.0%) | 0 (0.0%) | 5 (2.8%) |
| **4** | 0 (0.0%) | 6 (3.3%) | 3 (1.7%) | 4 (2.2%) |

| HOW LONG RIDING | AGE FIVE | AGE SIX | AGE SEVEN | AGE EIGHT |
|---|---|---|---|---|
| **0** | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| **1** | 4 (2.2%) | 1 (0.6%) | 1 (0.6%) | 1 (0.6%) |
| **2** | 5 (2.8%) | 1 (0.6%) | 2 (1.1%) | 1 (0.6%) |
| **3** | 3 (1.7%) | 2 (1.1%) | 1 (0.6%) | 2 (1.1%) |
| **4** | 2 (1.1%) | 2 (1.1%) | 2 (1.1%) | 1 (0.6%) |

**TABLE FIVE: WHEN PATIENTS REPORTED STARTING TO RIDE A BICYCLE VERSUS HOW LONG PATIENTS REPORTED RIDING A BICYCLE— BICYCLE AND SCOOTER GROUP (n=82 of 189; 43.4%)**

| HOW LONG RIDING | AGE ONE | AGE TWO | AGE THREE | AGE FOUR |
|---|---|---|---|---|
| **0** | 0 (0.0%) | 1 (0.5%) | 2 (1.1%) | 0 (0.0%) |
| **1** | 0 (0.0%) | 1 (0.5%) | 1 (0.5%) | 0 (0.0%) |
| **2** | 1 (0.5%) | 2 (1.1%) | 10 (5.3%) | 6 (3.2%) |
| **3** | 0 (0.0%) | 3 (1.6%) | 6 (3.2%) | 7 (3.7%) |
| **4** | 0 (0.0%) | 3 (1.6%) | 3 (1.6%) | 4 (2.1%) |

| HOW LONG RIDING | AGE FIVE | AGE SIX | AGE SEVEN | AGE EIGHT |
|---|---|---|---|---|
| **0** | 0 (0.0%) | 2 (1.6%) | 0 (0.0%) | 0 (0.0%) |
| **1** | 3 (1.6%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| **2** | 2 (1.1%) | 3 (1.6%) | 1 (0.5%) | 0 (0.0%) |
| **3** | 2 (1.1%) | 2 (1.1%) | 0 (0.0%) | 0 (0.0%) |
| **4** | 9 (4.8%) | 8 (4.2%) | 0 (0.0%) | 0 (0.0%) |

**TABLE SIX: WHEN PATIENTS REPORTED STARTING TO RIDE A SCOOTER VERSUS HOW LONG PATIENTS REPORTED RIDING A SCOOTER— BICYCLE AND SCOOTER GROUP (n=104 of 189; 55%)**

| HOW LONG RIDING | AGE ONE | AGE TWO | AGE THREE | AGE FOUR |
|---|---|---|---|---|
| 0 | 0 (0.0%) | 1 (0.5%) | 1 (0.5%) | 0 (0.0%) |
| 1 | 0 (0.0%) | 3 (1.6%) | 3 (1.6%) | 5 (2.7%) |
| 2 | 0 (0.0%) | 0 (0.0%) | 1 (0.5%) | 4 (2.1%) |
| 3 | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| 4 | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |

| HOW LONG RIDING | AGE FIVE | AGE SIX | AGE SEVEN | AGE EIGHT |
|---|---|---|---|---|
| 0 | 7 (3.7%) | 6 (3.2%) | 5 (2.7%) | 1 (0.5%) |
| 1 | 10 (5.3%) | 12 (6.4%) | 6 (3.2%) | 17 (9.0%) |
| 2 | 1 (0.5%) | 2 (1.1%) | 4 (2.1%) | 7 (3.7%) |
| 3 | 0 (0.0%) | 2 (1.1%) | 1 (0.5%) | 1 (0.5%) |
| 4 | 1 (0.5%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |

**TABLE SEVEN: BICYCLE ONLY GROUP—PARENTS REPORTED PATIENT'S WEARING PROTECTIVE EQUIPMENT**

| | MALE (n=108) | FEMALE (n=73) | P VALUE |
|---|---|---|---|
| **HELMET:** | | | |
| **YES** | 67 (62.0%) | 46 (63.0%) | 0.89 |
| **NO** | 41 (38.0%) | 27 (37.0%) | |
| **KNEE PADS:** | | | |
| **YES** | 15 (13.9%) | 15 (20.5%) | 0.24 |
| **NO** | 93 (86.1%) | 58 (79.5%) | |
| **ELBOW PADS:** | | | |
| **YES** | 11 (10.2%) | 14 (19.2%) | 0.09 |
| **NO** | 97 (89.8%) | 59 (80.8%) | |
| **WRIST PADS:** | | | |
| **YES** | 7 (6.5%) | 5 (6.8%) | 0.92 |
| **NO** | 101 (93.5%) | 68 (93.2%) | |

**TABLE EIGHT: BICYCLE AND SCOOTER GROUP— PARENTS REPORTED PATIENT'S WEARING PROTECTIVE EQUIPMENT**

| | MALES (n=126) | MALES (n=126) | P VALUE | FEMALES (n=63) * | FEMALES (n=63) | P VALUE |
|---|---|---|---|---|---|---|
| | BICYCLE | SCOOTER | | BICYCLE | SCOOTER | |
| **HELMET:** | | | | | | |
| **YES** | 87 (69.0%) | 64 (50.8%) | **0.003** | 45 (71.4%) | 32 (50.8%) | **0.01** |
| **NO** | 39 (31.0%) | 62 (49.2%) | | 17 (27.0%) | 31 (49.2%) | |
| **KNEE PADS:** | | | | | | |
| **YES** | 21 (16.7%) | 26 (20.6%) | 0.42 | 9 (14.3%) | 12 (19.0%) | 0.50 |
| **NO** | 105 (83.3%) | 16 (12.7%) | | 53 (84.1%) | 51 (81.0%) | |
| **ELBOW PADS:** | | | | | | |
| **YES** | 19 (15.1%) | 20 (15.9%) | 0.86 | 11 (17.4%) | 12 (19.0%) | 0.85 |
| **NO** | 107 (84.9%) | 106 (84.1%) | | 51 (81.0%) | 51 (81.0%) | |
| **WRIST PADS:** | | | | | | |
| **YES** | 8 (6.3%) | 11 (8.7%) | 0.47 | 8 (12.7%) | 8 (12.7%) | 0.97 |
| **NO** | 118 (93.7%) | 115 (91.3%) | | 54 (85.7%) | 55 (87.3%) | |

*** One person did not answer**

**For the significant P values from the above table:**

**p=0.003 with OR= 2.2 and 95% Confidence Interval (1.3, 3.6) for males**

**p=0.01 with OR=2.6 and 95% Confidence Interval (1.2, 5.5) for females**

**TABLE NINE: BICYCLE ONLY GROUP—PARENTS REPORTED INCOME VERSUS REPORTED WEARING A HELMET (n=181)**

| | $0-25,000 | $25,000-62,000 | $62,000-130,000 | $130,000-280,000 | >$280,000 |
|---|---|---|---|---|---|
| **INCOME** | 53 (29.3%) | 63 (34.8%) | 35 (19.3%) | 7 (3.9%) | 1 (0.6%) |
| **HELMET:** | | | | | |
| **YES** | 31 (58.5%) | 38 (60.3%) | 25 (71.4%) | 7 (100.0%) | 1 (100.0%) |
| **NO** | 22 (41.5%) | 25 (39.7%) | 10 (28.6%) | 0 (0.0%) | 0 (0.0%) |

**** 22 People did not answer this question**

**P Values and Odds Ratio with 95% Confidence Interval comparing all income groups to lowest income group for helmet use, yes versus no:**

| | P | OR (95% CI) |
|---|---|---|
| **$0-25,000 and $25,000-62,000** | 0.84 | 0.93 (0.44, 1.95) |
| **$0-25,000 and $62,000-130,000** | 0.22 | 0.56 (0.23, 1.41) |

**TABLE TEN: BICYCLE AND SCOOTER GROUP—PARENT'S REPORTED INCOME VERSUS REPORTED WEARING A HELMET (n=189)**

| | $0-25,000 | $25,000-62,000 | $62,000-130,000 | $130,000-280,000 | >$280,000 |
|---|---|---|---|---|---|
| **INCOME** | 43 (22.8%) | 70 (37.0%) | 42 (22.2%) | 12 (6.3%) | 3 (1.6%) |
| **HELMET--BICYCLE:** | | | | | |
| **YES** | 23 (53.5%) * | 44 (62.9%) | 37 (88.1%) | 12 (100.0%) | 2 (66.6%) |
| **NO** | 19 (44.2%) | 26 (37.1%) | 5 (11.9%) | 0 (0.0%) | 1 (33.3%) |
| **HELMET—SCOOTER:** | | | | | |
| **YES** | 14 (32.6%) | 30 (42.9%) | 29 (69.0%) | 10 (83.3%) | 2 (66.6%) |
| **NO** | 29 (67.4%) | 40 (57.1%) | 13 (31.0%) | 2 (16.7%) | 1 (33.3%) |

****19 people did not answer this question**
*** One person did not answer**

**P Values and Odds Ratio with 95% Confidence Interval comparing all income groups to lowest income group-- Helmet on bicycle, yes versus no:**

| | P | OR (95% CI) |
|---|---|---|
| **$0-25,000 and $25,000-62,000** | 0.40 | 1.4 (0.64, 3.0) |
| **$0-25,000 and $62,000-130,000** | **0.0007** | **6.1 (2.0, 18.6)** |

**Helmet on scooter, yes versus no:**

| | P | OR (95% CI) |
|---|---|---|
| **$0-25,000 and $25,000-62,000** | 0.28 | 1.6 (0.7, 3.4) |
| **$0-25,000 and $62,000-130,000** | **0.0008** | **4.6 (1.9, 11.5)** |

**TABLE ELEVEN: PARENT'S OPINION ON SIX QUESTIONS ***

QUESTIONS FROM APPENDIX A:

My child rides his/her bicycle without adult supervision?—Question 29
My child rides his/her scooter without adult supervision?—Question 39
My child rides his/her bicycle at night—Question 30
My child rides his/her scooter at night—Question 40
My child rides his/her bicycle in the street—Question 31
My child rides his/her scooter in the street—Question 41

| | **RIDING A BICYCLE (n=369)** | **RIDING A SCOOTER ** (n=199)** | **P VALUE** |
|---|---|---|---|
| **ADULT SUPERVISION:** | | | |
| **YES** | 234 (58.7%) | 136 (34.1%) | 0.24 |
| **NO** | 135 (33.8%) | 63 (15.8%) | |
| **RIDING AT NIGHT:** | | | |
| **YES** | 34 (8.6%) | 19 (4.9%) | 0.90 |
| **NO** | 335 (84.0%) | 180 (45.1%) | |
| **RIDING IN THE STREET:** | | | |
| **YES** | 158 (39.6%) | 77 (19.3%) | 0.34 |
| **NO** | 211 (52.9%) | 122 (30.6%) | |

***30 people did not answer ** (19 people without scooter and 181 bicycle only)**

**FIGURE THREE: PARENT'S OPINION—RIDING A SCOOTER IS SAFER THAN RIDING A BICYCLE?**

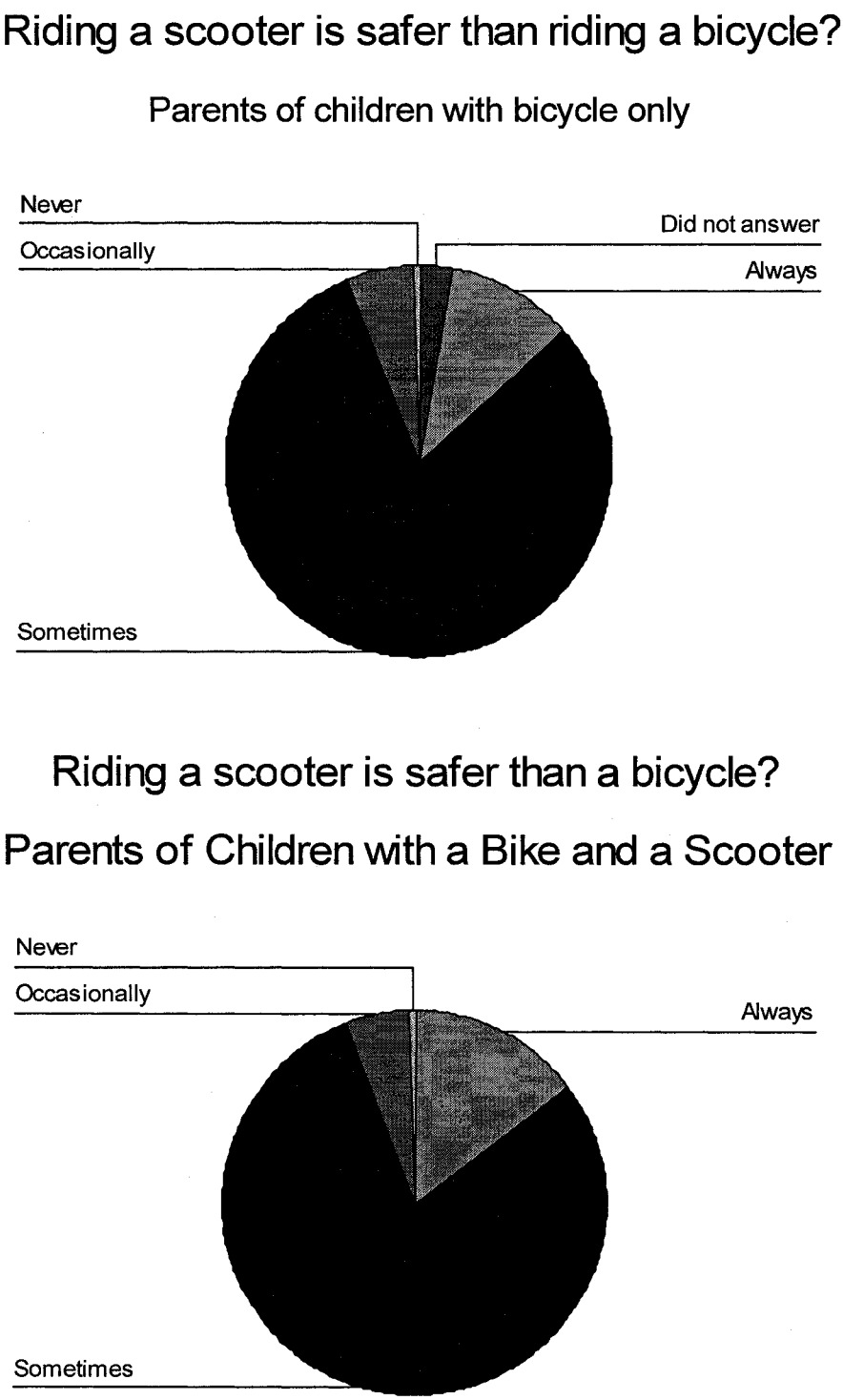


**FIGURE FOUR: HEAD INJURIES (N=73) REPORTED WEARING A HELMET— WHILE RIDING A BICYCLE? ***3 people did not answer (n=70)**

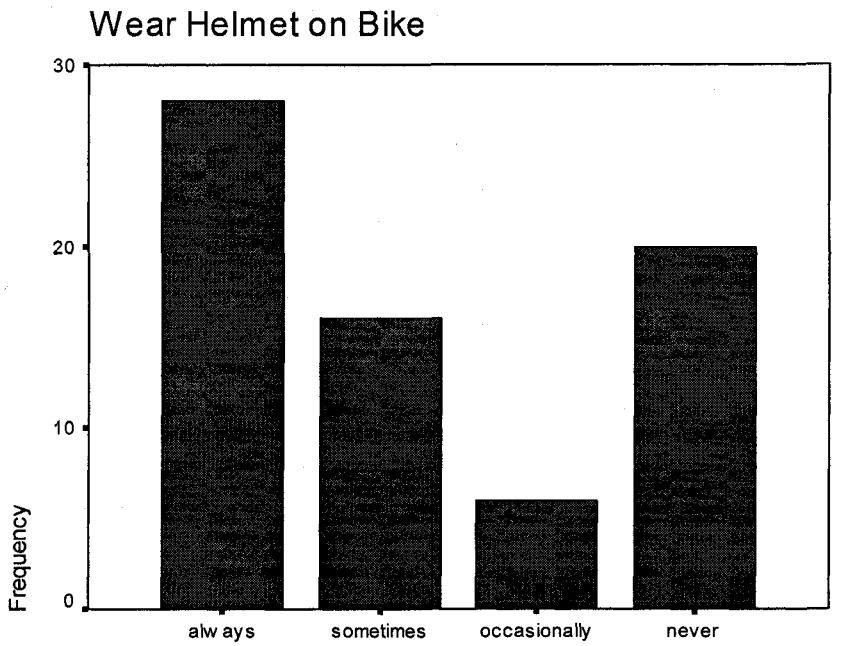
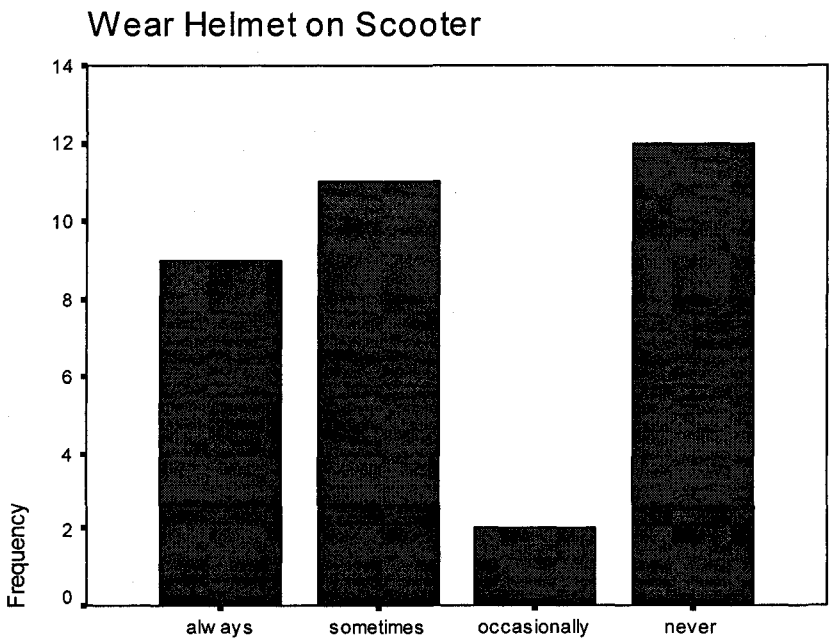



**FIGURE FIVE: HEAD INJURIES (N=73) REPORTED WEARING A HELMET— WHILE RIDING A SCOOTER ***39 people did not answer (n=34)**



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# APPENDICES

# APPENDIX A

# DATA COLLECTION

# QUESTIONNAIRE

Verbal consent obtained by: _____

Study number: _____

HISTORICAL INFORMATION/IDENTIFICATION: ___ (1)

Patient Name : _____

MR number: ___ ___ ___ ___ ___ ___ (2)

Date of birth: ___/___/___ (3)

Date of Visit: ___/___/___ (4)

Sex of patient 1 =male 2=female ___ (5)

Time of visit (military): ___:___ (6)

PMD: 1 =yes 2=no 3=clinic ___ (7)

Insurance type: ___ ___ ___ (8)

Age (months): ___ ___ (9)

How old is the patient? _____Years ___ (10)

How old is the caregiver? _____Years ___ (11)

Sex of the caregiver? 1=male 2=female ___ ___ (12)

Please identify yourself as one of the following:
1 =CaucasianlWhite 2=African American 3=Hispanic 4=Asian 5=Other ___ (13)

What is the highest level of education that you have completed? ___ (14)
1 =Junior high grade finished
2=High school grade finished
3=College grade finished
4=Graduate school- grade finished

What is your marital status? 1 =Single 2=Married 3=Divorced/separated 4=widowed ___ (15)

Are you currently employed? 1 =Yes 2=No ___ (16)

What is your household income? 1 =$0-$25,000 -( 17)
2=$25,001-$62,000
3=$62,001-$130,000
4=$130,001-$280,000
5=over $280,001

Does your child have a private pediatrician? 1 =Yes Name/Clinic _____ __ (18)

2=No

Has your private pediatrician ever counseled you about the risk of injuries in children? 1 =Yes ___( 19)
2=No

Has the emergency department ever counseled you about the risk of injuries in children? 1 =Yes __ (20)

2=No

Do you have health insurance? 1 =Yes, Medicare/Medicaid __ ( 21 )

2=Yes, HMO

3=No

Does your child have a bicycle/tricycle? 1 =Yes 2=No __ ( 22 )

What age was your child when they started to ride a bicycle? _____Years ___ ( 23 )

How long has your child had a bicycle? _____Years __ __(24)

My child wears a helmet when he/she rides a bicycle? ( 25 )

1 =Always 2=Sometimes 3=Occasionally 4=Never

My child wears knee pads when he/she rides a bicycle? __ _( 26 )

1 =Always 2=Sometimes 3=Occasionally 4=Never

My child wears elbow pads when he/she rides a bicycle? __ _( 27 )

1 =Always 2=Sometimes 3=Occasionally 4=Never

My child wears wrist pads when he/she rides a bicycle? ___ ( 28 )

1 =Always 2=Sometimes 3=Occasionally 4=Never

My child rides his/her bicycle without adult supervision? ___( 29 )

1 =Always 2=Sometimes 3=Occasionally 4=Never

My child rides his/her bicycle at night? ___( 30 )

1 =Always 2=Sometimes 3=Occasionally 4=Never

My child rides his/her bicycle in the street? ___( 31 )

1 =Always 2=Sometimes 3=Occasionally 4=Never

Does your child have a scooter? 1 =Yes, motorized ___ (32)
2=Yes, non-motorized
3=No

What age was your child when they started to ride a scooter? _____Years ___ ( 33 )

How long has your child had a scooter? _____Years ___ (34)

My child wears a helmet when he/she rides a scooter? ___ ( 35 )

1 =Always 2=Sometimes 3=Occasionally 4=Never

My child wears knee pads when he/she rides a scooter? _ __( 36 )

1 =Always 2=Sometimes 3=Occasionally 4=Never

My child wears elbow pads when he/she rides a scooter? ___ ( 37 )

1 =Always 2=Sometimes 3=Occasionally 4=Never

My child wears wrist pads when he/she rides a scooter? _ __( 38 )

1 =Always 2=Sometimes 3=Occasionally 4=Never

My child rides his/her scooter without adult supervision? ___( 39 )

1 =Always 2=Sometimes 3=Occasionally 4=Never

My child rides his/her scooter at night? ___( 40 )

1 =Always 2=Sometimes 3=Occasionally 4=Never

My child rides his/her scooter in the street? ___ (41 )

1 =Always 2=Sometimes 3=Occasionally 4=Never

Riding a scooter is safer than riding a bicycle? 1 =Always 2=Sometimes 3=Occasionally 4=Never ___(42 )

What was the body part that was injured? ___(43)

1=head
2=face
3=finger
4=hand
5=wrist
6=elbow
7=forearm
8=upper arm
9=shoulder
10=chest
11=abdomen
12=thigh
13=knee
14=chin
15=lower leg
16=ankle
17=foot
18=toe
19=other _____

How did the injury happen?

_____

_____

Where did the injury happen? ___( 44 )

1 =Home
2=Neighbor
3=Friend
4=Relative
5=Other-

What type of injury occurred?

1 =sprain/strain
2=muscular
3=fracture
4=laceration
5=abrasion
6=mild head injury
7=other

___ ( 45 )

What time of day did the injury occur?

1 =morning (7 am-12pm)
2=afternoon (12pm-5pm)
3=evening (5pm-10 pm)
4=nighttime (10pm-7am)

___ ( 46 )

Temperature ___.__ (47)

Heart Rate ___ (48)

Respiratory Rate ___ ( 49 )

GCS ___( 50 )

Any x-rays obtained?

1 =Yes
2=No

___ ( 51)

If there were x-rays taken, what were the official reading(s)? _____ ___( 52 )

_____

Hospitalized

1=Yes, 23 hour admit
2=Yes. floor admit
3=Yes, ICU admit
4=No

___(53)

If hospitalized, how long was the stay? _____ days ___( 54 )

If not admitted, outpatient follow-up

1 =see physician in morning
2=see physician in a few days
3=see physician PRN
4=No follow up scheduled

___( 55 )

What was the final diagnosis? _____ ___ ( 56 )

# APPENDIX B

## STATISTICAL INPUT DATA

## SPSS

**Notes**

| | | |
|---|---|---|
| Output Created | | 26-JUL-2003 15:10:22 |
| Comments | | |
| Input | Data | G:\Allen\Scooter Study\Scooter 4_8_02 ALL 399.sav |
| | Filter | <none> |
| | Weight | <none> |
| | Split File | <none> |
| | N of Rows in Working Data File | 399 |
| Missing Value Handling | Definition of Missing | User-defined missing values are treated as missing. |
| | Cases Used | Statistics are based on all cases with valid data. |
| Syntax | | FREQUENCIES VARIABLES=pmdrisk edrisk insur1 sex gsex ethnic educ marital employ income hosp /ORDER= ANALYSIS . |
| Resources | Elapsed Time | 0:00:00.10 |
| | Total Values Allowed | 149796 |

**Notes**

| | | |
|---|---|---|
| Output Created | | 19-JUL-2003 11:34:48 |
| Comments | | |
| Input | Data | G:\Allen\Scooter Study\Scooter 4_8_02 ALL 399.sav |
| | Filter | sex = 1 (FILTER) |
| | Weight | <none> |
| | Split File | <none> |
| | N of Rows in Working Data File | 255 |
| Missing Value Handling | Definition of Missing | User-defined missing values are treated as missing. |
| | Cases Used | Statistics are based on all cases with valid data. |
| Syntax | | FREQUENCIES VARIABLES=injury /ORDER= ANALYSIS . |
| Resources | Elapsed Time | 0:00:00.11 |
| | Total Values Allowed | 149796 |

**Notes**

| | | |
|---|---|---|
| Output Created | | 18-JUL-2003 10:13:29 |
| Comments | | |
| Input | Data | G:\Allen\Scooter Study\Scooter 4_8_02 ALL 399.sav |
| | Filter | sex = 2 (FILTER) |
| | Weight | <none> |
| | Split File | <none> |
| | N of Rows in Working Data File | 144 |
| Missing Value Handling | Definition of Missing | User-defined missing values are treated as missing. |
| | Cases Used | Statistics are based on all cases with valid data. |
| Syntax | | FREQUENCIES VARIABLES=injury injury2 injury3 injury1 hosp los dx /BARCHART FREQ /ORDER= ANALYSIS . |
| Resources | Elapsed Time | 0:00:00.07 |
| | Total Values Allowed | 149796 |

**Notes**

| | | |
|---|---|---|
| Output Created | | 26-JUL-2003 12:03:35 |
| Comments | | |
| Input | Data | G:\Allen\Scooter Study\Scooter 4_8_02 ALL 399.sav |
| | Filter | <none> |
| | Weight | <none> |
| | Split File | <none> |
| | N of Rows in Working Data File | 399 |
| Missing Value Handling | Definition of Missing | User-defined missing values are treated as missing. |
| | Cases Used | Statistics are based on all cases with valid data. |
| Syntax | | FREQUENCIES VARIABLES=newmech /BARCHART FREQ /ORDER= ANALYSIS . |
| Resources | Elapsed Time | 0:00:00.22 |
| | Total Values Allowed | 149796 |

**Notes**

| | | |
|---|---|---|
| Output Created | | 20-JUL-2003 12:05:42 |
| Comments | | |
| Input | Data | G:\Allen\Scooter Study\bike only 4_8_02 181.sav |
| | Filter | <none> |
| | Weight | <none> |
| | Split File | <none> |
| | N of Rows in Working Data File | 181 |
| Missing Value Handling | Definition of Missing | User-defined missing values are treated as missing. |
| | Cases Used | Statistics are based on all cases with valid data. |
| Syntax | | FREQUENCIES VARIABLES=injury /PIECHART FREQ /ORDER= ANALYSIS . |
| Resources | Elapsed Time | 0:00:00.17 |
| | Total Values Allowed | 149796 |

**Notes**

| | | |
|---|---|---|
| Output Created | | 20-JUL-2003 12:22:19 |
| Comments | | |
| Input | Data | G:\Allen\Scooter Study\bike and scooter 4_8_02 189.sav |
| | Filter | <none> |
| | Weight | <none> |
| | Split File | <none> |
| | N of Rows in Working Data File | 189 |
| Missing Value Handling | Definition of Missing | User-defined missing values are treated as missing. |
| | Cases Used | Statistics are based on all cases with valid data. |
| Syntax | | FREQUENCIES VARIABLES=injury /BARCHART FREQ /ORDER= ANALYSIS . |
| Resources | Elapsed Time | 0:00:00.10 |
| | Total Values Allowed | 149796 |

**Notes**

| | | |
|---|---|---|
| Output Created | | 18-JUL-2003 10:27:01 |
| Comments | | |
| Input | Data | G:\Allen\Scooter Study\bike only 4_8_02 181.sav |
| | Filter | <none> |
| | Weight | <none> |
| | Split File | <none> |
| | N of Rows in Working Data File | 181 |
| Missing Value Handling | Definition of Missing | User-defined missing values are treated as missing. |
| | Cases Used | Statistics are based on all cases with valid data. |
| Syntax | | FREQUENCIES VARIABLES=sex ethnic ptage agebike injury injury2 injury3 injury1 hosp /ORDER= ANALYSIS . |
| Resources | Elapsed Time | 0:00:00.06 |
| | Total Values Allowed | 149796 |

**Notes**

| | | |
|---|---|---|
| Output Created | | 18-JUL-2003 10:36:30 |
| Comments | | |
| Input | Data | G:\Allen\Scooter Study\bike and scooter 4_8_02 189.sav |
| | Filter | <none> |
| | Weight | <none> |
| | Split File | <none> |
| | N of Rows in Working Data File | 189 |
| Missing Value Handling | Definition of Missing | User-defined missing values are treated as missing. |
| | Cases Used | Statistics are based on all cases with valid data. |
| Syntax | | FREQUENCIES VARIABLES=sex ethnic ptage agebike injury injury2 injury3 injury1 hosp /ORDER= ANALYSIS . |
| Resources | Elapsed Time | 0:00:00.09 |
| | Total Values Allowed | 149796 |

**Notes**

| | | |
|---|---|---|
| Output Created | | 18-JUL-2003 10:31:03 |
| Comments | | |
| Input | Data | G:\Allen\Scooter Study\bike only 4_8_02 181.sav |
| | Filter | sex = 1 (FILTER) |
| | Weight | <none> |
| | Split File | <none> |
| | N of Rows in Working Data File | 108 |
| Missing Value Handling | Definition of Missing | User-defined missing values are treated as missing. |
| | Cases Used | Statistics are based on all cases with valid data. |
| Syntax | | FREQUENCIES VARIABLES=helmet knee elbow wrist helmet1 knee1 elbow1 wrist1 /ORDER= ANALYSIS . |
| Resources | Elapsed Time | 0:00:00.08 |
| | Total Values Allowed | 149796 |

**Notes**

| | | |
|---|---|---|
| Output Created | | 18-JUL-2003 10:32:23 |
| Comments | | |
| Input | Data | G:\Allen\Scooter Study\bike only 4_8_02 181.sav |
| | Filter | sex = 2 (FILTER) |
| | Weight | <none> |
| | Split File | <none> |
| | N of Rows in Working Data File | 73 |
| Missing Value Handling | Definition of Missing | User-defined missing values are treated as missing. |
| | Cases Used | Statistics are based on all cases with valid data. |
| Syntax | | FREQUENCIES VARIABLES=helmet knee elbow wrist helmet1 knee1 elbow1 wrist1 /ORDER= ANALYSIS . |
| Resources | Elapsed Time | 0:00:00.07 |
| | Total Values Allowed | 149796 |

**Notes**

| | | |
|---|---|---|
| Output Created | | 18-JUL-2003 10:40:59 |
| Comments | | |
| Input | Data | G:\Allen\Scooter Study\bike and scooter 4_8_02 189.sav |
| | Filter | sex = 1 (FILTER) |
| | Weight | <none> |
| | Split File | <none> |
| | N of Rows in Working Data File | 126 |
| Missing Value Handling | Definition of Missing | User-defined missing values are treated as missing. |
| | Cases Used | Statistics are based on all cases with valid data. |
| Syntax | | FREQUENCIES VARIABLES=helmet knee elbow wrist helmet1 knee1 elbow1 wrist1 /STATISTICS=RANGE MEAN /ORDER= ANALYSIS . |
| Resources | Elapsed Time | 0:00:00.07 |
| | Total Values Allowed | 149796 |

**Notes**

| | | |
|---|---|---|
| Output Created | | 18-JUL-2003 10:42:29 |
| Comments | | |
| Input | Data | G:\Allen\Scooter Study\bike and scooter 4_8_02 189.sav |
| | Filter | sex = 2 (FILTER) |
| | Weight | <none> |
| | Split File | <none> |
| | N of Rows in Working Data File | 63 |
| Missing Value Handling | Definition of Missing | User-defined missing values are treated as missing. |
| | Cases Used | Statistics are based on all cases with valid data. |
| Syntax | | FREQUENCIES VARIABLES=helmet knee elbow wrist helmet1 knee1 elbow1 wrist1 /STATISTICS=RANGE MEAN /ORDER= ANALYSIS . |
| Resources | Elapsed Time | 0:00:00.07 |
| | Total Values Allowed | 149796 |

**Notes**

| | | |
|---|---|---|
| Output Created | | 18-JUL-2003 10:52:30 |
| Comments | | |
| Input | Data | G:\Allen\Scooter Study\bike only 4_8_02 181.sav |
| | Filter | <none> |
| | Weight | <none> |
| | Split File | <none> |
| | N of Rows in Working Data File | 181 |
| Missing Value Handling | Definition of Missing | User-defined missing values are treated as missing. |
| | Cases Used | Statistics are based on all cases with valid data. |
| Syntax | | FREQUENCIES VARIABLES=income /ORDER= ANALYSIS . |
| Resources | Elapsed Time | 0:00:00.08 |
| | Total Values Allowed | 149796 |

**Notes**

| | | |
|---|---|---|
| Output Created | | 18-JUL-2003 10:52:30 |
| Comments | | |
| Input | Data | G:\Allen\Scooter Study\bike only 4_8_02 181.sav |
| | Filter | <none> |
| | Weight | <none> |
| | Split File | <none> |
| | N of Rows in Working Data File | 181 |
| Missing Value Handling | Definition of Missing | User-defined missing values are treated as missing. |
| | Cases Used | Statistics are based on all cases with valid data. |
| Syntax | | FREQUENCIES VARIABLES=income /ORDER= ANALYSIS . |
| Resources | Elapsed Time | 0:00:00.08 |
| | Total Values Allowed | 149796 |

**Notes**

| | | |
|---|---|---|
| Output Created | | 18-JUL-2003 10:54:58 |
| Comments | | |
| Input | Data | G:\Allen\Scooter Study\bike only 4_8_02 181.sav |
| | Filter | income = 2 (FILTER) |
| | Weight | <none> |
| | Split File | <none> |
| | N of Rows in Working Data File | 63 |
| Missing Value Handling | Definition of Missing | User-defined missing values are treated as missing. |
| | Cases Used | Statistics are based on all cases with valid data. |
| Syntax | | FREQUENCIES VARIABLES=helmet helmet1 /ORDER= ANALYSIS . |
| Resources | Elapsed Time | 0:00:00.07 |
| | Total Values Allowed | 149796 |

**Notes**

| | | |
|---|---|---|
| Output Created | | 18-JUL-2003 10:56:03 |
| Comments | | |
| Input | Data | G:\Allen\Scooter Study\bike only 4_8_02 181.sav |
| | Filter | income = 3 (FILTER) |
| | Weight | <none> |
| | Split File | <none> |
| | N of Rows in Working Data File | 35 |
| Missing Value Handling | Definition of Missing | User-defined missing values are treated as missing. |
| | Cases Used | Statistics are based on all cases with valid data. |
| Syntax | | FREQUENCIES VARIABLES=helmet helmet1 /ORDER= ANALYSIS . |
| Resources | Elapsed Time | 0:00:00.07 |
| | Total Values Allowed | 149796 |

**Notes**

| | | |
|---|---|---|
| Output Created | | 18-JUL-2003 10:56:49 |
| Comments | | |
| Input | Data | G:\Allen\Scooter Study\bike only 4_8_02 181.sav |
| | Filter | income = 4 (FILTER) |
| | Weight | <none> |
| | Split File | <none> |
| | N of Rows in Working Data File | 7 |
| Missing Value Handling | Definition of Missing | User-defined missing values are treated as missing. |
| | Cases Used | Statistics are based on all cases with valid data. |
| Syntax | | FREQUENCIES VARIABLES=helmet helmet1 /ORDER= ANALYSIS . |
| Resources | Elapsed Time | 0:00:00.07 |
| | Total Values Allowed | 149796 |

**Notes**

| | | |
|---|---|---|
| Output Created | | 26-JUL-2003 15:41:04 |
| Comments | | |
| Input | Data | G:\Allen\Scooter Study\bike only 4_8_02 181.sav |
| | Filter | income = 5 (FILTER) |
| | Weight | <none> |
| | Split File | <none> |
| | N of Rows in Working Data File | 1 |
| Missing Value Handling | Definition of Missing | User-defined missing values are treated as missing. |
| | Cases Used | Statistics are based on all cases with valid data. |
| Syntax | | FREQUENCIES VARIABLES=helmet helmet1 /ORDER= ANALYSIS . |
| Resources | Elapsed Time | 0:00:00.07 |
| | Total Values Allowed | 149796 |

**Notes**

| | | |
|---|---|---|
| Output Created | | 19-JUL-2003 13:12:33 |
| Comments | | |
| Input | Data | G:\Allen\Scooter Study\bike and scooter 4_8_02 189.sav |
| | Filter | <none> |
| | Weight | <none> |
| | Split File | <none> |
| | N of Rows in Working Data File | 189 |
| Missing Value Handling | Definition of Missing | User-defined missing values are treated as missing. |
| | Cases Used | Statistics are based on all cases with valid data. |
| Syntax | | FREQUENCIES VARIABLES=income /ORDER= ANALYSIS . |
| Resources | Elapsed Time | 0:00:00.07 |
| | Total Values Allowed | 149796 |

**Notes**

| | | |
|---|---|---|
| Output Created | | 18-JUL-2003 10:46:48 |
| Comments | | |
| Input | Data | G:\Allen\Scooter Study\bike and scooter 4_8_02 189.sav |
| | Filter | income = 1 (FILTER) |
| | Weight | <none> |
| | Split File | <none> |
| | N of Rows in Working Data File | 43 |
| Missing Value Handling | Definition of Missing | User-defined missing values are treated as missing. |
| | Cases Used | Statistics are based on all cases with valid data. |
| Syntax | | FREQUENCIES VARIABLES=helmet helmet1 /ORDER= ANALYSIS . |
| Resources | Elapsed Time | 0:00:00.07 |
| | Total Values Allowed | 149796 |

**Notes**

| | | |
|---|---|---|
| Output Created | | 18-JUL-2003 10:47:53 |
| Comments | | |
| Input | Data | G:\Allen\Scooter Study\bike and scooter 4_8_02 189.sav |
| | Filter | income = 2 (FILTER) |
| | Weight | <none> |
| | Split File | <none> |
| | N of Rows in Working Data File | 70 |
| Missing Value Handling | Definition of Missing | User-defined missing values are treated as missing. |
| | Cases Used | Statistics are based on all cases with valid data. |
| Syntax | | FREQUENCIES VARIABLES=helmet helmet1 /ORDER= ANALYSIS . |
| Resources | Elapsed Time | 0:00:00.07 |
| | Total Values Allowed | 149796 |

**Notes**

| | | |
|---|---|---|
| Output Created | | 18-JUL-2003 10:49:04 |
| Comments | | |
| Input | Data | G:\Allen\Scooter Study\bike and scooter 4_8_02 189.sav |
| | Filter | income = 3 (FILTER) |
| | Weight | <none> |
| | Split File | <none> |
| | N of Rows in Working Data File | 42 |
| Missing Value Handling | Definition of Missing | User-defined missing values are treated as missing. |
| | Cases Used | Statistics are based on all cases with valid data. |
| Syntax | | FREQUENCIES VARIABLES=helmet helmet1 /ORDER= ANALYSIS . |
| Resources | Elapsed Time | 0:00:00.07 |
| | Total Values Allowed | 149796 |

**Notes**

| | | |
|---|---|---|
| Output Created | | 26-JUL-2003 15:46:32 |
| Comments | | |
| Input | Data | G:\Allen\Scooter Study\bike and scooter 4_8_02 189.sav |
| | Filter | income = 4 (FILTER) |
| | Weight | <none> |
| | Split File | <none> |
| | N of Rows in Working Data File | 12 |
| Missing Value Handling | Definition of Missing | User-defined missing values are treated as missing. |
| | Cases Used | Statistics are based on all cases with valid data. |
| Syntax | | FREQUENCIES VARIABLES=helmet helmet1 /ORDER= ANALYSIS . |
| Resources | Elapsed Time | 0:00:00.08 |
| | Total Values Allowed | 149796 |

**Notes**

| | | |
|---|---|---|
| Output Created | | 26-JUL-2003 15:47:29 |
| Comments | | |
| Input | Data | G:\Allen\Scooter Study\bike and scooter 4_8_02 189.sav |
| | Filter | income = 5 (FILTER) |
| | Weight | <none> |
| | Split File | <none> |
| | N of Rows in Working Data File | 3 |
| Missing Value Handling | Definition of Missing | User-defined missing values are treated as missing. |
| | Cases Used | Statistics are based on all cases with valid data. |
| Syntax | | FREQUENCIES VARIABLES=helmet helmet1 /ORDER= ANALYSIS . |
| Resources | Elapsed Time | 0:00:00.08 |
| | Total Values Allowed | 149796 |

**Notes**

| | | |
|---|---|---|
| Output Created | | 18-JUL-2003 11:02:54 |
| Comments | | |
| Input | Data | G:\Allen\Scooter Study\Scooter 4_8_02 ALL 399.sav |
| | Filter | <none> |
| | Weight | <none> |
| | Split File | <none> |
| | N of Rows in Working Data File | 399 |
| Missing Value Handling | Definition of Missing | User-defined missing values are treated as missing. |
| | Cases Used | Statistics are based on all cases with valid data. |
| Syntax | | FREQUENCIES VARIABLES=adult night street adult1 night1 street1 safe /ORDER= ANALYSIS . |
| Resources | Elapsed Time | 0:00:00.09 |
| | Total Values Allowed | 149796 |

**Notes**

| | | |
|---|---|---|
| Output Created | | 20-JUL-2003 13:16:39 |
| Comments | | |
| Input | Data | G:\Allen\Scooter Study\Scooter 4_8_02 ALL 399.sav |
| | Filter | <none> |
| | Weight | <none> |
| | Split File | <none> |
| | N of Rows in Working Data File | 399 |
| Missing Value Handling | Definition of Missing | User-defined missing values are treated as missing. |
| | Cases Used | Statistics are based on all cases with valid data. |
| Syntax | | FREQUENCIES VARIABLES=safe /PIECHART FREQ /ORDER= ANALYSIS . |
| Resources | Elapsed Time | 0:00:00.13 |
| | Total Values Allowed | 149796 |

**Notes**

| | | |
|---|---|---|
| Output Created | | 18-JUL-2003 11:13:43 |
| Comments | | |
| Input | Data | G:\Allen\Scooter Study\Scooter 4_8_02 ALL 399.sav |
| | Filter | injury = 1 (FILTER) |
| | Weight | <none> |
| | Split File | <none> |
| | N of Rows in Working Data File | 73 |
| Missing Value Handling | Definition of Missing | User-defined missing values are treated as missing. |
| | Cases Used | Statistics are based on all cases with valid data. |
| Syntax | | FREQUENCIES VARIABLES=helmet1 helmet /ORDER= ANALYSIS . |
| Resources | Elapsed Time | 0:00:00.05 |
| | Total Values Allowed | 149796 |

# APPENDIX C

## STATISTICAL INPUT DATA

## SAS

```
proc format;
 value group 1='bike'
             2='scooter';
 value yesno 1='yes'
              2='no';

data bike;
 set in.bikeonly;
if helmet le 3 then helcat=1;
else helcat=2;
if elbow le 3 then elbowcat=1;
else elbowcat=2;
run;

proc freq;
 tables sex*elbowcat/cmh;
run;

data bikescooter;
 set in.bikescooter;
if helmet le 3 then helcat=1;
else helcat=2;
if elbow le 3 then elbowcat=1;
else elbowcat=2;
if helmet1 le 3 then helcat1=1;
else helcat1=2;
if elbow1 le 3 then elbowcat1=1;
else elbowcat1=2;
if knee le 3 then kneecat=1;
else kneecat=2;
if knee1 le 3 then kneecat1=1;
else kneecat1=2;
if wrist gt 0 and wrist le 3 then wristcat=1;
else  wristcat=2;
if wrist1 gt 0 and wrist le 3 then wristcat1=1;
else wristcat1=2;

format group group.;
run;

proc freq;
tables helcat*helcat1 elbowcat*elbowcat1 wristcat*wristcat1/chisq;
run;



proc sort; by sex;
proc freq;
tables helcat*helcat1 elbowcat*elbowcat1/chisq;
by sex;
run;
```

```
data bike1;
 set bikescooter;
group=1;
  keep stdy_ helcat elbowcat kneecat wristcat sex group;
run;


data scooter1;
  set bikescooter;
keep stdy_ helcat1 elbowcat1 kneecat1 wristcat1 sex;
run;


data scooter1;
  set scooter1;
group=2;
rename helcat1=helcat elbowcat1=elbowcat kneecat1=kneecat wristcat1=wristcat;
run;

proc sort data=bike1; by stdy_;
proc sort data=scooter1; by stdy_;
data both;
 set bike1 scooter1;
by stdy_;
format group group. helcat kneecat elbowcat wristcat yesno.;
run;

proc freq;
tables group*(helcat kneecat elbowcat wristcat)/chisq cmh;
run;

proc freq;
 tables group*helcat/cmh;
run;


proc freq;
 tables sex*group*helcat/cmh;
run;


proc sort; by sex;
proc freq;
tables group*(helcat kneecat elbowcat wristcat)/chisq cmh;
by sex;
run;

proc freq;
tables sex*(helcat kneecat elbowcat wristcat)/chisq cmh;
run;

proc format;
 value group 1='bike'
             2='scooter';
 value yesno 1='yes'
              2='no';
```

```
data bike;
 set in.bikeonly;
if helmet le 3 then helcat=1;
else helcat=2;
if elbow le 3 then elbowcat=1;
else elbowcat=2;

biketime=ptage-agebike;
agebike4=2;
if agebike le 4 then agebike4=1;

biketime4=2;
if biketime le 4 then biketime4=1;

run;

proc freq;
 tables biketime4*agebike4/chisq;
run;

proc freq;
 tables biketime agebike ptage;run;

proc freq;
tables biketime*agebike;run;


proc reg;
 model everinjured=agebike;
run;quit;


proc freq;
 tables sex*elbowcat/cmh;
run;

data bikescooter;
 set in.bikescooter;
if helmet le 3 then helcat=1;
else helcat=2;
if elbow le 3 then elbowcat=1;
else elbowcat=2;
if helmet1 le 3 then helcat1=1;
else helcat1=2;
if elbow1 le 3 then elbowcat1=1;
else elbowcat1=2;
if knee le 3 then kneecat=1;
else kneecat=2;
if knee1 le 3 then kneecat1=1;
else kneecat1=2;
if wrist gt 0 and wrist le 3 then wristcat=1;
else  wristcat=2;
if wrist1 gt 0 and wrist le 3 then wristcat1=1;
else wristcat1=2;

*format group group.;
run;
```

```
proc freq;
tables helcat*helcat1 elbowcat*elbowcat1 wristcat*wristcat1/chisq;
run;



proc sort; by sex;
proc freq;
tables helcat*helcat1 elbowcat*elbowcat1/chisq;
by sex;
run;


data bike1;
 set bikescooter;
group=1;
  keep stdy_ helcat elbowcat kneecat wristcat sex group;
run;


data scooter1;
  set bikescooter;
keep stdy_ helcat1 elbowcat1 kneecat1 wristcat1 sex;
run;


data scooter1;
  set scooter1;
group=2;
rename helcat1=helcat elbowcat1=elbowcat kneecat1=kneecat wristcat1=wristcat;
run;

proc sort data=bike1; by stdy_;
proc sort data=scooter1; by stdy_;
data both;
 set bike1 scooter1;
by stdy_;
format group group. helcat kneecat elbowcat wristcat yesno.;
run;

proc freq;
tables group*(helcat kneecat elbowcat wristcat)/chisq cmh;
run;

proc freq;
 tables group*helcat/cmh;
run;


proc freq;
 tables sex*group*helcat/cmh;
run;


proc sort; by sex;
proc freq;
```

```
tables group*(helcat kneecat elbowcat wristcat)/cmh;
by sex;
run;

proc freq;
tables sex*(helcat kneecat elbowcat wristcat)/chisq cmh;
run;


******* income****;
******* NEED TO PLUG IN THE PROPER NUMBERS****;
 data;
 do INCOME = 1 to 2;
    do HELMET = 1 to 2;
       input wt @@;
       output;
    end;
 end;
 cards;
   2  1
   14  29
 ;
proc freq ;
   weight wt;
   tables INCOME*HELMET/CHISQ cmh ;
title '0-25K VS >280';
TITLE2 'BIKE AND SCOOTER GROUP, SCOOTER HELMET';
run;
```

## APPENDIX D

## CONTRIBUTORS TO THE PROJECT

I, Sheryl Elaine Allen Bracey, M.D., came up with the research idea. I performed the literature review. I along with Melinda Mahabee-Gittens, M.D., M.S., determined the methodology, study design, and ideas for analyses. I wrote the questionnaire. The questionnaire was administered by the emergency department research assistants—Matt Short and Stephanie Jauch. I wrote the Institutional Review Board at Cincinnati Children's Hospital Medical Center for approval.

The SPSS program data base was set up by Kate Berz. I did the data analyses. I met with Melinda Mahabee-Gittens, M.D., M.S., and we reviewed the data and the conclusions. I met with Jareen Meinzen-Derr, M.P.H., to recheck my statistical calculations and to help me with the Logistic Regression calculations.

The study was financed by Emergency Medicine of Cincinnati Children's Hospital Medical Center.