

AN ABSTRACT OF THE THESIS OF

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The present study investigated the prevalence of head injury among four-year college students. Students from four colleges in three states were asked to participate in the study. The students were asked to respond to a questionnaire about head injuries. The questionnaire was specifically designed to measure the incidence of head injury or prolonged periods of unconsciousness of 20 minutes or more.

Of the 850 questionnaires sent out, a total of 648 were obtained and analyzed for a return rate of 76%. Twenty-seven students (4.16%) indicated having sustained a medically diagnosed head-injury/illness. Forty-two students (6.48%) reported an unconscious period of 20 minutes or longer. The remainder of the students (89.38%) reported no period of prolonged unconsciousness or head injury/illness.

Analyses of variance were conducted to determine if there was a significant difference between the mean grade point averages (GPAs) and ages of the three groups. The mean GPAs of the groups did not show significance. The age factor was significant $F(2,645) = 18.66, p < .001$. Tukey's (a) test was conducted to determine where the significant differences existed. Significant differences in age were discovered between the group of students who had sustained a prolonged period of

unconsciousness and the other two groups. The group reporting a period of unconsciousness was significantly younger ($\underline{M} = 18.93$) than the head injury ($\underline{M} = 23.84$) or no injury group ($\underline{M} = 22.10$). Descriptive statistics were also conducted and reported.

The results of this replication give support to the Holmes, Kixmiller, Minor, Thomas and Wurtz (1988) study. This study more firmly establishes a prevalence rate of the head-injured college student. However, it also highlights the need for further studies to better assess the needs of head-injured college students.

THE PREVALENCE OF HEAD INJURY AMONG
FOUR-YEAR COLLEGE STUDENTS

A Thesis

Presented to

The Division of Psychology and Special Education

EMPORIA STATE UNIVERSITY

In Partial Fulfillment

of the Requirements for the Degree

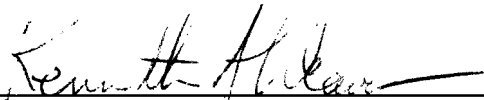
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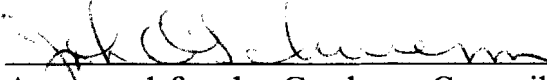
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Approved for the Division of Psychology
and Special Education



Approved for the Graduate Council

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I would like to extend a special thanks to my mom, dad and Lauri. You have all played a very influential part in my life. There were many times growing up when I doubted my capabilities but it was your encouragement that kept me going.

Finally, I would like to dedicate my thesis to my best friend, who just happens to be my wife, Katherine, and our three beautiful children, Patrick, Margaret, and Christopher.

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CHAPTER 1

Introduction

A review of the available studies of head-injuries in college students shows that interest in this area is growing. However, much of the information that has been obtained in these studies has lacked factual results (Begali, 1987; Holmes, 1988; National Head Injury Foundation, 1985). As a result, little is known about the types of brain injuries among this particular group, the number of head-injured students in college, the specific problems they encounter, and their reasons for withdrawal from college. A study was conducted by Holmes, Kixmiller, Minor, Thomas, and Wurtz (1990) to determine the prevalence of head injury in four-year colleges. A similar study was done by Holmes and Buzzanga (1991) to determine the prevalence of head injury in community colleges. In the studies by Holmes et al. (1990) and Holmes and Buzzanga (1991), the authors called for further empirical studies of these students and their needs as well as replication of their studies. Presently no replication of the studies has been undertaken.

How many four-year college students have incurred a head injury? There is very little factual knowledge regarding the prevalence of head injury, and the information that does exist is based on the one study by Holmes et al. (1990).

Literature Review

Hall and Depompei (1986) estimated that as many as 170,000 persons suffer from head injuries each year resulting from events such as motor vehicle accidents, falls, blows to the head, or physical abuse. Of the 170,000, approximately 50,000 of the persons with head injuries

become comatose. Another 75,000 suffer significant head injuries but do not become comatose. As more is learned about head injury and as technology advances, the number of persons who survive head trauma is steadily increasing. With increased survival rates, there is a need for more rehabilitation services as well as knowledge to improve care in dealing with these individuals' emotional, psychological, physical, and social readjustment to society.

Rimel, Giordini, Barth, Boll, and Jane (1981) stated that 8 million people report minor head injuries each year. Of this number, only 400,000 are hospitalized. Minor head injury can be defined in many ways, ranging from a loss of consciousness, which may or may not require a hospital stay, to lacerations of the face and scalp which do not seem to affect the brain. The number of individuals who are unconscious for brief periods of time and are not admitted to a hospital remains unknown. The total number of people at risk of sequelae after head injury lies somewhere between the number of patients who are admitted to a hospital and the millions who suffer minor head injury of unknown severity each year.

The group incurring the highest number of head injuries are those individuals in the 15-28 year range. The majority of college students fit into this age range. In fact, Jane and Rimel (1983) did a survey of the head-injured at a university hospital and found 24% of their head-injured population to have been college students prior to their accidents.

There are several types of problems that the head-injured person experiences, and these have been well documented (Hackler & Tobis, 1983). The most noticeable type of brain disorder is one with clear

physical disfigurement. For individuals with no physical evidence of a past head injury, the head injury may be overlooked when looking for causes for their problems. Motor and visual coordination may be poor. Psychosocially, they can experience difficulty in the display of appropriate behaviors. They may become overly emotional, irritable, depressed, have a poor self-image, and become overly dependent upon others. They may have a difficult time forming social relationships. Learning and memory processes can be especially difficult for problems requiring logic and abstractions (Bauer & Titonis, 1987).

There is evidence that some individuals who suffer from a minor head injury may have long-term effects. Postmortem examinations of individuals who suffered from a concussion at some time in their lives showed them to have neuronal loss, although no indication of other brain damage was reported (Rimel et al., 1981).

Since the largest group of individuals who suffer a head injury are those within the 15-28 year range, it would seem obvious that they should be the group upon which current research is directed. Many of these individuals could be applying to college or currently enrolled in college. Of this group, many of the students who sustained a closed-head injury are unable to return to college or return but experience academic difficulties of varying degree because of the impairment caused by the head trauma (Hall & DePompei, 1986).

Ozer (1988) has suggested plans that are needed to help head-injured individuals readjust and become productive once again. According to Ozer, a rehabilitation program must examine the individual's pre-injury performance levels. For example, was the individual an above

average student or a below average student prior to the injury? It is not feasible to ask a below average student to do above average work if he or she never performed at that level. The program must examine the nature of the head injury and the individual's specific disabilities. Does the individual have a support system available such as family or friends? Are there community resources accessible to the individual? What type of goals and motivation does the student possess? Most importantly, the evaluation process must be ongoing. Recovery after head injury can continue for many months after the injury and at various rates. Thus, the program needs to be able to adapt to the individual's changing needs.

Within the educational system, high schools have developed materials and programs for head injury. However, the same cannot be said for colleges. As Holmes (1988) pointed out, high schools and colleges are vastly different in terms of the amount of work expected, the material covered in classes, the amount of formal structure, the level of independence, and the increased pressure for better grades in college. It would be unwise then to devise head-injured programs for colleges based upon the guidelines developed by high schools.

Crovitz (1987) reported that in some cases head-injured students are prone to providing inaccurate information when recalling actual events due to poor memory functioning. Thus, families and friends of head-injured individuals can help determine the accuracy of recovered memories. The recovery process is dependent upon the brain injured individual, the goals of the student, the expertise of the assessment team, and the willingness of the student to cooperate.

Levin, Benton, and Grossman (1982) reported that the sooner

rehabilitation is received, the better the results. The authors have suggested there is a critical period for recovery and emphasized the importance of counseling and family support to help the individual cope with the often frustrating rehabilitation process. Unresolved denial by family members and unrealistic expectations of the students can lead to frustration, anger, and depression in the head-injured individual. Successful recovery is characterized by the individual's involvement in the program's services, such as speech therapy, remedial reading, writing, math, and group activities. Becoming an active participant in the rehabilitation process and open communication with family members and friends help facilitate the student's recovery.

The Holmes et al. (1990) study indicated a need to establish the actual numbers of head-injured students, the students' concerns, and how both rehabilitation centers and colleges can be of assistance in their recovery and continued educational pursuits. In that study it was determined approximately 4.37% of the students sampled had suffered a head injury and 5.22% of the students had experienced a prolonged period of unconsciousness of 20 minutes or longer. The Holmes and Buzzanga (1991) study of community college students found prevalence rates almost identical with four-year colleges. However, one study on four-year colleges and one study on community colleges does not establish a definitive baseline. A great deal of investigation remains to be done with this population. As Holmes et al. (1990) pointed out, there is an obvious need for intensive study of the head-injured college student to assess strengths, difficulties, and subtle deficits. Finally, Holmes et al. (1990) has recommended additional investigations be undertaken to replicate their

findings. The present study was designed to further investigate the number of four-year college students who have sustained a head injury or prolonged period of unconsciousness. The results can then be used to facilitate both further study of the topic and assistance to the four-year college student population if the need is there.

CHAPTER 2

Method

Sample

This study was conducted during the 1993-1994 academic year. A sample of men and women four-year college students of all ages was selected from four colleges in Arkansas, Texas, and Indiana to determine the prevalence of undergraduate head injury. The four-year colleges were: John Brown University (Arkansas), a private nondenominational religious college with an enrollment of 1,500 (all figures are rounded); Texas Wesleyan University, a private university with an enrollment of 2,000; Franklin College of Indiana, an independent college with an enrollment of 1,000; and University of Indiana at Kokomo, a state-supported university with an enrollment of 3,600.

Two-hundred-sixty-four males and 384 females completed the survey used in this study for a total n of 648. The subjects were selected on the basis of availability without specific criteria except their attendance at a four-year college and their willingness to participate. Twenty-seven different classes were surveyed. The subjects were recruited from as many different classes as possible (freshman to senior-level) to accurately represent the school's population and academic disciplines. The sample is described in further detail in Table 3 in the next chapter.

Materials

The questionnaire was the same one used in the Holmes et al. (1990) study. It contained a brief demographic section for age, sex, classification, GPA, major, college attending and the class in which the

subject is currently filling out the questionnaire. The front side of the questionnaire asked specific questions regarding head injury/illness such as type of injury and classes that may be difficult for the subject. The backside of the questionnaire asked questions regarding prolonged periods of unconsciousness and difficulties the subject may experience (refer to Appendix A for a copy of the questionnaire). The following instructions preceded the administration of the questionnaire:

This is a survey about brain injuries and illness. Your participation is voluntary and your responses will be anonymous. I would appreciate your cooperation in completing this survey. If you have completed this survey in another class, please do not complete another one. If any of the items on the form are not clear, please ask about them. Begin by filling out the top portion of the front page where you are asked to give information about yourself. As the instructions indicate, if you have had a brain injury or illness, you will complete the rest of that page. If you have not had a brain injury or illness, you will complete the back of the page. In other words, you will only complete one side of the form after you have given the background information. When you have finished, please give the forms to the instructor. Thank you for your time and participation.

Procedure

A cover letter, informed consent forms, questionnaires, instructions and a return envelope were mailed to the psychology professor at each

institution who had agreed to distribute the questionnaires. The subjects were given a brief introduction and an informed consent document (refer to Appendix B for a copy of the informed consent document). Once they understood, read, signed, and returned the informed consent form, the instructor of the class read the instructions verbatim and distributed the questionnaires. Though no time limit was placed on the subjects, all the questionnaires were completed in approximately 10 minutes. The questionnaires were collected when the subjects had finished. The subjects were then thanked for their participation and assured of confidentiality.

CHAPTER 3

Results

Age and grade point average (GPA) were analyzed by analysis of variance. All schools reported GPAs using a four point scale. Descriptive statistics were computed to report the additional data. The surveys were divided into three groups: subjects who did not report a head injury/illness or period of unconsciousness, subjects who reported that they had experienced a period of unconsciousness of 20 minutes or longer, or subjects who reported that they had received a medically diagnosed head injury/illness.

The analysis of variance did not show a significant difference among the three groups for GPA, $F(2, 565) = .66, p > .05$. The analysis of variance summary for GPAs is presented in Table 1. The GPA means and standard deviations are presented in Table 2. The analysis of variance conducted on the ages was significant, $F(2, 645) = 18.66, p < .001$. The large difference in the error degrees of freedom between the GPA and age analyses is due to the fact that 80 people reported their age without listing their GPA. Tukey's (a) test was conducted to determine where the specific significant differences were located. Subjects reporting no head injury/illness or periods of unconsciousness or reporting a medically diagnosed head injury/illness were significantly older than those experiencing prolonged periods of unconsciousness. The difference between the younger group and the other two groups was statistically significant. The summary of the analyses of age is presented in Table 2. The age and GPA means and standard deviations are presented in Table 3. Other demographic information regarding the results of the study are presented in Table 4.

Table 1

ANOVA Summary Table for the GPA

Source	<u>SS</u>	<u>df</u>	<u>MS</u>	<u>F</u>	<u>p</u>
Injury Status	.32	2	.16	.24	NS
Error	377.60	565	.66		
Total	377.93	567			

Table 2

ANOVA Summary Table for the Age

Source	<u>SS</u>	<u>df</u>	<u>MS</u>	<u>F</u>	<u>p</u>
Injury Status	1936.39	2	986.20	18.66	.001
Error	33462.37	645	51.88		
Total	35398.76	647			

Table 3

Means and Standard Deviations for Age and GPA

	<u>No injury</u>	<u>Unconscious</u>	<u>Head Injury</u>
GPA	2.89	2.91	2.97
<u>SD</u>	.76	.55	.53
Age	22.10 _a	18.93 _b	23.84 _a
<u>SD</u>	6.76	6.78	2.82

For GPA none of the means differed significantly.

For the three age means different subscripts indicate the significant differences.

Table 4

Characteristics and Results of the Head Injury Survey

	<u>No Injury</u>	<u>Unconscious</u>	<u>Head Injury</u>
Sample Size			
Total ($\underline{n} = 648$)	579	42	27
By Gender			
Men ($\underline{n} = 262$)	229	20	13
Women ($\underline{n} = 386$)	350	22	14
By Academic Class			
First Year	96	8	4
Second Year	176	14	7
Third Year	171	14	8
Fourth Year	136	6	8
Percent of Total Sample			
Men	35.33	3.09	2.00
Women	54.01	3.39	2.16
Combined	89.34	6.48	4.16
Percent of own Gender			
Men	87.40	7.63	4.96
Women	90.67	5.70	3.62

A more detailed discussion of the data gained from the surveys is provided in the following sections. The data are presented according to the injury status of the subjects (i.e., no injury, period of unconsciousness, and diagnosed head injury or illness).

No Injury/No period of Unconsciousness

Three hundred and fifty women and 229 men reported not having sustained a head injury/illness or period of unconsciousness of 20 minutes or more. The mean age of this group was 22.10 years ($SD = 6.46$). Over 22 different majors were reported in this group. The most frequently reported majors were business ($n = 66$), followed by education and psychology ($n = 36$). The mean GPA for this group was 2.89 ($SD = .76$). Subjects in this group reported math ($n = 94$) and science ($n = 47$) to be the most difficult classes for them. Seventeen other classes were listed as being difficult, ranging from history to studio art. These 579 subjects made up 89.34% of the total sample, with 90.67% of the women and 87.40% of the men not reporting head injury or extended period of unconsciousness.

Unconscious for at Least 20 Minutes

Twenty-two women (5.70% of all the women or 3.39% of the total sample) and 20 men (7.63% of all the men or 3.09% of the total sample) indicated they had not sustained a head injury/illness but had had a period of unconsciousness for at least 20 minutes. The mean age of this group was 18.93 ($SD = 6.78$). The mean GPA for this group was 2.91 ($SD = .55$). A total of 42 subjects combined to make up this group and represented 6.48% of the total sample. A total of 26 different majors were represented in this group. The mean years since the unconscious

episode was 7.0 years ($SD = 5.27$) with a range from 1-16 years. The median time unconscious was 30 minutes, and the range was from 20 minutes to 360 minutes. Nine subjects reported a second period of unconsciousness (21.42% of this group). No one in this group reported more than two episodes of unconsciousness. None of the subjects making up this group listed any medications they were taking as a result of their episode of unconsciousness. In regards to aftereffects, 78.28% of the subjects in this group reported no problems that they related to their unconsciousness. However, 11.44% reported problems with concentration or memory, increased test anxiety, and prolonged attentiveness.

The two most difficult classes reported by this group were math ($n = 12$) and English/Composition ($n = 9$). Twelve subjects indicated that no classes were especially difficult for them. Five other classes (history, chemistry, science, political science, and psychology) were each mentioned one time.

The subjects listed a wide range of causes for their periods of unconsciousness. The most frequently listed causes were car/motorcycle accidents ($n = 15$) and sports related injuries ($n = 9$). The other causes included alcohol ($n = 6$), falling ($n = 6$), seizure ($n = 2$), and migraine headache, anemia, low blood pressure, and running into a clothes line ($n = 1$ for each).

Medically Diagnosed Head Injury/Illness

Twenty-seven subjects reported having had a medically diagnosed head injury/illness (4.16% of the entire sample). This group is comprised of 14 women (3.62% of the women sampled and 2.16% of the total sample) and 13 men (4.96% of the men and 2.00% of the entire sample).

The mean age of the group reporting head injuries was 23.84 years ($SD = 2.82$). The mean GPA of this group was 2.97 ($SD = .53$). Of the total sample, six subjects reported a second head injury and one subject reported a third injury. The mean number of years since the head injury was 6.33 ($SD = 3.92$) with a range from 1 through 15. Three subjects (11.11% of the head-injured group) indicated that they had taken medication for their injury at the time of the injury. No subject reported that they were currently taking medication for the injury. Two subjects (7.40% of the head-injured group) were taking anticonvulsants, two (7.40%) were taking analgesics, one student (3.70%) was taking antihypertensive medication, and one student (3.70%) reported taking the prescription medication Tegretol. These figures show that some subjects were taking more than one type of medication. Twenty-four of the head-injured group (88.88%) reported taking no medications as a result of the head injury/illness. The median time unconscious was 5 minutes with a range of 2 minutes to 36 hours.

The head injury group consisted of 15 different majors with sociology ($n = 6$) and education ($n = 6$) as the two most prominent. The classes reported to be the most difficult were math/algebra ($n = 12$), and science ($n = 7$). Thirty percent of the sample reported having no problems with any particular class as a result of their head injury.

In terms of the causes of the head injury, 18 (66.66%) reported a concussion, and six (22.22%) reported a car or motorcycle accident. There were three reports of brain illness in this sample, two (7.40%) reported psychomotor epilepsy, and one (3.70%) listed meningitis.

For aftereffects of the injury or illness, 18.00% of the sample listed

memory, 10.00% listed concentration, and 5.00% listed reading comprehension. Sixty-seven percent of the sample did not list any problems as a result of the head injury/illness.

In observing the data, the fact that both the head injury group and unconsciousness group report concussions points to an obvious overlap between the two groups. Holmes et al. (1988) stated that not all medically diagnosed concussions have serious aftereffects and not all undiagnosed concussions are necessarily minor. For this reason it may be difficult to differentiate between these two groups. It may, therefore, be helpful to look at these two groups with combined data.

Combined Head Injury and Unconscious Episode Groups

When the groups of diagnosed injury and period of unconsciousness are combined, the figures for women represent 5.86% of the total sample and 9.89% of the women sampled. For men, the percentages are 4.78 for the total sample, and 11.74 for the men sampled. When the two groups are combined, 10.65% ($n = 69$) of the total sample of four year college students reports a head injury or illness.

CHAPTER 4

Discussion

The U.S. Department of Education's Digest of Educational Statistics will be used in order to put these figures in a more meaningful perspective (U.S. Department of Education, 1993). It is important to understand that all figures are rounded and thus will not give the exact numbers of students with head injury/illness who may be experiencing difficulty in college. These extrapolations will be based on the information from the present study and the information given in the Digest of Educational Statistics. It is estimated that there are 11,825,000 students enrolled in four-year colleges, of which approximately 6,267,250 are females and 5,557,750 are males.

Using the percentages obtained from the present study, this would translate into approximately 760 thousand students who have incurred a period of unconsciousness, and approximately 490 thousand with a diagnosed head injury. These figures make the head-injury group one of the largest disability groups on campus. By gender, the number of males who experienced a period of unconsciousness of 20 minutes or more would be 325 thousand, and the number who had a medically diagnosed head injury/illness would be 235 thousand. For females, the number who had experienced periods of unconsciousness of 20 minutes or more would be 439 thousand, and the number with a diagnosed head injury/illness would be 255 thousand. By combining the head injury group and the period of unconsciousness group, the total number of head-injured students attending college could possibly be as high as 1,260,000.

This study was undertaken to replicate the findings of the Holmes et al. study of 1990. The results of the present study confirm the accuracy of the original study in terms of the percentages of head-injured students attending college. As stated in the original study, head injury among college students is more than an uncommon occurrence and certainly warrants greater attention and investigation. This study also highlights the fact that with the increase in the number of students attending college, the number of head-injured students attending college is also increasing.

As in the original study, the number of students with a diagnosed injury or period of unconsciousness who reported no noticeable effects of the injury or episode was higher than expected. The number of students who listed things such as bipolar disorder and depression as brain injury/illnesses was higher than expected, illuminating the fact that little information is available about head-injured college students.

As reported earlier in the study, the GPA factor was not statistically significant for the three groups. This information raises the question of why there is not a significant GPA difference. The age factor was statistically significant and these findings also need to be addressed. Age differed significantly in that the groups who had sustained a medically diagnosed head injury/illness or no injury or period of unconsciousness tended to be older than those who had experienced prolonged periods of unconsciousness. Since the GPA factor was not significantly different for the three groups, the difference in the age factor is difficult to interpret. However, some assumptions can be made. It is possible that those students who suffered from a medically diagnosed head injury/illness

chose to hold off on going to college longer and not risk being overwhelmed by the hectic lifestyle that college can produce. The students who had experienced an unconsciousness episode of 20 minutes or more but were not medically diagnosed as head-injured may not have perceived themselves as having any difficulties which they could attribute to the period of unconsciousness. They therefore may have begun college earlier than the medically diagnosed head injury group.

Even with a more firmly established data base, a great deal of study remains to be done with this population. Follow-up analysis of those head-injured students who drop out of college and their reasons for doing so is needed. Additionally, intensive studies on students who report head injury/illness or extended periods of unconsciousness are needed so that a better understanding can be gained of their specific needs, overt difficulties, subtle deficits, and overall strengths.

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APPENDIX A

Questionnaire

Age _____ Sex _____ Classification _____ Major _____

Overall GPA _____ College _____ This Class _____

Have you ever had a medically diagnosed brain injury or disorder?

YES _____ (Please complete this side of the page.)

NO _____ (Please complete the other side of this page.)

1. What was (is) it? Please give the type of problems, part(s) of the brain involved, the year of the diagnosis and the time unconscious (other than from surgery). If more than one problem, list each one separately.

_____ Year _____ Time Unconscious _____
(other than anesthesia)

_____ Year _____ Time Unconscious _____
(other than anesthesia)

_____ Year _____ Time Unconscious _____
(other than anesthesia)

2. Please list any medications you take for the injury/disorder.

3. Are there any classes especially difficult for you?

4. If you feel the injury or disorder has affected your college performance, please list the problems you feel are related to the injury/disorder.

(front of questionnaire)

1. Have you ever been unconscious (other than from anesthesia) for 20 minutes or more?

NO _____ Please name any classes that are especially difficult for you.

(You are finished).

YES _____ (Please continue)

How many times? _____

Cause _____ Time Unconscious _____ Year _____
(other than anesthesia)

Cause _____ Time Unconscious _____ Year _____
(other than anesthesia)

Cause _____ Time Unconscious _____ Year _____
(other than anesthesia)

Please name any classes that are especially difficult for you.

2. If you feel that the period (s) of unconsciousness has (have) affected your college performance, please list the problems you feel are related to the unconsciousness.

(back of questionnaire)

APPENDIX B

Consent Form

Consent Form

Carefully read the following statements and sign below if you are in agreement.

The purpose of the present study is to better understand the particular needs and interests of students who have a past head injury and/or brain illness.

The time taken to fill out the questionnaire will be approximately 10 minutes. Your answers as well as any identifying data will remain confidential.

If for any reason during the session you feel uncomfortable, you may discontinue participation.

I have read and understand the preceding information and agree to participate in this study.

Signature of Subject / Date

I, Bradley Douglas Powell, hereby submit this thesis/report to Emporia State University as partial fulfillment of the requirements for an advanced degree. I agree that the Library of the University may make it available for use in accordance with its regulation governing materials of this type. I further agree that quoting, photocopying, or other reproduction of this document is allowed for private study, scholarship (including teaching) and research purposed of a nonprofit nature. No copying which involves potential financial gain will be allowed without written permission of the author.

Brad Powell

Signature of the Author

December 17, 1994

Date

The Prevalence of Head Injury Among

Four Year College Students

Title of Thesis/Research Project

Doug Cooper

Signature of Graduate Office Staff Member

December 20, 1994

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