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Alyson Cregger
James Madison University

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The Effect of Communication Type on Knowledge Retention of Brain Injuries

A Project Presented to
the Faculty of the
College of Health and Behavior studies
James Madison University

in Partial Fulfillment of the Requirements
for the Degree of Bachelor of Science

by Alyson Lorayne Cregger

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Accepted by the faculty of the Department of Psychology, James Madison University, in partial fulfillment of the requirements for the Degree of Bachelor of Science.

FACULTY COMMITTEE:

Project Advisor: Monica Reis-Bergan,
Ph.D.
Professor, Psychology

Reader: Jeff Dyche, Ph.D.
Associate Professor, Psychology

Reader: Kenn Barron, Ph.D.
Professor, Psychology

HONORS PROGRAM APPROVAL:

Philip Frana, Ph.D.,
Interim Director, Honors Program

The Effect of Communication Type on Knowledge Retention of Brain Injuries

Alyson 'Lori' Cregger

James Madison University

COMMUNICATION TYPE ON KNOWLEDGE ABOUT OF BRAIN INJURIES

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Abstract

Misconceptions about traumatic brain injuries have been seen in the general population since 1988. Previous research has demonstrated that the misconceptions are not limited to geographical area and have been seen in health care professionals. A possible explanation for these misconceptions could be the ineffective transmission of knowledge. The current study examined the effect of an educational intervention on eight misconceptions and their ‘real life’ applications, as well as the general knowledge surrounding traumatic brain injuries. Comparative and absolute risk were also examined. Thirty undergraduate students were given a pre-test consisting of four surveys (misconceptions, application of misconception, general knowledge, and comparative risk), randomly assorted into an educational intervention group (verbal or verbal and written), and then given a post-test consisting of the same surveys. There was a significant time effect for the misconceptions survey. A significant interaction was seen in the general knowledge demonstrating the participant’s capability to learn. Future research is needed to examine why participants endorse particular beliefs.

Introduction

A traumatic brain injury is often described as damage to the brain that is caused by an external jarring force that may result in partial or total impairment of function (Rotatori & Burkhardt, 2011). The Centers for Disease Control and Prevention estimates as many as 1.4 million Americans sustain a traumatic brain injury each year (Langlois, Mitchko, & Johnson, 2005). This number is based on the reported injuries so the actual number of traumatic brain injuries may be much higher.

The need to understand traumatic brain injuries is only growing. In 1980, the United States contained fewer than fifty head injury treatment centers; less than ten years later, the number of centers grew to over 400 (Gouvier, Prestholdt, & Warner, 1988). The growth of treatment centers is possibly related to an increase of head injuries. The knowledge pertaining to head injuries including recognition, prevention, and treatment was expected to increase at a similar rate (Gouvier et al., 1988). Unfortunately, false beliefs surrounding traumatic brain injuries, also called misconceptions, have been demonstrated in the general public (Gouvier et al., 1988). The current study aims to examine college students' knowledge of traumatic brain injuries, the endorsed misconceptions and the perceived optimism demonstrated possibly as a result of previous experience.

General Misconceptions of Brain Injuries.

In order to increase knowledge about traumatic brain injuries, current misconceptions must be examined. In 1988, Gouvier et al. administered a survey of 25 misconceptions about head injuries to 221 participants in a large regional shopping mall in Louisiana, United States. Over half (67%) of the participants fell into the age range of 20-59 years. Approximately 42% of the 221 participants indicated they acquired information from a professional pertaining to brain

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injuries. The participants were asked to respond to the statement by indicating if it was true, probably true, false, or probably false. Gouvier et al. (1988) found over 40% of participants incorrectly endorsed twelve of the misconceptions. The categories in the survey included seatbelts, brain damage, unconsciousness, amnesia and recovery.

- 16.6% Participants incorrectly endorsed seatbelt misconceptions.
- 25.2% participants incorrectly endorsed misconceptions about brain injuries.
 - “Whiplash injuries to the neck can cause brain damage even if there is no direct blow to the head” was incorrectly endorsed by 45.2% of participants.
- 44.53% Participants incorrectly endorsed misconceptions about unconsciousness of the time with two misconceptions incorrectly endorsed by over 40% of participants.
 - “When people are knocked unconscious, most wake up shortly with no lasting effects” was incorrectly endorsed by 59.3% of participants.
 - “Even after several weeks in a coma, when people wake up, most recognize and speak to others right away” was incorrectly endorsed by 41.18% of participants.
- 55.4% Participants incorrectly endorsed misconceptions about amnesia with four misconceptions incorrectly endorsed by over 40% of participants.
 - “People can forget who they are and not recognize others, but be normal in every other way” was incorrectly endorsed by 82.4% of participants.
 - “Sometimes a second blow to the head can help a person remember things that were forgotten” was incorrectly endorsed by 45.7% of participants.

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- “People with amnesia for events before the injury usually have trouble learning new things too” was incorrectly endorsed by 43% of participants.
- “People usually have more trouble remembering things that happen after an injury than remembering things from before” was incorrectly endorsed by 50.7% of participants.
- 49.7% participants incorrectly endorsed misconceptions about recovery of the time with five misconceptions incorrectly endorsed by over a 40% of participants.
 - “How quickly a person recovers depends mainly on how hard they work at recovering” was incorrectly endorsed by 70.14% of participants.
 - “People who have had one head injury are more likely to have a second one” was incorrectly endorsed by 73.4% of participants.
 - “Once a recovering person feels ‘back to normal’, the recovery process is complete” was incorrectly endorsed by 47.1% of participants.
 - “It is good advice to rest and remain inactive during recovery” was incorrectly endorsed by 60.6% of participants.
 - “Complete recovery from a severe head injury is not possible, no matter how badly the person wants to recover” was incorrectly endorsed by 57.9% of participants.

Participants who had previous exposure to traumatic brain injuries were expected to not endorse the misconceptions compared to participants who had not had the previous exposure. Participants who have had previous exposure are those who have had a traumatic brain injury themselves, known a friend or family member with one, or learned about the injury from another source (newspaper, physician, television, etc.). Surprisingly, that was not the case. Gouvier et al.

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(1988) found that participants who had personal experience were just as likely to endorse misconceptions. This finding has been replicated multiple times since the Gouvier et al. study in which participants with exposure to traumatic brain injury were just as likely to hold the same misconceptions as their non-exposed counterparts (Guilmette & Paglia, 2004; Swift & Wilson, 2001).

Misconceptions were not found to be a result of the location in which the survey was given. The Gouvier et al. (1988) study was conducted in Louisiana, USA. Another study, in which the survey was replicated, found that similar misconceptions were also in Western New York State and Southern Ontario Canada (Willer, Johnson, Rempel, & Linn, 1993). For example, Willer et al. (1993) found that 82.4% of participants endorsed the misconception of “after a head injury, people can forget who they are and not recognize others but be perfectly normal in every other way” in Western New York State and 82.4 % in Southern Ontario Canada. Gouvier et al. (1988) found that 89% of participants endorsed the same misconception in Louisiana. Other items replicated from the Gouvier et al. (1988) study like “People who have had one head injury are more likely to have a second one” demonstrated similar results.

Misconceptions were not limited to the general public; health care professionals were likely to endorse misconceptions. Farmer & Johnson-Gerard (1997) conducted a study in which a 40-item questionnaire was given to 184 educators and 111 rehabilitation specialists. Researchers found that educators answered questions confidently and accurately only 50% of the time and rehabilitation specialist only answered questions confidently and accurately 67% of the time. Researchers also found that when compared to rehabilitation specialist, educators demonstrated correct answers with less confidence 30% of the time and were overall incorrect 20% of the time.

In a related study, Swift and Wilson (2001) found that the misconceptions endorsed by

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health care professionals were similar in topic compared to the general public. Interviews were conducted on brain-injured individuals, caregivers and the professionals involved in the rehabilitation process. Researchers found that non-expert health care professionals were found to endorse misconceptions regarding recovery, symptoms, and cognitive disruptions, which were similar to those held by the general public. This inaccurate knowledge could have serious implications regarding recovery, complications and recognition. Misconceptions in health professionals may influence the general public resulting in inaccurate care and inability to recognize signs and symptoms.

Official Response to Misconceptions.

Gouvier et al. (1988) suggested that the need for better education on traumatic brain injuries was not only evident but also necessary. Correction of public knowledge and health care professionals was needed (Farmer & Johnson-Gerard, 1997). In response to this issue and others, Congress passed the Children's Health Act of 2000 (Langlois et al., 2005).

The Children's Health Act of 2000 provided the necessary push the Centers for Disease Control and Prevention (CDC) needed in order to improve current public knowledge. One result of the Children's Health Act of 2000 was the implementation of a national education and awareness campaign about traumatic brain injuries (Langlois et al., 2005). In 2002, the CDC formatted its first educational tool for primary physicians. This tool was named *Heads Up: Brain Injury in Your Practice*. This tool quickly spread from physicians to also nurses, nurse practitioners, and physical therapist (Langlois et al., 2005).

As of November 2014, the CDC's *Heads Up: Brain Injury in Your Practice* tool was available at their online site. The tool includes training for coaches, parents, and school staff in recognition of concussions, treatment and recovery. The tool is divided by sport (baseball,

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cheerleading, field hockey, etc) as well as age level (youth, high school, collegiate, and professional) (Centers for Disease Control and Prevention, 2014).

Follow up Survey of Misconceptions

Guilmette and Paglia (2004) conducted a follow up survey of brain injury misconceptions in which 179 participants that were conducting business at a major department of motor vehicles just outside of Providence, RI. The mean age of the sample was 42.5 years (S.D.= 16.1) in which approximately half (46.2%) reported having previous exposure to brain injuries. Much like the previous study, a 19-item survey was given to participants; 11 items from the Gouvier et al. (1988) study were assessed. Although the Children's Health Act of 2000 was passed two years prior to the publication of this study, the misconceptions generally had not changed. Guilmette and Paglia (2004) found that on average participants endorsed misconceptions at 43.5%. Most of the replicated items yielded similar results even though the surveys were given nearly sixteen years apart from the Gouvier et al. (1988) study and eleven years apart from the Willer et al. (1993) study.

Optimism Bias and Attention to Threat

Although a national educational intervention was implemented to improve general knowledge surrounding brain injuries, misconceptions remained. There could be several explanations for this including lack of attention to the information and communication of knowledge. Additionally, optimism bias may be a key factor in the lack of attention to traumatic brain injury information.

People generally consider past experiences in order to predict future outcomes. Weinstein (1986) concluded that when participants relied on previous experiences in order to gauge the future chances of a problem. For example, they had no experience with a problem they

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would conclude that their future chances were relatively low. According to Weinstein (1986) this inability to find previous experience with problems produces an optimism bias about the future. Research has shown that optimism bias increases with age and this may be due to the lack of experience with health problems such as cancer or even brain injuries which increases the confidence that the problem will not occur (Morrongiello & Rennie, 1998).

Optimistic bias may be linked to information processing. If information seemed threatening or negative to listeners about a topic they have not experienced or expect to experience, they may be less inclined to listen or pay attention to the details of the message. Segerstrom (2001) observed that as optimism increases, the attention to threats decrease. Forty-eight participants completed personality measures and then were sorted into three groups: pessimists, moderate optimists, and high optimists (Segerstrom, 2001).

Among the moderate optimist, an approximate equal attention bias was demonstrated for both positive stimuli and negative stimuli (Segerstrom, 2001). Researchers observed that participants sorted into the optimist group demonstrated a much higher attention bias for the positive stimuli compared to the negative stimuli. Furthermore, participants sorted into the pessimistic group demonstrated an attentional bias for the negative stimuli. This may be a factor at explaining the lack of retention of certain types of educational messages. This can be seen in many circumstances including, but not limited to, students in an educational classroom, workers learning a new skill, and patients in a physician's office.

Transmission of Information

Communication between physician and patient is vital for the patient to retain the information. As noted above, an optimistic patient may exhibit optimism bias and not listen closely to the information because of the negative nature. Therefore, given the opportunity to

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share information, the communication must be as effective as possible. The most common form of communication between physician and patient is strictly verbal communication in which the physician or health care provider talks to the patient without providing physical supplemental information such as an educational pamphlet (Lee, Back, Block, & Stewart, 2002). Northcraft and Jernstedt (1975) found that students who were not given any supplement materials along with the lecture materials performed significantly lower on the examinations than students who were given supplement materials. In the event that supplement materials were available, it was found to be superior to that of lecture only (Siegel, 1973). It is expected that patients given both lecture information as well as supplement information would retain information more readily.

Current Study

Although the prevalence of treatment centers for traumatic brain injuries increased, the knowledge surrounding the injury including signs and symptoms, recovery time, and consequences did not increase at a similar rate (Gouvier et al., 1988). This disconnection between the two can be seen in the prevalence of misconceptions. Although an effort to educate the public was implemented, the prevalence of the misconceptions remained at a constant rate (Guilmette & Paglia, 2004; Langlois et al., 2005). A possible explanation for this could be optimism bias of the population. Another possible explanation for the prevalence of misconceptions may be the lack of effective transmission of information.

The current study aims to examine the impact of an education intervention on knowledge and beliefs about traumatic brain injury. Using a mixed repeated measures design, I examined the effect of time and an educational intervention (video lecture vs. video lecture and supplement) on the dependent variables: general knowledge of traumatic brain injuries, misconceptions of traumatic brain injuries, and application of misconceptions. Optimism bias

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was examined as a potential covariate along with traumatic brain injury history. These two variables have been discussed in previous research as having a potential to influence knowledge and misconceptions. Optimistic bias is theoretically related to previous history and experience so this will be an addition to the literature to explore them together in the content of an intervention.

I predicted a time by intervention interaction such that the participants in the video lecture plus supplement condition will report more knowledge gained than the video lecture only. The selected misconceptions had a misconception rate of over 40% in previous studies; therefore I expected to see similar results in the pretest for both conditions.

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Methods

Participants

Young adults (10 men and 20 women, $M_{age} = 19.6$, age range: 18-23 years) were recruited from a large, public university through the participant pool for their general education psychology courses. The ethnicity of the sample consisted of 80% white, 7% Black/African American, 7% Hispanic/Latino, and 7% Asian/Pacific Islander. Students received class credit for participating in the study.

Procedure

Participants were randomly assigned to one of the intervention groups: lecture only or lecture and supplement. Participants were then pre-tested with the misconception survey, application of misconception survey, general knowledge survey, and the comparative risk survey. Participants were then given their assigned intervention group (video lecture or video lecture and supplement) in a laboratory room. Participants were then tested with the post-test on the misconception survey, application of misconceptions survey, general knowledge survey, comparative risk survey, and the demographics survey. The participants were given 45 to complete the study. Upon completion, participants were given a debriefing form.

Misconceptions. Eight misconceptions were taken from the Gouvier et al. (1988) study and the follow up study conducted by Guilmetter and Paglia (2002). All selected misconceptions had over a 40% misconception rate in both studies. These eight misconceptions were examined in the current study. An example of a misconception is “It is good advice to remain inactive during recovery.” Participants indicated agreement or disagreement consisting of true or false for each item (See Appendix A for full list of misconceptions).

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Application of Misconceptions. The eight misconceptions taken from the Gouvier et al. (1988) study and Guilmette and Paglia (2002) study were adapted into real life ‘scenarios’ to form application questions following the misconception survey. Each question reflected the nature of one misconception. An example scenario would be “After receiving a moderate concussion, Lacy read on the Internet to sleep regularly and continue daily activities.” Participants indicated agreement or disagreement by selecting true or false for each item (see Appendix B for full list).

General knowledge. A general knowledge questionnaire was created to assess understanding in three different domains: recognition, signs and symptoms, and recovery. Nine of the questions were asked in a multiple-choice format and six of the questions were asked in a true or false format. An example multiple-choice question would be ‘what is the most common traumatic brain injury?’ Participants were asked to select the best answer out of the options. An example set of answers was a) mild, b) moderate, or c) severe. An example true or false question was “A concussion is not considered a traumatic brain injury”. Participants were instructed to select their agreement or disagreement by selecting true or false for each item (see Appendix C). A general knowledge score was created for analysis.

Optimism Bias. Optimism bias was measured using questions modified from Weinstein (1987) and Morrongiello and Rennie (1998). Participants made assessments of risks related to obtaining a traumatic brain injury. This risk assessment was measured absolute risk, conditional risk, and comparative risk. Consistent with Weinstein’s (1987) study, comparative risk was assessed on a 7 point scale (-3 much less, -2 a little less, -1 less, 0 the same, 1 more, 2 a little more, 3 a lot more). An average of zero indicated neither optimism nor pessimism of the participant (Appendix D). The comparative risk index was used as the covariate. Absolute Risk measure was used for description purposes.

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Demographic Information. Information about previous exposure to brain injuries, type of involvement in sports, and form of communication health care professions used, gender, age and ethnicity was recorded.

Results

The first set of analyses described the variables of interest. The second set of analyses examined the influence of the education intervention on the outcome variables. A third set of exploratory analyses investigated factors associated with endorsement of misperceptions.

Of the eight misconceptions five were above the 40% cut previously determined for the study. During the pre-test, the misconception most commonly endorsed was “Complete recovery from a severe traumatic brain injury is not possible, regardless of how badly the person wants to recover” at 80%. The second most commonly endorsed misconception was “It is good advice to remain inactive during recovery from a traumatic brain injury” at 76.7%. The third most commonly endorsed misconception was “Sometimes a second blow to the head can help a person remember things that were forgotten” at 50%. The fourth most commonly endorsed misconception was “When most people are knocked unconscious, most wake up shortly after with no long-term effects” at 46.7%. Finally, the fifth most commonly endorsed misconception was “How quickly a person recovers from head injury depends on how hard they work at recovering” at 43.3%. The three other misconceptions were endorsed between 6.7- 30% (see Table 1).

During time 1, of the applications created by the author only two were endorsed over 40%. The most commonly endorsed application pertained to the misconception “How quickly a person recovers from head injury depends on how hard they work at recovering” at 93.3%. The second most commonly endorsed application pertained to the misconception “It is good advice to remain inactive during recovery from a traumatic brain injury” at 50%. All others ranged between 3.3-30% (see Table 1).

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During time 2, only three of the five misconceptions endorsed above 40% during time 1 remained above 40%. The misconception that “Complete recovery from a severe traumatic brain injury is not possible, regardless of how badly the person wants to recover” rose from 80% to 86.7%. The misconception that “It is good advice to remain inactive during recovery from a traumatic brain injury” decreased from 76.7% to 66.7%. Finally, the misconception that “When most people are knocked unconscious, most wake up shortly after with no long-term effects” rose from 46.7% to 50%. All others ranged between 3.3-26.7% (see Table 1).

During time 2, the same two applications were endorsed over 40%. The application about “How quickly a person recovers from head injury depends on how hard they work at recovering” decreased from 93.3% to 83.3%. The application about “It is good advice to remain inactive during recovery from a traumatic brain injury” rose from 50% to 53.3%. All others ranged between 3.3-23.3% (see table 1).

Analyses examined change in overall endorsement of misconceptions and overall endorsement of applications over time as a result of the educational intervention. Misconceptions were added together to create a sum score. The same was done for the applications. Repeated measures ANCOVAs were conducted separately for misconceptions and applications. Consistent with hypothesis, comparative risk was included as a covariate. Results indicated a significant main effect for time in the analysis of misconceptions such that the sum scores significantly decreased between time 1 and time 2, $F(1,28)= 8.113$, $p= .008$, $\eta^2= .225$. The predicted interaction was not significant. Moreover there was not a main effect for education condition. The covariate was not found to be significant.

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A mixed repeated measures ANCOVA examining the sum score of applications yielded non-significant results. There were no significant main effects or interactions present in the analysis.

General knowledge was computed by adding the correct answers from the 15-item scale. See table 2 for means and standard deviations. A mixed repeated measures ANCOVA examined the impact of the comparative risk covariate as well as education intervention on knowledge scores. Results indicated a main effect for time such that scores increased between time 1 and time 2, $F(1,28)= 77.621$, $p<.001$, $\eta^2= .735$. The time by condition interaction was also significant, $F(1,28)= 6.904$, $p= .014$, $\eta^2= .198$. See table 2 for means and standard deviations. Consistent with my hypothesis knowledge scores increased more in the educational intervention condition with both verbal and written information.

Exploratory frequencies examined response and application responses by individual item. Table 3 represents change in misconceptions over time. Of the three misconceptions resistant to change, similar trends were seen. The misconception that “Complete recovery from a severe traumatic brain injury is not possible, regardless of how badly the person wants to recover” had 23 participants remain incorrect and 5 participants change their answer from correct to incorrect after the intervention. The misconception that “It is good advice to remain inactive during recovery from a traumatic brain injury” had 12 participants remain incorrect and 8 participants change their answer from correct to incorrect. Finally, the misconception that “When most people are knocked unconscious, most wake up shortly after with no long-term effects” had 11 participants remain incorrect and 4 participants change their answer from correct to incorrect after the intervention.

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Table 4 represents the change in applications over time. Of the two applications resistant to change, similar trends were also seen. The application about “How quickly a person recovers from head injury depends on how hard they work at recovering” had 23 participants remain incorrect and 2 participants change their answer from correct to incorrect after the intervention. The application about “It is good advice to remain inactive during recovery from a traumatic brain injury” had 9 participants remain incorrect and 7 participants change their answer from correct to incorrect after the intervention.

Discussion

Misconceptions about Traumatic Brain injuries

Of the eight misconceptions, five were endorsed above 40% before the educational intervention and three were still endorsed after the intervention. These three misconceptions existed in spite of the educational intervention and widespread information in the news and on campus. I purposed that the comparative risk might impact the ability to learn but no evidence for this was found. I hypothesized that the eight selected misconceptions would show similar results in the pre-test (time 1) and, as seen in Table 1, only five misconceptions supported the hypothesis. Thus nearly 28 years after the original study conducted by Gouvier et al. (1988), five misconceptions are still endorsed incorrectly.

For this study, I created the ‘real life’ applications of the eight misconceptions to see if people would make the right choice in the situation regardless of their beliefs pertaining to the misconceptions. Participants generally did better with the applications overall. Participants endorsed the incorrect answer above 40% in only two scenarios. The most commonly missed application was about the misconception “how quickly a person recovers from head injury depends on how hard they work at recovering.” The secondly most commonly missed application was about the misconception “it is good advice to remain inactive during recovery from a traumatic brain injury.” Both applications were missed at similar rates even after the educational intervention. A possible explanation for this could be that the wording of the application question was not clear enough.

General knowledge improved and the addition of verbal and written information was helpful for participants, however the misconceptions remained. The educational information did not directly address the three persisting misconceptions in such a fashion that the participants

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could apply to the misconceptions. Future research could ask students why they endorse the beliefs or even the confidence they have in their beliefs. More information is needed to determine the origin of these beliefs and why they persist. The same could be done for the application questions. Creating scenarios and having participants self-talk through their decisions might yield valuable information for the public and health professions.

Along with asking participants why they endorse a particular belief, the validity of each misconception and statement should be confirmed in order to prevent the spread of incorrect information. Participants often asked for clarification on a particular statement when taking the misconception survey during time 1. This could have been caused by poor sentence structure, incorrect information, unclear purpose of question, etc.

The specific misconceptions that persisted after the educational intervention could become a problem for health care professionals. In the event that a patient endorses the belief that “complete recovery from a severe traumatic brain injury” is possible, false hope may occur resulting in the discontinuing of treatment after significant improvements have not happened in a timely manner. In the event that a patient endorses the belief that “after going unconscious there are often no long term effects”, the likelihood for that patient to seek medical care will most likely decrease if such an event occurred. This could pose to be a problem if the patient did received damage that could have been prevented with professional help. Finally, if a patient endorsed the belief that “they should remain inactive during recovery” they may not allow their body to receive the stimulation that often aids in the recovery process. These beliefs could spread resulting in not only a patient endorsing the misconception but also neighbors, significant others, family members, co-workers, etc.

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Implications

This study has important implications for how knowledge surrounding particular health concerns. The current study aimed to examine the current beliefs surrounding traumatic brain injuries and the possible misconceptions. Similar misconceptions were seen in 1988 and 2002. Nearly thirteen years later, the misconceptions were still prevalent in the participants tested and endorsed at similar rates. Participants in the current study were undergraduates at James Madison University and several reported exposure to this type of injury (Table 5). Participants with exposure to traumatic brain injuries generally answered the surveys during time 1 no differently than participants with no exposure. This meant that the knowledge surrounding traumatic brain injuries are still not being properly addressed to the general public even after a traumatic brain injury is obtained.

As previously mentioned, the most common form of communication between physician or health care provider is verbal communication in which the physician or health care provider talks to the patient without providing physical supplemental information such as an educational pamphlet (Lee et al., 2002). This form of communication is has often demonstrated to be ineffective when not paired with supplement materials (Northcraft & Jernstedt, 1975). Most of the participants who had previous exposure to traumatic brain injury themselves reported communicating verbally with their health care provider. The lack of supplement materials could cause the transmission of incorrect information into the public. Patients may not be in the emotional state to retain information, as seen in cancer patients, or patients may not be receiving accurate information from the physician (Lee et al., 2002). Further study is needed to see if similar trends are seen in the general public.

Although 12% of participants experienced a traumatic brain injury, 56% reported having talked to a physician about traumatic brain injuries (Table 5). Of those 56%, nine participants communicated strictly with verbal communication and eight with verbal and written communication. Over 50% of

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participants indicated they engaged in high risk sports and over 60% indicated they would likely participate in high risk sports in the future. The misconceptions that were once thought to be addressed were still present in the participants even after over half reported talking to a health care professional. As mentioned by Gouvier et al. (1988) a national education is necessary to prevent further injury and harm and, as demonstrated in the current study, is still needed.

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Appendices

Appendix A

Misconception Survey

Please circle the answer that most closely reflects your agreement or disagreement with the following statements:

1. When most people are knocked unconscious, most wake up shortly after with no long-term effects.

True

False

2. It is good advice to remain inactive during recovery from a traumatic brain injury.

True

False

3. Complete recovery from a severe traumatic brain injury is not possible, regardless of how badly the person wants to recover.

True

False

4. How quickly a person recovers from head injury depends on how hard they work at recovering.

True

False

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5. People who have one head injury are more likely to have a second one.

True

False

6. Once a person feels 'back to normal' the recovery process from traumatic brain injuries is complete.

True

False

7. Whiplash injuries to the neck can cause brain damage even if there is no direct blow to the head.

True

False

8. Sometimes a second blow to the head can help a person remember things that were forgotten.

True

False

Appendix B

Application of Misconception Survey

Please read the following statements and indicate your agreement or disagreement by circling the option that most closely reflects your answer:

- 1) A 200lb football player ran head first into a similar sized athlete. The football player does not report a headache or dizziness. He was reported saying the incident was a blur and cannot remember hitting the guy because of the rush of adrenaline.

This player is suspect of having a brain injury: True or false

- 2) A female rugby player was knocked unconscious by a player on the other team. She awoke shortly after able to remember the events both prior to and after being knocked out.

This player is not at risk for long lasting effects: True or false

- 3) After receiving a moderate concussion, Lacy is told by her parents to sleep regularly and continue daily activities.

Lacy should sleep regularly and continue daily activities: True or False

- 4) Gary has sustained a moderate traumatic brain injury. Having gone to bi weekly doctor visits, strictly following doctors orders', and participating in mental stimulation (cross words and Sudoku).

Gary will most likely recover fully from this injury: True or False

- 5) Teddie unknowingly sustained a traumatic brain injury after falling and hitting her head while walking to class on Monday. She complained of headaches and dizziness for several days following the fall. The following weekend she felt back to 'her normal self' and decided not to go to the doctor.

Teddie has completely healed from her Injury: True or False

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- 6) Two soccer players bumped heads while trying to head butt the ball. Both players were taken out of play due to suspected head injury. One player complained of a headache and nausea. After 20 minutes, this soccer player felt 'ready to play'!

Because this player felt better under an hour, he is not more likely to sustain a second head injury: True or False

- 7) Sam was driving to school when another vehicle rear ended him. He was wearing a seatbelt and sustained no other injury besides whiplash. He complained of a 'stiff neck' for several days and a headache from 'the stress of the accident'.

Sam is suspected of having a brain injury: True or False

- 8) Grandma Jean just turned 72. She was outside in her garden hanging pots when one unexpectedly fell and hit her in the head. She blames herself for being clumsy and does not report a headache or dizziness. She finds herself feeling nauseous later on in the day and blames it on her lack of appetite.

Grandma Jean is suspected of having a brain injury: True or false

Appendix C

General Knowledge Survey

Please circle the option that most closely reflects your answer to the following statements:

1. What is a Traumatic Brain Injury?

- a) A bump or blow to the head that improves normal function of the brain
- b) A bump or blow to the head that disrupts normal function of the brain
- c) A bump or blow to the head that neither improves or disrupts normal brain function

2. Who is more likely to get a traumatic brain injury?

- a) Men
- b) Women
- c) They are both equally likely

3. Traumatic Brain Injuries contribute to more than _____ deaths per year.

- a) 25,000
- b) 50,000
- c) 100,000

4. What is the most common traumatic brain injury?

- a) Mild
- b) Moderate
- c) Severe

5. Which of the follow is true regarding sleep during recovery from a Traumatic brain injury (including mild, moderate and severe)?

- a) Don't Sleep
- b) Get extra sleep
- c) Normal amount of sleep

6. Which of the following is true regarding symptoms from a mild traumatic brain injury like a concussion?

- a) If there are no immediate symptoms of an injury, there is no need to worry
- b) Symptoms only appear immediately after the injury took place
- c) Symptoms vary in time when they appear

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7. Which of the following is true regarding a second injury to the head after the initial injury?

- a) A second blow to the head could fix the problems caused by the first blow
- b) A second blow to the head could cause death in rare cases
- c) A second blow to the head will cause no harm

8. Which of the following is not a sign of having a mild traumatic brain injury like a concussion?

- a) Loss of consciousness
- b) Uneven pupils
- c) Improved cognition

9. Which of the following is not a long-term problem associated with concussions?

- a) Trouble concentrating
- b) Loss of Memory
- c) Improved Brain function

Please circle the answer that most closely reflects your agreement or disagreement with the following statements:

10. A concussion is not considered a traumatic brain injury.

True

False

11. If someone does not have a loss of consciousness, they should not be afraid of having a concussion

True

False

12. Nausea is a symptom of a concussion.

True

False

13. There will always be an outward sign (ex, uneven pupils) for someone with a concussion

True

False

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14. If there are not unusual complications, people who have sustained a concussion will most likely heal quickly.

True

False

15. Following a hit to the head, a person should stay awake for as long as possible

True

False

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Appendix D

Comparative Risk Survey

Please circle the option that most closely reflects your answer to the following statements:

1. Out of **one hundred people**, how many would you estimate experience brain injuries at some point in their lifetime?

0	1	2	3	4	5	6	7	8	9
0 – 10	11 – 20	21 – 30	31 – 40	41 – 50	51 – 60	61 – 70	71 – 80	81 – 90	91 – 100
people	people	people	people	people	people	people	people	people	people

2. Common risk factors of brain injuries are participation in contact sports like football, rugby or soccer, previous brain injuries, family history of brain injuries and occupational hazards. Based on these risk factors please indicate how likely you are to obtain a brain injury like a concussion in the future:

0	1	2	3	4	5	6	7	8	9
No	11 – 20	21 – 30	31 – 40	41 – 50	51 – 60	61 – 70	71 – 80	81 – 90	91 –
Chance	Small				Moderate				Large
	Chance				Chance				Chance

Please answer the following questions. Please indicate your agreement or disagreement by circling a number (-3 much less, -2 a little less, -1 less, 0 the same, 1 more, 2 a little more, 3 a lot more).

3. Compared to other men/women of similar age, your chances of getting a brain injury in the future are:

-3	-2	-1	0	1	2	3
Much less	A little less	Less	The same	More	A little more	A lot more

4. If you were engage in a sport like football or rugby, compared to other men/women of similar age also playing the same contact sport, your chances of getting a brain injury are:

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-3	-2	-1	0	1	2	3
Much less	A little less	Less	The same	More	A little more	A lot more

5. Imagine you had previous history of brain injuries, compared to other men/women with a similar history of brain injuries, your chances of getting another brain injury are:

-3	-2	-1	0	1	2	3
Much less	A little less	Less	The same	More	A little more	A lot more

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Appendix E Demographics Survey

1. Have you ever read about head injuries in the Newspaper, weekly journals, magazines or other news sources?

Yes

No

2. Have you ever talked to friends about head injuries?

Yes

No

3. Have you ever talked to family members about head injuries?

Yes

No

4. Have you ever talked to health care professionals (Doctors, nurses, etc.) about head injuries?

Yes

No

If you indicated yes to question 4, please answer the following questions:

a. Please indicate how the information was communicated to you by circling your answer:

Orally

Written (pamphlet, sheet of paper) orally and written

b. After the communication did you feel as if you retained the correct information?

Yes

No

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Traumatic Brain Injury History

Please answer the following questions by circling the option that most closely reflects your answer:

1) Have you ever had a traumatic brain injury (this includes a concussion)?

Yes

No

If you answered yes to the previous question please answer the following questions by circling the option that most closely reflects your answer:

a. When did it occur?

1
Within the past 30
days

2
Within the past 6
months

3
Within the past year

4
More than a year
ago

b. Indicate the severity:

0
Unknown

1
Mild

2
Moderate

3
Severe

c. Indicate the recovery time:

1
Less than a
month

1
Between 1 – 6
months

2
Within 6 months

3
Within 6 – 12
Months

4
More than a
year

d. Did you experience any complications during recovery? If so, please explain.

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1. Have you had multiple traumatic brain injuries (this includes a concussion)?

No I have never had a traumatic brain injury	No I have only have one	Yes I have had more than one
---	--	---

If you answered that you have had more than one traumatic brain injuries, please answer the following questions by circling the option that most closely reflects your answer:

a) How many have you had?

2 I have had 2 traumatic brain injuries	3 I have had 3 traumatic brain injuries	4 I have had 4 traumatic brain injuries	5 I have had more 5 or more traumatic brain injuries
--	--	--	---

b) When did the second one occur?

1 Within the past 30 days	2 Within the past 6 months	3 Within the past year	4 More than a year ago
--	---	---	---

c) Indicate the severity:

0 Unknown	1 Mild	2 Moderate	3 Severe
----------------------------	-------------------------	-----------------------------	---------------------------

d) When did the third one occur?

1 Within the past 30 days	2 Within the past 6 months	3 Within the past year	4 More than a year ago
--	---	---	---

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e) Indicate the severity:

0
Unknown

1
Mild

2
Moderate

3
Severe

f) Did you experience any lasting complications from the traumatic brain injury? If so, please explain.

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1. Have you had a family member or friend who has had a traumatic brain injury?

Yes

No

If you answered yes to the previous question, please answer the following questions:

a) Indicate the severity:

0
Unknown

1
Mild

2
Moderate

3
Severe

b) Indicate the recovery time:

1
**Less than a
month**

1
**Between 1 – 6
months**

2
Within 6 months

3
**Within 6 – 12
Months**

4
**More than a
year**

2) Do you participate in any sport that requires contact with another player or object like a ball or bat?

3)

Yes

No

4) If you answered yes to the previous question, please list the sports you participate in:

5) Do you plan on participating in any sport that requires contact with another player or object like a ball or bat in the future?

Yes

No

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- 6) If you answered yes to the previous question, please list the sports you plan on participating in:

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Demographics

1. Please indicate your gender:

Female

Male

2. Please indicate your age:

Under 17

17

18

19

20

21

22

Over 22

3. Please specify your ethnicity:

White

**Hispanic or
Latino**

**Black or
African
American**

**Native
American or
American
Indian**

**Asian /
Pacific
Islander**

Other

Appendix F

Communication Script

Please read the following statement:

Traumatic brain injuries are caused by a bump or sudden jolt to the head that normally disrupts function but not every jolt or bump results in a traumatic brain injury. A person can still obtain a brain injury from whiplash. Men are nearly three times more likely to sustain a traumatic brain injury than women. The most common traumatic brain injuries are considered mild and called concussions. It's important to note that concussions are considered a traumatic brain injury.

Signs and symptoms of concussion or mild traumatic brain injuries can be difficult to spot. Although mild traumatic brain injuries are the most common type of brain injury, many miss the signs and symptoms completely. These signs may be missed by the person with the concussion and may not appear right away. Signs and symptoms for a concussion range with any of the following: appearance of confusion, clumsiness, inability to recall the event or things prior to event, loss of consciousness, uneven pupils, nausea, sensitivity to light, headache or even trouble concentrating. A loss of consciousness, even briefly, can be an indicator of a traumatic brain injury with potential lasting effect. Outward signs like uneven pupils and loss of consciousness accompany not every concussion so it's good. A person may also experience mood abnormalities like irritability, sadness or increased anxiety. Sleep patterns may also be interrupted causing more sleep or less sleep, or trouble falling asleep.

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Recovery from a mild brain injury includes getting more than the normal amount of sleep, avoiding activities that are very demanding such as weightlifting and gradually returning to daily activities. Contrary to popular belief, it's ok to go to sleep after a concussion; the brain needs the rest to recover. Once a person feels well enough, and with doctors consent, a person can gradually introduce daily activities again because the healing process is not over. Cognitive activities, like reaction time, may be slower even after a person feels better. Traumatic brain injuries contribute to many deaths and permanent disabilities and often-complete recovery is not possible.

After obtaining the first concussion, a person is at a higher risk of obtaining a second. It is also good advice to try and avoid obtaining a second head injury during the healing process. On rare occasion, a second blow to the head may cause the brain to swell ultimately causing death; this is called second impact syndrome. Although concussions and mild traumatic brain injuries are normally non-life threatening, their effects can be serious. Nearly 50,000 deaths are reported each year due to this type of injury.

It's extremely important to remember this information. There can be long-term complications from this type of injury. Memory and attention span may be damaged. There may also be a loss of coordination and balance. A person may suffer from long-term headaches as a result of this injury. The good news, though, is that most people heal from concussion quickly.

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Table 1

The percentage each misconception and application of misconception was incorrectly endorsed for each of the 8 beliefs at time 1 and time 2

Misconception	Time 1	Time 2
1) Unconscious with no long term effects		
Misconception	46.7	50.0
Application of Misconception	20.0	13.3
2) Remaining inactive during recovery		
Misconception	76.7	66.7
Application of Misconception	50.0	53.3
3) Complete recovery from severe TBI		
Misconception	80.0	86.7
Application of Misconception	3.30	3.30
4) Recovery speed and how hard a person works		
Misconception	43.3	26.7
Application of Misconception	93.3	83.3
5) One head injury leads to a second one		
Misconception	30.0	6.70
Application of Misconception	20.0	6.70
6) Feeling back to normal, completely healed		
Misconception	6.70	3.30
Application of Misconception	20.0	6.70
7) Whiplash causes TBI		
Misconception	6.70	6.70
Application of Misconception	33.3	6.70
8) Second blow helps remember		
Misconception	50.0	16.7
Application of Misconception	30.0	23.3

Note. The misconceptions listed in the table are recorded in shorthand.

COMMUNICATION TYPE ON KNOWLEDGE ABOUT OF BRAIN INJURIES

Table 2

The mean correct responses and standard deviations in the General Knowledge Survey per condition for both time 1 and time 2

Condition	Time 1	Time 2
Video lecture	12.1 (1.30)	13.5 (1.13)
Video lecture and script	10.9 (1.96)	13.3 (1.05)

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Table 3

The number of participants per misconception that remained incorrect, remained correct, moved from incorrect to correct and moved from correct to incorrect between time 1 and time 2 of the misconception survey.

Misconception	# participants remained incorrect	# participants remained correct	# participants moved from incorrect to correct	# participants moved from correct to incorrect
1) Unconscious with no long term effects	11	12	3	4
2) Remaining inactive during recovery	12	6	4	8
3) Complete recovery from severe TBI	23	1	1	5
4) Recovery speed and how hard a person works	2	11	11	6
5) One head injury leads to a second one	0	20	9	1
6) Feeling back to normal, completely healed	0	27	2	1
7) Whiplash causes TBI	1	27	1	1
8) Second blow helps remember	4	14	11	1

Note. The misconceptions listed in the table are recorded in shorthand.

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Table 4

The number of participants per misconception that remained incorrect, remained correct, moved from incorrect to correct and moved from correct to incorrect between time 1 and time 2 of the application of misconception survey.

Misconception	# participants remained incorrect	# participants remained correct	# participants moved from incorrect to correct	# participants moved from correct to incorrect
1) Unconscious with no long term effects	4	24	2	0
2) Remaining inactive during recovery	9	8	6	7
3) Complete recovery from severe TBI	29	0	0	0
4) Recovery speed and how hard a person works	23	0	5	2
5) One head injury leads to a second one	1	23	5	1
6) Feeling back to normal, completely healed	2	24	4	0
7) Second blow helps remember	1	19	9	1
8) Second blow helps remember	6	20	1	3

Note. The misconceptions listed in the table are recorded in shorthand.

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Table 5.

Summary of demographic information obtained from participants

	Number of Participants	Percentage of Participants
Male	10	33.3
Verbal	4	13.3
Verbal and script	6	20
Female	20	66.6
Verbal	11	36.6
Verbal and script	9	30
Has had previous TBI	12	40
Has communicated with physician about TBI verbally	9	30
Has communicated with physician about TBI verbally and written	8	26.6
Has had engagement in high Risk sports	17	56.6