

NFL Player's Worst Nightmare:
The Relationship Between Concussions
in the NFL and Their Long-Term Damages
Phillip Montezuma

Abstract

This study examined the awareness people have of the long term damages and effects to the brain NFL players may receive from multiple concussions or blows to the head throughout their career. The participants voluntarily completed a 10 question survey I created via Survey Monkey that was posted on Facebook and Twitter. I predicted that there would be around 25-30 participants but there turned out to be 177 participants but only the first 100 responses were analyzed in this research. There was a wide range in the ages of participants and a few were in the medical field or former football players. A hypothesis was that not many people are aware of the long list of brain damages NFL players may suffer from after their careers are over and that is due to the simple fact that the NFL had denied the fact that there was a relationship between concussions in football and brain damage. However the participants seemed to have knowledge of the long list of possible long-term psychological damages concussions can cause. The only question most participants got wrong was that they assumed the concussion rate in the NFL increased from last season when it actually decreased, but not by much.

NFL Player's Worst Nightmare: The Relationship Between Concussions in the NFL and Their Long Term Damages

Since the creation of the National Football League it has arguably become the most powerful and popular professional sport league in America out of the "Big Four" which consists of Major League Baseball(MLB), National Hockey League(NHL), and the National Basketball Association(NBA). To no surprise the NFL's popularity was linked to the league's violence and brutality that happens on the 100 yard fields. Today's society in America views these professional athletes as larger-than-life men and some are idolized as heroes. Kids grow up wanting to play sports and hopefully make it to the big leagues just like these athletes they watch on their television screens every Sunday, Monday, and Thursday. However there is something that occurs on the fields, the sidelines, and even the locker rooms that doesn't get addressed as much as it should: concussions. Concussions have been a professional football player's worst nightmare for decades because not only can multiple concussions cause an end to their career, it can cause long-term brain damage affecting the way they live their everyday life.

The NFL was first founded in Canton, Ohio on September 17, 1920. However it was previously known as the American Professional Football Association, APFA for short. It was renamed the NFL two years later in 1922. The first APFA game was played on September 26, 1920 between the Rock Island Independents and the St. Paul Ideals. Only two of the 11 original franchises are around to this day: the Decatur Staleys and Chicago Cardinals. The Staleys moved to Chicago during 1921 then were named the Bears in 1922 and the Cardinals are now in Arizona not Chicago.

A problem that occurred frequently in football games were head related injuries. In response to the injuries leather helmets were introduced to the league in the mid-1920's, however

the leather helmets did not provide much protection for the players. Around the 1930's the teams began decorating their helmets with colorful logos. It wasn't until 1939 where a helmet company, Riddell, stepped in and created a helmet with a hard plastic shell. Riddell is a company started in Chicago that was founded by high school football coach John T. Riddell in 1929. It wasn't until four years after the introduction of the Riddell helmets that the NFL had finally made wearing helmets mandatory. During the 1950's, the plastic helmets now were made in a model that had a single face bar. Then in the 1980's the single face bar was replaced with what we see players wear now, a cage-like "face mask". The addition of the face masks made players believe they had more protection and were determined they could withstand stronger head to head collisions. However, not long after the addition of the face masks on the helmets they were being used as a "weapon" and could cause a player significant damages to their head or body being dragged down by it. To compensate for what was happening with the face masks, the NFL created what we know as the "facemasking" penalty in 1956 in attempting to stop players from using the face bar to tackle players.

According to the [*New York Times Article*](#), "Players Face Head-Injury Risk Before the N.F.L." by Alan Schwarz, Neurosurgeons believe that helmets provided false comfort, he called it "false confidence", for players which may lead them into thinking they can perform more daring plays and tackles when leading with their head. Concussions in football is not a new topic by any means, it is just a topic that in recent years is finally being brought into the spotlight. For years concussions had been passed off as just "getting your bell rung." In November of 1982, the *Wall Street Journal* had circulated a frontpage story calling concussions a "silent epidemic".

Which is true due to the fact the NFL had denied the fact that there is a relationship between concussions and brain injuries and hid it from the public.

The NFL is notoriously known for having an extensive history of injuries due to the aggressive and physical nature of the sport. Every time we see our favorite players put their pads on and step on the field they are taking the risk of possibly getting hurt or suffering a concussion. There are minor injuries that aren't too drastic and the player may be able to return to the game after spending some time being evaluated on the sidelines. Then there are the more serious injuries where the player may not be able to get off the field on his own and needs a teammate's help or medical assistance. Those are scenarios where a player has either broken a bone, torn a ligament, or even became unconscious from a blow to the head which could result in a concussion. A concussion is defined as "a type of traumatic brain injury that is caused by a blow to the head or body, a fall, or another injury that jars or shakes the brain inside the skull." To

Somatic	Cognitive	Emotional/Behavioral
Headaches	Slowed thinking, confusion	Frustration
Nausea	Slowed reaction times	Irritability
Fatigue, low energy	Impaired judgment	Restlessness
Sleep disturbances	Impaired attention	Lability
Vision changes	Distractibility	Depression
Tinnitus	Impaired learning and memory	Anxiety
Dizziness, balance problems	Disorganization	Personality changes
Sensitivity to light/noise	Problem-solving difficulties	

Figure 1

bring that into context of football, it is when a player suffers a major blow or multiple hits to the head causing the brain to shake so forcefully that the brain hits the inside of the skull.

Various scholarly articles, secondary articles, documentaries and interviews about concussions have led me to an understanding that NFL players who receive multiple concussions can develop long lasting brain damages such as Chronic Traumatic Encephalopathy (CTE), Amyotrophic Lateral Sclerosis (ALS), Alzheimer's, Dementia, and Depression. However, not until recently did the NFL acknowledge the fact that there was a relationship between hits to the head in football and long-term damages after being aware of that fact for decades but continued to deny it.

There are multiple cases where former NFL players committed suicide and their brains were examined and found with traces of CTE caused from blows to the head throughout their career. Chronic Traumatic Encephalopathy, as expressed by The American Medical Society, is a "neurodegenerative disease associated with repetitive brain trauma and characterized pathologically by the accumulation of protein in specific areas of the brain." CTE was first discovered in the brains of boxers around the 1920s and wasn't previously identified in football players until 2002. Former NFL player "Iron" Mike Webster had spent 17 seasons in the league, two with the Kansas City Chiefs and 15 with the Steelers including four Super Bowl teams. The fans loved him for his hard hitting "brutal" defense on the line because he was a Center which means he spent all of his career in what some call the "trenches". His favorite weapon to use was his head. His body that once seemed "invincible" began to deteriorate right in front of him and his loved ones eyes. On October 28, 1999 the NFL's disability board for retired players had granted total and complete disability to Webster because all the years of football and head-to-head collisions caused Webster's severe mental illness and symptoms of dementia. That case was the first time the NFL had ever acknowledged the fact that is a relationship between

football and long-term brain injuries. Towards the last few years of his life, he was unable to sleep, couldn't finish sentences, and even one day broke down in front of his son because he couldn't remember how to get home.

Just 11 short years after his retirement, Webster died of a heart attack at the age of 50 on September 24, 2002. Dr. Bennet Omalu studied Webster's brain posthumously and found CTE in the brain, which had never previously been identified in football players, only boxers. Dr. Omalu, also a trained neuropathologist, said Webster looked worn out and older than his age, there were even a few teeth that had fallen out and Webster attempted to superglue them back in. He didn't released his paper about the case of CTE found in Mike Webster's brain until 2005, in which he came to a conclusion that his [study](#) "highlights potential long-term neurodegenerative diseases in retired professional NFL players that suffer repeated mild traumatic brain injuries such as concussions."

The chain of events that followed Webster's death changed the way Americans viewed football. In 2005, former Pittsburgh Steeler Terry Long, 45, who played eight seasons in the NFL committed suicide by drinking a gallon of antifreeze. Dr. Omalu examined Long's brain posthumously and discovered traces of CTE in his brain, a second football player with this disease. Just a year later, one of NFL's hardest-hitting defenders Andre Waters, 44, committed suicide by a self-inflicted gunshot wound just three days before Thanksgiving. Omalu examined his brain as well, and his findings were breathtaking. Waters brain damage was so intense from the all the hits to the head he endured throughout his career that his brain was similar to that of an 85-year-old man and early stages of Alzheimer's. Dr. Omalu had discovered CTE in American football players for the the first time, and in just four short years he had discovered it

in the brain of three former NFL players. His medical evidence suggested that multiple concussions may result in long-term brain damages such as CTE, Dementia, and Alzheimer's.

In 2007 the NFL released their first concussion policy, which only took 87 years. The policy requires that a player needs to be examined by the team's medical staff immediately following the injury. The NFL even added a measure that would punish teams that fail to properly enforce the league's concussion protocols. As of recent years, concussions have been on the rise. In just the first 10 weeks of the 2015-2016 season, the league added 97 players to the injury list with concussion related injuries whereas the previous season in it's entirety (preseason and playoffs) only had a total of 123 concussions.

Due to the lack of concussion acknowledgement from the NFL for decades, players were unaware of the long-term brain damages they are at risk of suffering. Not only were players uninformed, so are the parents and it is vital that parents are aware of the dangers they are signing their children up for. According to source #20 (Traumatic Brain Injury: Research) Hasbro Children's Hospital ran a study and came to a conclusion that despite a recent decline in children's participation across organized youth sports, the number of emergency-room department visits resulting from "sport-related concussions has increased dramatically over the past 10 years." Most professional football players have been playing since a young age and were unaware that repetitive head trauma leads to them being more prone to developing ALS or CTE later in life. Nowadays high school football players are trying to hit harder to imitate what they see on their TV's watching these larger-than-life college and professional athletes. Which is not a good progression because the age group of 15-19 years is one of the highest risk periods for significant head trauma because they are still growing. As stated in a study ran by McKay Moore

Sohlberg, sport-related concussion cases in the US occurs at levels as high as 1.6-3.8 million annually. (Source #19)

Since the first three cases where Dr. Omalu found CTE in former NFL players (Webster, Long, Waters), there have been multiple cases where former NFL players had committed suicide and were diagnosed with traces of CTE in their brains. In February of 2011, a former Chicago Bears defensive back Dave Duerson committed suicide with a gunshot wound to his chest. Duerson shot himself in the chest instead of his head so his brain could be used for research for CTE. A year later in April of 2012, former Atlanta Falcons safety Ray Easterling committed suicide at the age of 62 and his autopsy found signs of CTE in his brain.

Less than a month later well-known NFL linebacker Junior Seau, 43, was found dead in his home with a gunshot wound to his chest just two short years after retiring from the league and was classified as a suicide. Seau played in the NFL for 20 years and endured his fair share of hard hits and head-to-head collisions. He spent most of his career on the San Diego Chargers, 13 seasons, and even helped lead the Chargers to their first and only Super Bowl appearance to date. Seau is well known in New England because of the four seasons he spent with the Patriots Franchise(2006,2007,2008,2009). His ex-wife, Gina Seau, noticed drastic changes in Seau during the final few years of his life which included random mood swings, depression, forgetfulness, insomnia, and even detachment. Family members and close friends believe that his suicide was brought on by multiple concussions although the initial autopsy report had found no apparent brain damage. So a few portions of his brain was sent out to the National Institutes of Health(NIH) for further studying. On January 10, 2013 the NIH released the result of their study of Seau's brain tissue confirming that he did in fact suffer from CTE.

In 2009 Greg Aiello, Head of NFL PR's Department and Leagues Spokesman, finally acknowledged the fact that "it's quite obvious from medical research that's been done that concussions can lead to long-term problems" over a telephone interview according to a New York Times [article](#) by Alan Schwarz. It was that year that the NFL had published stricter concussion policy guidelines to whether players can return to play. The new policy explained that a player who sustains a concussion should not return to play in the same game if he shows certain signs or symptoms such as:

- Inability to remember assignments or plays
- A gap in memory
- Persistent dizziness & headaches
- Lost consciousness

The following summer the NFL finally hung up a poster in every locker room warning players that "concussions may lead to problems with memory and communication, personality changes, as well as depression and the early onset of dementia. Concussions and conditions resulting from repeated brain injury can change your life and your family's life forever." It took multiple decades of research and numerous players sustaining concussions before the NFL had finally acknowledge the relationship between concussions and brain injuries.

The NFL was finally under fire for the information they kept a secret about concussions from their players for decades. On June 7, 2012 over 4,000 former NFL players filed a lawsuit against the NFL in attempt of receiving financial compensation for "long-term chronic injuries, financial losses expenses, and intangible losses suffered by the [players and their families.]" (Source #11) The "Plaintiffs"(former NFL players) alleged that the league knew of the fact that

repeated head trauma could cause players to suffer from neurodegenerative diseases, yet still hid the fact that there are long-term effects from multiple blows to the head from the players for decades. The [case](#) alleged that the NFL had engaged in:

- Fraud
- Fraudulent concealment
- Negligence
- Negligent omission
- Negligent misrepresentation
- Negligent hiring and retention

The lawsuit created a controversy because it exposed the NFL's duty to protect their players through not promoting the risk of injury by not revealing information or enforcing procedures that would ensure the players safety. The case was dragged out in court over a timespan of three years. On August 29, 2013 the NFL and the former players reached a deal in the lawsuit that calls for the league to pay up to \$765 million to help fund medical exams, concussion-related compensation, medical research for retired NFL players and their families, and litigation expenses but the agreement still needed to be approved by the judge. Just under five months later on January 14, 2014 the federal judge declined the proposal because she didn't feel that it was enough money.

It wasn't until April 22, 2015 that the federal judge gave the final approval to the lawsuit. The settlement of this case only applies to former NFL players who retired on or before July 7, 2014 as well as family members of former players who died before that date. The league agreed to provide up to \$5 million per former NFL player in the case for serious medical conditions

associated with repeated head trauma. The money paid for damages to players and families based on the former players' psychological injuries as well as funding research towards concussion damages and enforcing mandatory diagnostic exams for current players. Some of the former NFL players and critics saw the settlement as a win for the NFL believing that they got away with it easy because the league is such a money powerhouse in this country.

The total concussions in the NFL dropped from 275 in the 2015 season to 244 in the 2016 season, a 11.3% decrease. However that total is still higher than the 2014 season(206) and the 2013 season (229). Over the last few seasons the league has attempted to handle in game concussions in a variety of ways. In 2006 the NFL began enforcing fines and possible suspensions for illegal hits. Four years later in 2010 the NFL established a rule that moved kickoffs up five yards to the 35-yard line to encourage more touchbacks and reduce the number of high-impact collisions between players. Then to ensure less injuries on kickoffs the league changed the rule a little more during the offseason before the 2016-2017 season hoping it will evidently reduce the number of kick returns taken. What they adjusted to the rule was touchbacks on kickoff now allow the receiving team to start at the 25-yard line when it previously was taken out to the 20-yard line. Also in a direct response to the settlement of the to the concussion settlement from the 2012 case the league passed a rule that prevents ball carriers from partaking in head-to-head contact in the open field. That rule was an attempt to not only protect the ball carrier but the defenders as well by penalizing the offensive players who use their helmets like a "weapon" and create a high risk of head trauma.

The findings of Chronic Traumatic Encephalopathy in Mike Webster's brain was the start of research about cases of CTE in former NFL players. In 2003 Dr. Kevin Guskiewicz, sports

medicine researcher at University of North Carolina, published a [paper](#) stating that “1 in 15 players with a concussion may have additional concussions in the same playing season” as well as the fact that “previous concussions may be associated with slower recovery of neurological function.” Then in September of 2009 there was a front-page [article](#) published by the New York Times that reported that an NFL-funded study found that former NFL players are 19 times more likely to have dementia, Alzheimer's, or any other memory-related diseases than the normal rate of men between the ages of 19 and 49.

One of the more interesting sources was *Nine-Year Risk of Depression Diagnosis Increases with Increasing Self-Reported Concussions in Retired Professional Football Players* a study performed at University of North Carolina at Chapel Hill. They believed that concussions may accelerate the progression to long-term mental health outcomes such as depression in athletes and that players with a history of career concussions are at an elevated risk for depressive episodes later in life compared to those retired players without a history of concussions. Out of 1,044 respondents who are members of the National Football League Retired Players Association, 106 (10.2%) of them reported being clinically diagnosed with depression between their first interview in 2001 and the follow up interview 9 years later in 2010. The study concluded that professional football players self-reporting concussions are at a greater risk for having depressive episodes (depression) later in life compared with those retired players that have no concussion history.

All of this has happened due to trained neuropathologist Dr. Bennet Omalu's findings making him the first person to discover traces of CTE in a brain of a former NFL player. Mike Webster's brain was the first hard evidence that hits to the head in football can lead to long-term

brain damages. The first [study](#) Dr. Omalu released about CTE was published in 2005 and highlighted potential long-term neurodegenerative diseases in retired professional NFL players that suffer repeated mild traumatic brain injuries such as concussions. As well as that the onset of “dementia-related” syndromes may be initiated by repetitive cerebral concussions in professional football players. The NFL hid the fact that they knew about the evidence presented in Dr. Omalu’s research and publically denied the relationship between hitting your head in football and long-term brain damages. Even after Omalu had multiple cases of CTE found in former NFL player’s brains his work was still brushed to the side and not addressed by the league. In the PBS FRONTLINE documentary *League of Denial: The NFL’s Concussion Crisis* Dr. Omalu said “you can’t go across the NFL, they’ll squash you”. A valid statement because the NFL is a money-making powerhouse here in America and is arguably the most popular sport of the “Big Four” so the league is a powerful thing.

Dr. Omalu’s impact and story had not gone unnoticed. In 2015 Peter Landesman directed the movie *Concussion*, which was influenced by Omalu’s findings and the struggle he faced being an American immigrant and going up against the NFL. Will Smith plays the role of Dr. Bennet Omalu. The movie begins with former Pittsburgh Steeler Mike Webster giving his Hall of Fame inductee speech. It shows the decline of the man who at once seemed invincible. Once Dr. Omalu (Will Smith) examines Webster’s brain he discovered traces of CTE in the brain, which was never previously identified in a football player. The NFL and other corporations continued to neglect and deny Omalu’s findings because he had turned on the lights and finally given a name to the NFL’s biggest “boogeyman”. The league did not want to look bad because of the CTE findings so Dr. Omalu struggled immensely trying to get people to listen to his work.

The movie was interesting seeing how they depicted Omalu's life and his struggles in the sort of "David-and-Goliath" type battle against the NFL, especially since a lot of this research had to do with him and his findings.

The fact that the NFL denied the relationship between concussions and long-term brain damages for multiple decades up until recent years is astonishing. There have been a plethora of former NFL players that now are suffering from or have died from CTE, ALS, Alzheimer's, Dementia, Depression, etc. A lot of that could have been prevented if the NFL had informed their players for the long-term risks they are at when they are out there on the field. The league was created in 1920 and it wasn't until 2010 that the NFL had hung up concussion awareness posters in locker rooms. The athletes keep getting bigger, faster, and stronger which is making football become increasingly more dangerous. It wasn't until the last few years that player safety became a topic of conversation among the sports community. Concussions are not only an NFL player's worst nightmare, but any football player's because not only can multiple concussions cause an end to their career, it can cause brain damage affecting the way they live their everyday life.

This research study was to see how aware people in society are of concussions and their long-term damages. Regardless if the participant is a former football player or current football player, or if they never even played in their life. Even people in the medical field who would have a better sense of understanding of the long-term psychological damages a person can receive from playing football. I want this research to shine light on a topic that has affected former and current NFL player's lives since the first time they put on football pads and a helmet.

To show the public what the NFL had denied for decades, that there is in fact a relationship between concussions in the NFL and long-term brain damages.

Method

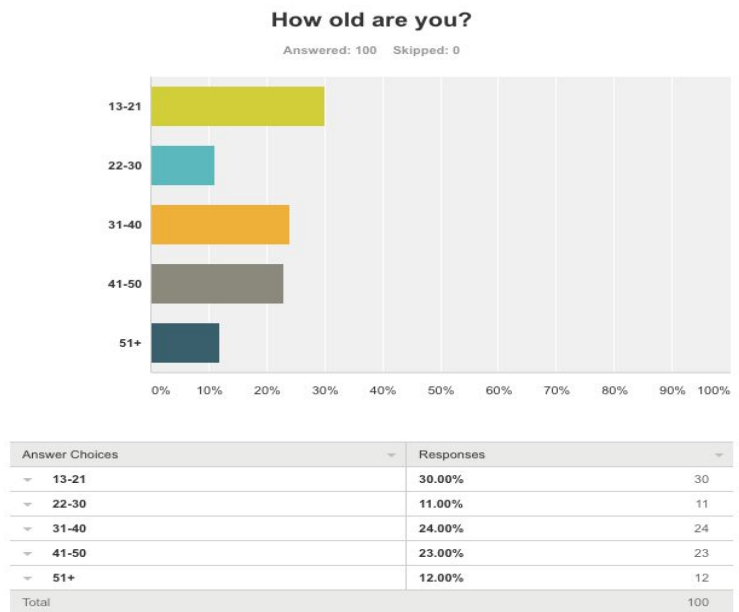
Participants

My participants were all voluntary because I posted my survey's link out on my Facebook and Twitter. In total there were 177 responses, but SurveyMonkey only analyzes the first 100 participants. The 100 participants age range was widely spread, from 13 and up. The mode age group was 13-21 (30), and the age group that is represented the least was 22-30 (11). The participants consisted of former football players, non-football players, people in the medical field, people who have been concussed before, and even people that aren't any of the above.

Materials

The material was an online survey. The survey was created via Survey Monkey and consisted of 10 multiple choice questions. The 10 questions consisted of getting to know the participants age group, athletic history, medical field history, knowledge of concussions, and if they have ever received one.

Figure 2



Procedure

The 10 question survey was posted on my Facebook and Twitter captioned "If you could take a few minutes out of your day to participate in a survey I created to help me with my research for one of my classes at Salem State. Anyone is welcome to take it, the more the merrier. Please Share, Thank you!" The survey consisted of 10 multiple choice questions that were not complicated but were there to see the participants understanding of concussions and the long-term damages. The purpose of the survey is to see how informed people are about concussions.

Results

After posting the survey to Facebook and Twitter, the results started pouring in. Within the time span of two days the survey surpassed the maximum response limit of 100 survey responses. In total there were 177 responses, 167 via the Facebook post and 10 from Twitter. The first four questions were for me to categorize the participants by age group, if they played football before or not, and if they are currently in the medical field. I predicted that I was going to have somewhere between 25-40 responses so I was satisfied with my plethora of responses and wide range of ages.

The participants age groups ranged anywhere from 12-21 up to 51+. The mode age group was 13-21 (30 responses) which is reasonable because my friends mostly fall within the age group. The other two most common ages were 31-40 (24 responses) and 41-50 (23 responses) which is due to the fact that my mother and a few of her friends shared my survey on their Facebook wall. The two least common age groups were 51+ (12 responses) and 22-30 (11 responses).

The second question, "Have you ever played football on an organized team? If No, Skip to question #4", received 88 responses and 12 people skipped this question entirely. Out of the 88 responses, only 18 participants (20.45%) had answered "Yes". Of those 18 participants that have played football on an organized team, only four are currently playing on a team. The fourth question helped me see how many people are currently in or trying to get into the medical field. Out of 95 responses on this question, 17 participants (17.89%) answered "Yes".

After the being able to see what type of people were participating in my survey, the questions began to test their knowledge of concussions in the NFL and the long-term damages. Out of 100 responses, all the participants got the question right about "what is a concussion?" So the respondents are aware of what a concussion is. The sixth question was in a true or false fashion: "Most concussions occur without losing consciousness." It is a true statement and 94 of the 100 participants chose true. The next question asked "how does one get a concussion from football?" and 99 participants said "one or more hits to the head"

Two of the most essential questions asked for the survey were questions eight and nine. Question eight asked "what long-term psychological damages can multiple concussions cause?" There were six different possible answers: *Chronic Traumatic Encephalopathy (CTE)*, *Amyotrophic Lateral Sclerosis (ALS)*, *Alzheimer's*, *Dementia*, *Depression*, and *All the Above*. 87 of the 99 participants chose all the above which is the correct response although all the options are correct. 12 participants chose CTE which is also true but the right choice was all the

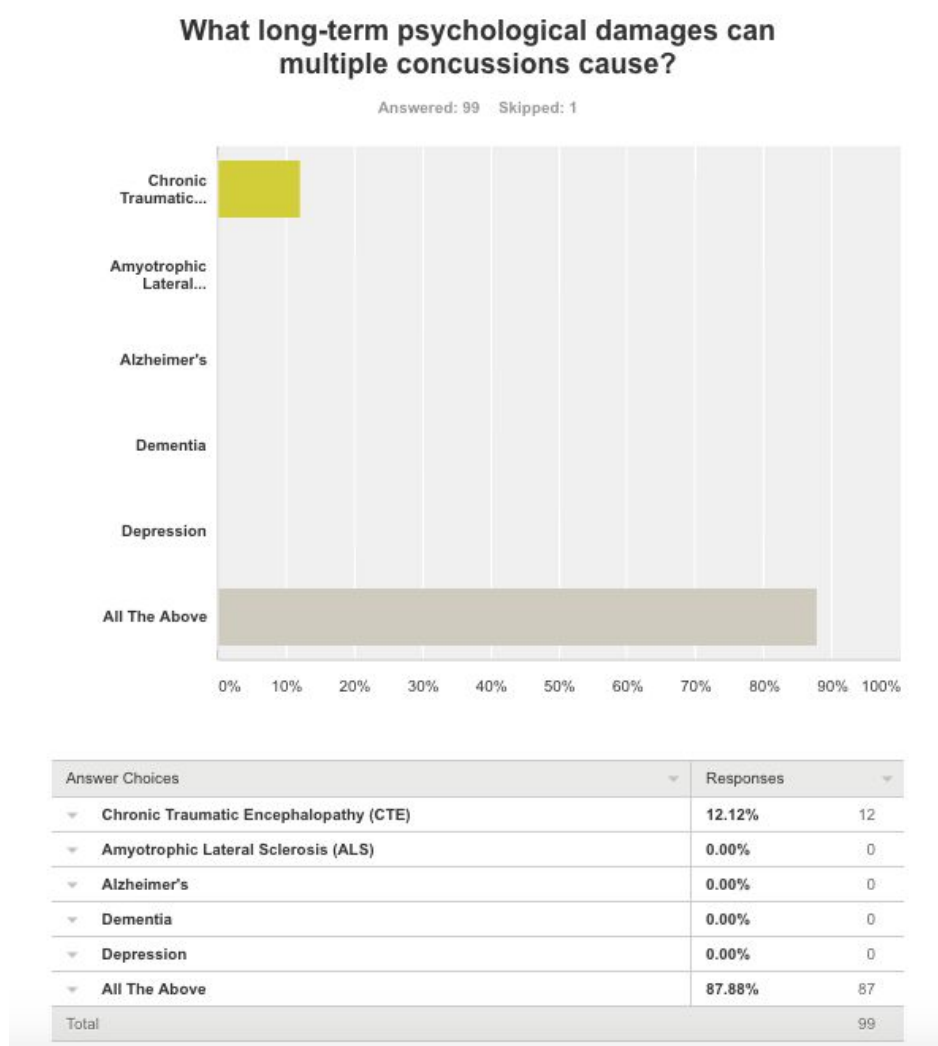


Figure 3

above because all of them are possible long-term psychological damages that can be caused by multiple concussions.

The next question was to see how aware the survey participants are of the current concussion problem in the NFL. The question asked if concussions “Dropped or increased” by 11.3 percent in 2016 from the previous season. 76 of the 98 participants chose increased, however the correct answer is that it dropped. Only 22 participants (22.45%) got this question right, the only question of the 10 where a majority of responses were incorrect.

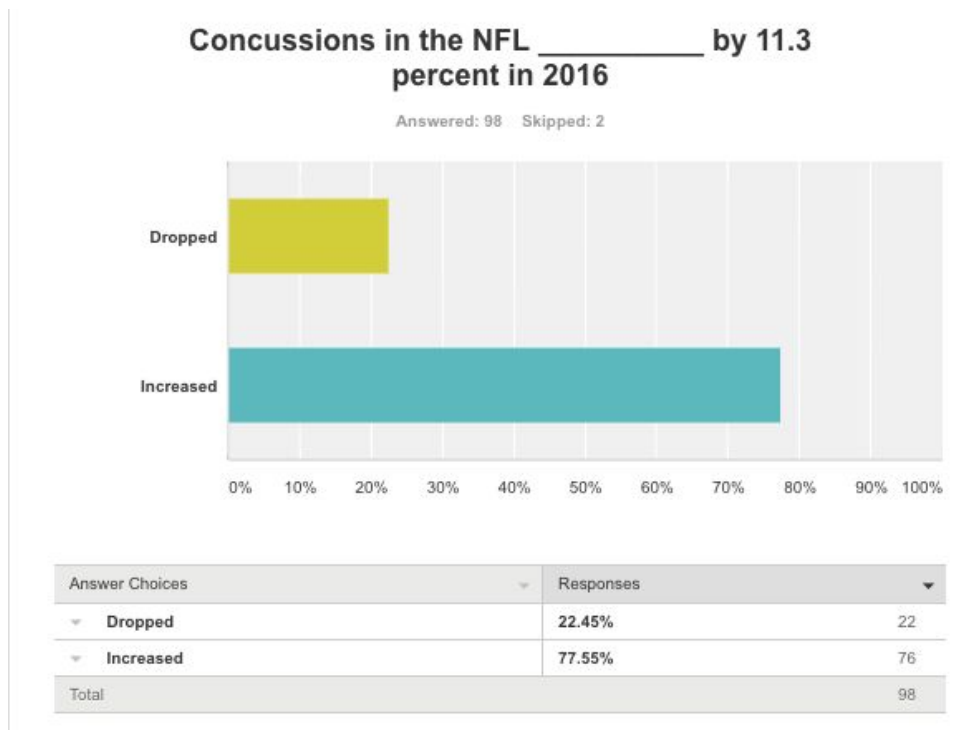


Figure 4

The final question was out of curiosity to see how many of the participants had ever suffered a concussion or multiple concussions. There were three possible responses to this question: “*Yes, once*”, “*Yes, multiple times*”, and “*No*”. The vast majority of the 100 participants had never suffered a concussion injury, 67 participants to be exact. 24 participants had only suffered a concussion once and unfortunately 9 of the survey participants had suffered a concussion multiple times.

Conclusion

Overall, the survey was beneficial towards my research to see how much knowledge everyday people have about concussions and their possible long-term brain damages. Due to the large amount of responses the poll received I was able to gather information from former football

players, current players, people who have never played, as well as some people in the medical field. The NFL is arguably the most popular sport league in this country and it hid crucial information concerning their player's health and safety for decades. A lot of people grow up idolizing the professional football players they see on the TV screen and even wanted to be them at some point. While gathering information from various sources I learned that concussions in the NFL may lead to long-term brain damages and one of the most severe brain diseases to be linked with multiple hits to the head is Chronic Traumatic Encephalopathy. Dr. Omalu was the first to find traces of CTE in a former NFL player's brain posthumously and sparked a chain of events that changed the NFL and how they go about protecting their player's health. The league has handled concussions in a variety of ways since Omalu's findings in 2002 such as: creating new rules, adjusting some old ones, hanging up informative posters, and paying retired players in need of aid for serious medical conditions that are associated with repeated head trauma. After denying the relationship between concussions and long-term brain damages since Dr. Omalu's first study was published back in 2002, senior NFL official Jeff Miller who is the NFL's Senior Vice President of Health and Safety Policy had publicly acknowledged a connection between football and CTE on March 14, 2016. In conclusion concussions have been a professional football player's worst nightmare for decades because not only can multiple concussions cause an end to their career, it can cause long-term brain damage affecting the way they live their everyday life.

References

- Abreu, Marcos A., Wirt Edwards, and Brandon Spradley. "The War Against Concussions." *The Sport Journal*. U.S. Sports Academy, 12 Feb. 2016. Web. 24 Apr. 2017.
- Duff, Melissa C. "Management of Sports-Related Concussion in Children and Adolescents." Editorial. *ASHA Leader* n.d.: n. pag. Web. 24 Apr. 2017.
- Fainaru-Wada, Mark, Jim Avila, and Steve Fainaru. "Doctors: Junior Seau's Brain Had CTE." *ESPN*. ESPN Internet Ventures, 11 Jan. 2013. Web. 24 Apr. 2017.
- Farrey, Tom. "Pathologist Says Waters' Brain Tissue Had Deteriorated." *ESPN*. ESPN Internet Ventures, 19 Jan. 2007. Web. 24 Apr. 2017.
- Fifer, Robert. "Head-to-Head with Helmets and Hearing Aids." Editorial. *ASHA Leader* n.d.: n. pag. Web. 24 Apr. 2017.
- Flynn, Simone Isadora. "Concussions in Professional Sports." Salem Press Encyclopedia, Jan. 2016. Web.
- Kerr, Zachary. "Nine-Year Risk of Depression Diagnosis Increases With Increasing Self-Reported Concussions in Retired Professional Football Players." *Nine-Year Risk of Depression Diagnosis Increases With Increasing Self-Reported Concussions in Retired Professional Football Players - Aug 24, 2012*. N.p., n.d. Web. 24 Apr. 2017.
- Kerr, Z. Y., S. W. Marshall, J. R. Harding, and K. M. Guskiewicz. "Nine-year Risk of Depression Diagnosis Increases with Increasing Self-reported Concussions in Retired Professional Football Players." *The American Journal of Sports Medicine*. U.S. National Library of Medicine, Oct. 2012. Web. 24 Apr. 2017.

Knoblauch, Austin. "NFL Sees Decrease in Concussions from 2015 Season to 2016." *NFL.com*.
N.p., 26 Jan. 2017. Web. 24 Apr. 2017.

League of Denial: The NFL's Concussion Crisis. WGBH, n.d. *PBS FRONTLINE*. PBS, 8 Oct.
2013. Web.

Michael, Elise. "SCHOOL OF HARD KNOCKS — THE IMPACT OF THE NFL
CONCUSSION LITIGATION." *CARDOZO ARTS & ENT*. (n.d.): n. pag. May 2015.
Web.

Nation, Kevin SeifertNFL. "NFL Sees Drop in Player Concussions during 2016 Season." *ESPN*.
ESPN Internet Ventures, 26 Jan. 2017. Web. 24 Apr. 2017.

"NFL Concussions Fast Facts." *CNN*. Cable News Network, 01 Aug. 2016. Web. 24 Apr. 2017.

"NFL Founded in Canton." *Pro Football Hall of Fame Official Site*. N.p., 01 Jan. 2005. Web. 24
Apr. 2017.

Omalu, Bennet, S. DeKosky, R. Minster, M. Kamboh, R. Hamilton, and C. Wecht. "Chronic
Traumatic Encephalopathy in a National Football League Player." *Neurosurgery*. U.S.
National Library of Medicine, July 2005. Web. 24 Apr. 2017.

Schwarz, Alan. "Players Face Head-Injury Risk Before the N.F.L." *The New York Times*. The
New York Times, 01 Oct. 2009. Web. 24 Apr. 2017.

Sohlberg, McKay, and Alexander Ledbetter. "Management of Persistent Cognitive Symptoms
After Sport-Related Concussion." *AJSLP* (n.d.): n. pag. Web. 24 Apr. 2017.

Stites, Adam. "How Does the NFL's Concussion Protocol Work?" *SBNation.com*.
SBNation.com, 18 Sept. 2016. Web. 24 Apr. 2017.

"Traumatic Brain Injury: Research and Resources." *The ASHA Leader*. American

Speech-Language-Hearing Association, 01 Nov. 2010. Web. 24 Apr. 2017.

Figure 1: A table about post-concussive symptoms pulled from source #2

Figure 2: A screenshot from my poll on SurveyMonkey and an analysis of the responses to question #1: "How Old Are You?"

Figure 3: A screenshot from my poll on SurveyMonkey and an analysis of the responses to question #8: "What long-term psychological damages can multiple concussions cause?"

Figure 4: A screenshot from my poll on SurveyMonkey and an analysis of the responses to question #9: "Did concussions in the NFL drop/increase by 11.3% in 2016?"