

# Preventing Concussions and Head Injuries in College Football: A Case Study of Sports Management

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## Abstract

**Purpose:** This study aims to address preventing head injuries and concussions among college football players. It investigates various tactics and measures intended to lessen the frequency and severity of these injuries.

**Design/ Methodology/ Approach:** A comprehensive survey of pertinent literature was conducted for determining viable solutions to prevent concussion, namely helmet design (Rowson et al., 2014), training methodology (Shanley et al., 2021), and policy implementation (Emery et al., 2017; Obana et al., 2021). The decision matrix was used as a tool to evaluate and compare different options, which were assessed based on the criteria of the least amount of political or media resistance, ease of measurement, convenience of implementation, and maximum purpose.

**Findings:** Policy development, player education, equipment improvements, and medical assistance are important components. College football can successfully reduce the risk of concussions and head injuries among its players by implementing thorough concussion management policies and protocols that prioritize player safety, encouraging a culture of awareness and responsibility, and utilizing advancements in protective equipment technology.

**Research Limitation:** As leaders, stakeholders, and individual practitioners all have various roles to play, further studies may be conducted to explore these roles. The researchers may also evaluate the effectiveness of prevention and treatment strategies for reducing concussions in college football.

**Managerial Implications:** In order to safeguard the long-term health and safety of players, this study underlines the significance of giving player well-being a high priority and putting forth specific preventive measures.

**Originality/ Value:** The study is an addition to the current body of knowledge, as it brings into spotlight some important improvements which can be strengthened as well as streamlined at the local, national, and worldwide levels, and thus the industry and sports professionals may play a big part in resolving this issue.

**Keywords:** Brain Function and Structure, Brain Injury Rates, College Football, Concussion, Football Retirement, NCAA Football, Post-Concussion Effect.

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## INTRODUCTION

The issue of concussions and head injuries in sports is a significant problem, affecting athletes of all ages and skill levels. Every year, an estimated 1.6 to 3.8 million sports-related concussions occur in the United States, with contact sports such as football, ice hockey, and soccer being the most prevalent (Gessel et al., 2007). According to Meehan III et al. (2013), football has the highest rate of concussions among high school athletes, with offensive and defensive line men being more likely to sustain head injuries than other positions. In professional sports, the National Football League (NFL) has a higher incidence of concussions than other professional sports, with the risk increasing with game intensity and certain positions being more susceptible (Casson et al., 2014). Concussions and head injuries have both short-term and long-term consequences, including cognitive decline, depression, and chronic traumatic encephalopathy (CTE), which has been discovered in the brains of deceased (McKee et al., 2009). Football laws that encourage high-speed collisions between players increase the likelihood of injuries and make the game contentious (Snow, 2010). As public awareness of the long-term pathological effects of concussions and head injuries has grown, there has been a demand to ban football (Mukand & Serra, 2015).

Repeated concussions in football players can cause chronic traumatic encephalopathy and neuropathological abnormalities that last a lifetime, leading to the disruption of numerous physiological processes and the accumulation of abnormal protein aggregates in brain cells (Giacomo et al., 2022). A recent study found that 182,000 football players may experience at least one concussion annually in youth, high school, and NCAA football programs, with around 1 in 30 youth players and 1 in 14 high school players being affected (Giacomo et al., 2022). The injury's minor symptoms can cause lifelong issues with physical function, focus, memory, behavior, and emotion, leading to neuropsychiatric symptoms such as depression, agitation, psychosis, violence,

dementia, and parkinsonism (Mukand & Serra, 2015).

Injuries have a negative impact on both team and individual athletic success, and injury prevention should be a primary priority to improve football players' performance and promote the activity. The media plays a crucial role in player health, with a strong and critical relationship between the NFL and the media (Orr, 2015). There has been significant dispute, though, regarding how the media has covered player health issues.

Through concussion education and awareness, players are reminded of the risks and signs of a concussion. If athletes are ignorant of concussions, which raise the risk in sports, they may succumb to the rush of energy and disregard their own safety (Ferry & DeCastro, 2023). Therefore, athletes, particularly football players, need to be informed and aware of measures to prevent their own injuries in order to decrease head injuries that could result in concussions.

### **The objectives of this study are to:**

- Identify the prevalence of concussions among college football players.
- Identify the source of CTE among college football players
- Examine the most effective safeguards players can take to prevent concussions.

These solutions include using the right equipment, (Rowson et al., 2014), altering the rules (Emery et al., 2017; Obana et al., 2021), receiving concussion awareness training, and fostering a culture of accountability and safety (Musumeci et al., 2019).

## CONCUSSION RESEARCH

Concussions and head injuries are a significant concern in college football, with severe consequences for players. Several studies have explored their prevalence and impact in this population (Garnett et al., 2021; Lakshakar et al., 2022). Concussion research

is a major focus for the Brain Injury Research Institute (BIRI, 2023), emphasizing that even minor head impacts can lead to long-term health issues. Symptoms include headache, nausea, fatigue, memory loss, disturbed sleep, and mood changes (Muckand & Serra, 2015).

Annually, millions of Americans experience concussions from sports and recreational activities, with football accounting for a significant portion (BIRI, 2023). Brain injuries in football cause a substantial number of fatalities, with around one in every 5.5 games resulting in brain damage (BIRI, 2023). In high school and college football, approximately 20% and 10% of players, respectively, experience brain injuries each season (BIRI, 2023). Moreover, players with a history of concussions are more prone to repeated concussions (Stamm et al., 2015; Swaine et al., 2007).

Repeated concussions can lead to chronic traumatic encephalopathy and dementia syndrome, raising occupational safety and public concerns (James et al., 2023). It is particularly common in contact sports like football, resulting in a progressive tauopathy (James et al., 2023; Bieniek et al., 2015). Concussions are also associated with musculoskeletal injuries, and the risk of subsequent concussions increases with prior injuries (Brett et al., 2018; Harada et al., 2019; McPherson et al., 2018).

The findings underscore the importance of effective prevention and management strategies for concussions and head injuries in college football, considering their potential long-term impact on players' well-being.

### **Problems of Concussion in Football**

Concussions are prevalent in various sports, with team sports like football accounting for 40.3% of cases, emphasizing the need to address the high incidence (Reid, 2020). In the US, over 5 million individuals are involved in football, including approximately 100,000 college football players (Cob

et al., 2013). The Center for Disease Control (CDC) has declared concussions an epidemic due to the increasing number of cases in emergency room visits, especially among children aged 9 to 13 (Anthony et al., 2013). Injuries in high school sports account for 13.2% of all injuries, while injuries in college sports account for 7.9% (Gassel et al., 2007; Marar et al., 2012).

The media, public, legislators, and sports medicine officials have shown increasing interest in concussion statistics, supported by significant epidemiological data (Bakhos et al., 2010; Covassin & Elbin, 2011; O'Connor et al., 2017; Stewart et al., 2014). Concussion rates are calculated based on the number of athlete exposures (AEs) or participations (Comstock et al., 2017; Lincoln et al., 2011; Zuckerman et al., 2015). Traumatic brain injuries related to sports and recreation affect teenagers between the ages of 10 and 19 in 70% of cases.

While most people recover from concussions within 2 to 4 weeks, 10% to 33% may experience symptoms persisting for 1 to 3 months (Kurowski et al., 2018). Long-term issues can range from minor to serious cognitive and behavioral problems. Second impact syndrome (SIS), resulting from repeated concussions in quick succession, can lead to serious brain injury and an increased risk of death (Kurowski et al., 2018). Immediate removal from participation is recommended if a concussion is suspected to prevent SIS (Kurowski et al., 2018). The increase in reported concussions may be attributed to more people playing sports, improved concussion education, and increased awareness and reporting (Daneshvar et al., 2011; Houck et al., 2016).

### **Changes in Brain Function and Structure**

Iverson et al. (2020) conducted research on the impact of premorbid mental health on clinical outcomes following concussions. They found that patients with pre-existing mental health issues had worse outcomes, particularly in terms of psychological symptoms such as depression and

worry. Football players often experience these symptoms, and there is growing concern that anxiety and mood disorders may present a specific clinical profile or subtype of concussions (Kontos et al., 2020). The fear of long-term effects and recovery from concussions is commonly associated with anxiety and depressive moods (Iverson et al., 2020). In rare cases, these issues can manifest as more complex phenomena such as functional neurological and somatic symptom disorders, malingering, or even suicide (Kontos et al., 2020). However, it can be challenging to determine the exact cause, as players may use concussions as a cover to discuss their mental health concerns, and anxiety may be exacerbated by worries about recovery (Kontos et al., 2020).

Rieger et al. (2019) found that students who sustain concussions while participating in sports activities are more likely to experience depression, anxiety, and a decline in academic achievement.

The current approach to concussion prevention, particularly in clinical and diagnostic examination, is deemed insufficient and in need of improvement (Musumeci et al., 2019). While the awareness of concussion risks has led to increased diagnoses across various sports, there are currently no validated indicators to accurately predict outcomes. Athletes' recovery is typically based on the disappearance of symptoms and returning to baseline on neuropsychological tests and physical exams, without assessing brain metabolism and function before allowing the athletes to return to play (Musumeci et al., 2019). Football players, who may experience symptoms without apparent physical pain, often decline testing and subsequent treatment. Therefore, it is crucial to closely monitor the short-term effects of a single brain injury on a player's physical and mental health, considering the findings from multiple experimental investigations (Musumeci et al., 2019).

### **Post-Concussion Effect After Football Retirement**

If left untreated, concussions, especially when they occur frequently, can have long-term effects (Guskiewicz et al., 2019). Guskiewicz et al. (2019) conducted research on retired professional football players and found an 11.1% diagnosis of depression. The study revealed a correlation between the number of concussions experienced throughout a player's career and the prevalence of depression. Those with a history of concussions were three times more likely to be diagnosed with depression compared to those without a history.

Concussions may also play a significant role in the development of osteoarthritis in former football players (Lynall et al., 2017). Football players who experienced injuries resulting in loss of consciousness were found to be at an increased risk of mild cognitive impairment due to higher hippocampal atrophy. Individuals with a history of concussions also showed higher hippocampal volume loss (Strain, 2015). Ruital et al. (2019) conducted a study on retired football players and identified neurophysiological indicators of cognitive deficits, including response delays and decreased amplitude in neurophysiological responses. Overall cognitive decline and poor self-reports of social, psychological, and physical well-being were also noted. Multiple concussions have been linked to neurodegenerative diseases, cognitive deficits, and mental impairment (Misquitta et al., 2018).

A systematic review by Manley et al. (2017) revealed that college football players with a history of multiple concussions are more likely to experience depression and cognitive impairment later in life. Pietrosimone et al. (2015) found a correlation between the frequency of concussions in retired NFL players and musculoskeletal injuries. The odds of reporting different musculoskeletal injuries were significantly higher in players with a history of concussions compared to those who had never been injured.

The media plays a crucial role in player health as it is closely tied to the NFL, but there have been

controversies surrounding how the media has covered player health issues (Orr, 2015). While some journalists have raised concerns and shed light on player health issues, there have been instances where coverage has been questionable. Various injuries sustained by college football players, such as the case of Jahvid Best and Tim Tebow, highlight the need for attention to player health (Orr, 2015). Football can be thrilling and fulfilling for players, but there is a serious risk of sustaining brain injuries and concussions. Chronic traumatic encephalopathy (CTE), depression, and cognitive impairment are some of the long-term negative effects associated with concussions (Giacomo et al., 2022).

### **Potential Remedy for lowering Athlete Concussions**

Sport-related injuries are prevalent among individuals of all ages, but those between the ages of 9 and 24 experience them most frequently (Reid et al., 2020). A study in 2012 examined around 2,048 youth football players for concussions, with 97.9% of them being male. There was an increase in head-to-head collisions throughout that year (Jacobson et al., 2013). Jinguji et al. (2012) found that males were more affected by concussions than females in terms of memory and focus. Tsushima et al. (2018) reported that 1,250 young athletes (12.1%) experienced concussions overall, and 18-year-old athletes had a higher relative risk compared to 13-year-olds. Injuries have a negative impact on both team and individual athletic success, with player availability playing a significant role in the likelihood of success. Injury prevention should be a priority to improve athletic performance and promote physical activity (Meehan III et al., 2013).

### **NCAA Football Strategies**

Jefferies et al. (2020) conducted a study on concussion prevention strategies using a survey instrument with structured and open-ended questions. The study aimed to determine the use and effectiveness of cervical-strengthening programs,

helmets, and other concussion prevention strategies. The athletes' perspectives on the effectiveness of mouth guards, helmets, and neck strengthening in preventing concussions were also examined. The findings revealed that 69.86% of the athletes believed that strengthening the cervical region could help prevent concussions, while 20.74% believed that mouth guards and 8.76% believed that soccer helmets could prevent concussions. This suggests that most contact sport players perceive mouth guards to be more effective in preventing concussions compared to other preventive equipment.

Parsons et al. (2019) proposed several principles and approaches for player safety, specifically focusing on football player safety from concussions. These principles include adherence to agreed moral criteria during training sessions and tournaments, prohibition of using any type of protective or playing equipment as a weapon, intolerance of intentional injury to another player, and conformity with applicable equipment safety rules and certification criteria for all athletic and protective equipment. The authors also highlighted the importance of implementing an emergency action plan based on the Concussion Safety Protocol Checklist for suspected concussions to ensure prompt and appropriate management.

McCrea et al. (2017) emphasized the significance of accurate concussion diagnosis and management in college football players. The review recommended that coaches and medical staff receive training in recognizing and managing concussions, and that players undergo baseline testing before the season to assist in concussion diagnosis and management.

### **College Football Head Injury Prevention Gear and Technology**

Guskiewicz et al. (2005) conducted a study on the cumulative effects associated with recurrent concussions in collegiate football players and found that helmet design significantly impacts the risk of

concussion. The study emphasized the importance of helmet designs that reduce the risk of rotational acceleration, which has been linked to concussions. It was noted that athletes in contact sports, including professional and collegiate levels, have a higher likelihood of experiencing concussions.

The use of mouth guards as a concussion prevention strategy has been proposed, but Barbic et al. (2005) highlighted that studies investigating the impact of mouth guards on concussion prevention have had limitations in study design or small sample sizes. While there is currently no conclusive evidence that any type of mouth guard can prevent concussions, some experts in sports injury research suggest that wearing mouth guards can reduce the risk of concussions by as much as 75%. Protective headgear, mouth guards, and helmets work by reducing the risk of severe traumatic brain injury (TBI) through the absorption of impact and the prevention of the brain from colliding with the skull. The technology in helmets, such as energy-absorbing materials, compresses upon impact to reduce the force transferred to the head (Daneshvar, 2011).

Advancements in technology are being explored to provide preventive measures for head injuries in football. Krzeminski et al. (2012) noted the use of high-tech products in football at various levels. For example, Xenith X2 football helmets use proprietary technology to minimize impact and head jolt, adapting to the player's cranium for a custom fit. The VSR4 and Revolution headgear have also shown a significant reduction in concussions (Rowson et al., 2014). These findings suggest that appropriate helmet design can help decrease head injuries and concussions (Guskiewicz et al., 2005).

Helmet designs vary based on the specific needs and requirements of each activity. X2IMPACT mouth guards, for example, have embedded sensors that track impacts and can wirelessly notify a trainer when a high-impact hit occurs, allowing for prompt assessment of the player's condition (Krzeminski et al., 2012). While helmets and headgear in most sports

are effective in preventing high-impact collisions that cause severe traumatic brain injuries, it remains unclear to what extent they can protect players from the lower-impact collisions that lead to concussions (Parsons et al., 2019).

### **Rule Modifications**

The National Collegiate Athletic Association (NCAA) plays a crucial role in the development and review of concussion prevention guidelines. The Division I Concussion Safety Protocol Review Process was established in 2015, when five Division I conferences approved concussion safety protocol legislation to protect student-athlete well-being (Baugh & Kroshus, 2015). Each autonomous school is required to submit a concussion safety protocol to the Concussion Safety Protocol Committee for annual review. These regulations aim to mitigate the risks associated with concussions (Baugh & Kroshus, 2015). Various procedures, such as pre-season education, pre-participation assessments, concussion recognition and diagnosis, post-concussion management, and return to learning and sport, are implemented to ensure proper equipment use and adherence to safety protocols (Baugh & Kroshus, 2015). These recommendations support student education, monitoring recovery, and reducing concussion rates.

Legislation focused on reducing injury rates is crucial, as brain injuries and concussions can have significant financial implications for healthcare. Implementing targeted regulations has been shown to reduce concussions in youth football, including regulations that discourage unwarranted contact with a player's head or neck area (Obana et al., 2021). However, some authors argue that the effectiveness of targeting regulations in reducing concussions may be limited if players who are subjected to such contact are not screened for concussion at the end of each game (Aukerman et al., 2022). Rules limiting the number of collisions in practices and games have been effective in reducing head contacts, with a significant decrease observed when the limit was

implemented. Similarly, limiting contact practices to a specified frequency and enforcing penalties for head impacts have resulted in reductions in head injuries (Emery et al., 2017).

Overall, the implementation of concussion prevention guidelines and targeted regulations plays a crucial role in reducing the incidence of concussions and promoting the safety of players in college football.

### **Education and Awareness**

Concussions can have significant physical, mental, and emotional impacts on individuals, highlighting the importance of effective management and prevention. According to Daneshvar et al. (2021), one crucial aspect of this is the need for comprehensive concussion awareness, particularly among college and high school football participants who have shown a lack of knowledge about concussions (Cournoyer & Tripp, 2014). Ignoring concussion signs and continuing to train or compete can lead to incomplete recovery and an increased risk of subsequent concussions, potentially resulting in serious traumatic brain injury or even death (Daneshvar et al., 2021). To mitigate these risks, athletes need to understand the significance of reporting concussion symptoms to coaches, trainers, or parents to prevent second-impact syndrome or traumatic brain injury. Therefore, it is essential to provide thorough education to athletes about the causes, symptoms, appropriate actions, and potential consequences of concealing symptoms (Daneshvar et al., 2021).

Concussion reporting by football players remains a challenge due to the difficulty of observing symptoms in the fast-paced and chaotic game environment (Manasse-Cohick & Shapley, 2013). However, the National Electronic Injury Surveillance System (NEISS) database has been instrumental in updating concussion-related injury data and can provide valuable information for policy implementation. By extracting and categorizing

concussion statistics from this database according to age groups and sport types, policymakers can make more informed decisions. The lack of concussion knowledge among football players in high schools and colleges underscores the need for concussion awareness and education (Cournoyer & Tripp, 2014). Enhancing football players' understanding and attitude towards concussions through structured educational programs should be considered in all high school sports programs (Daneshvar et al., 2021).

Improving concussion management and prevention requires a multi-faceted approach that includes effective information sharing, education, and a shift in athletes' attitudes towards reporting symptoms. By addressing these issues, the goal is to reduce the negative physical, mental, and emotional impacts of concussions and promote the overall well-being of football players.

### **Solutions to Limit Concussions**

A comprehensive approach is necessary for effective concussion prevention in college football, encompassing education, the use of protective gear such as helmets, and targeted rule enforcement. It is crucial for players to be educated about concussion symptoms and the importance of reporting them to coaches and medical experts (Daneshvar et al., 2021). This education can help players make informed decisions on the field and resist the temptation to continue playing despite potential concussion symptoms.

Targeted rule enforcement, along with instruction on proper technique, plays a significant role in preventing concussions (Daneshvar et al., 2021). Emphasizing good tackling technique can reduce the risk of concussion, while improvements in helmet technology have led to the development of helmets that provide better protection against the forces that cause concussions. A recent study by McCarty et al. (2021) showed that specialized helmet liners can decrease the risk of concussion by up to 34%. Focused rule enforcement and instruction on proper

technique can substantially reduce the likelihood of concussion among college football players (Shanley et al., 2021).

In conclusion, preventing concussions in college football requires a multifaceted strategy. By prioritizing education, the use of protective gear, and targeted rule enforcement, coaches, players, and medical experts can create a safer playing environment. It is worth noting that while helmet design is an important aspect of concussion prevention, it should be integrated into a broader approach that addresses various factors contributing to concussions.

## METHODOLOGY

After reviewing the literature on concussions, we determined three solutions to prevent concussion: helmet design (Rowson et al., 2014), training methodology (Shanley et al., 2021), and policy implementation (Emery et al., 2017; Obana et al., 2021). These options were then compared to see which offered the greatest remedy for brain injuries. The first stage in this procedure involved listing these three possibilities, followed by assigning weight to each of them using a pairwise matrix decision model.

Assigning letters to each of the options, A to helmet design, B to training pattern, and C to policy implementation, respectively, was done in the second stage (MindTools, 2022). The two most significant possibilities were determined by comparing the rows and columns. The matrix compares the three options based on two criteria: Helmet Design (A), Training Pattern (B), and Policy Implementation (C). 1) the least amount of political/media pushback, and 2) the maximization of purpose. For each pair, the letter of the chosen option was noted, and some cells were blocked to prevent repetitive comparison. For instance, C is marginally more important than A, but B is significantly more important (MindTools, 2022). Scholarly works like Shanley et al. (2021); Emery et

al., (2017); Obana et al., (2021) & Rowson et al., (2014) were quoted to support this suggestion. The effectiveness of certain training treatments for lowering the risk of concussions among college football players is discussed in this article. College football players can lessen the incidence and severity of concussions by instituting a training program that emphasizes effective tackling methods, building neck strength, and encouraging safe play.

The decision matrix is a tool used to evaluate and compare different options based on specific criteria. In this case, the options were evaluated based on the criteria of the least amount of political or media resistance, ease of measurement, convenience of implementation, and maximum purpose. Each criterion was given a maximum score of 3, with 3 being the highest and 1 being the lowest. These criteria were used to rank the options, and weights were given to each of them in order to determine the weighted score for each choice. For instance, the criteria with the highest weight of 3 would be the one with the least amount of political or media opposition. Based on each criterion's relative significance in accomplishing the overall objective, its weight was assigned.

## Analysis and Comparison of Solution

These weights and criteria were used to evaluate the possibilities, and a weighted score was generated for each option. The recommendation was to select the option with the highest weighted score. In order to provide a clear suggestion based on the set criteria, the decision matrix and weighted scoring system enabled a complete and objective review of the various possibilities.

The results are as shown in Tables 1 and 2, given as appendices.

Each option is represented by a letter, which is tied to them. Each letter's number indicates how much better each one is than the benchmark. (MindTools, 2022). The letter designation is for comparison



purposes only.

A = 1

B = 3

C = 1

### *Criteria for evaluation*

The matrix identifies four criteria for evaluating the options. These are: the least amount of political/media pushback, ease of measurability, ease of implementation, and maximizing purpose.

### *Weighted scores calculation*

The weighted scores are calculated by multiplying each option's raw score (obtained by adding up the scores for each criterion) by the weight assigned to the option. The weighted scores for each option are:

- **Helmet Design:** Raw score = 6 (least political/media pushback score of 1 + ease of measurability score of 1 + ease of implementation score of 2 + maximizing purpose score of 2). Weighted score = 17
- **Training Pattern:** Raw score = 9 (least political/media pushback score of 3 + ease of measurability score of 2 + ease of implementation score of 2 + maximizing purpose score of 2). Weighted score = 21
- **Policy Implementation:** Raw score = 7 (least political/media pushback score of 2 + ease of measurability score of 1 + ease of implementation score of 1 + maximizing purpose score of 3). Weighted score = 19

### **Ranking**

Finally, the options are ranked based on their weighted scores. In this case, Training Pattern has the highest weighted score of 21, followed by Policy Implementation with a score of 19, and Helmet Design with a score of 17.

### **Recommendation**

The training pattern had the highest weighted score (21), followed by policy implementation (19) and helmet design (17), as displayed in the decision-making models. The criterion and the pairwise matrix comparison weight served as the foundation for these. Therefore, training regimens are advised for college football players to lower the frequency of concussions and head injuries.

Football concussions or head injuries will be best treated with training regimens, according to research. This backs up the findings by some writers who claimed that concussions and head injuries would be significantly decreased with effective training of coaches and players on concussion and injury prevention techniques (Shanley et al., 2021).

It is vital to combine the diverse options and solutions offered for improved injury prevention. The model's training practices, and policy implementation are the two most successful preventative tactics. In the choice model, these two received the highest rating. By teaching football players how to avoid brain trauma and concussions, policy implementation will be less bureaucratic because individuals will be aware of the risks and effects of their behavior.

The fines and other penalties associated with policy implementation will go a long way in preventing this form of injury, which the Centers for Disease Control have already classed as an epidemic due to its repetitive nature and regular recurrence (Obana et al., 2021).

The helmet design, model, and make should be considered in concussion prevention. This is because it can aid in the prevention of direct impact and thus minimize the impact of concussions. A player should ordinarily not be allowed to play without protective gear in the form of a helmet. The design, model and make of helmets had been found to be particularly important in concussion prevention. (Rawson et al., 2014)

## **Methods for avoiding brain injuries and concussions in sports**

We have short-term, mid-term, and long-term aims when adopting a strategy. The intermediate and long terms are born from the short term. To reduce and avoid additional concussions and brain injuries, several techniques must be implemented as soon as possible—ideally within the following two to three months.

### **Short-term head injury and concussion preventative measures**

The first step is educating college football players about all there is to know about head injuries and concussions. Even after they have finished playing football, the effects of frequent concussions and head traumas need to be ingrained in their subconscious. This is not to scare the players but to encourage them to take all reasonable precautions to keep themselves and others from suffering head injuries or concussions. Several authors have noted the significance of sensitization for head traumas and concussions (Cournoyer & Tripp, 2014; Emery et al., 2017). Football players who experience recurrent concussions may choose not to report them because they are unaware of the risks. Concussion instances will be more likely to be reported because of increased awareness, leading to more accurate statistics, which will help with decision-making regarding the best preventive steps to adopt. Concussion cases not being reported have been a challenge in reducing this issue.

Checking for concussions after every game, treating them, noting individuals impacted, and taking steps to prevent repetitive concussions are additional crucial short-term concussion prevention strategies. This entails maintaining a list of players who experience this repeat. The issues being treated include brain traumas and repetitive concussions, as they are the actual causes of the various issues related to concussions (Meehan, et al., 2015). By keeping track of concussion incidences, monitoring

the situation, and denying participation to those who are still experiencing symptoms or have not fully recovered from a concussion, concussions, and brain injury issues can be reduced in the near term. To ensure football players' awareness and self-prevention, it is important to ensure the adoption of both monitoring for concussions after each game, treating them, and keeping records, as well as concussion-awareness campaigns (Meehan, et al., 2015).

### **Medium-term head injury and concussion preventative measures**

Training can be used as a medium-term control measure in addition to a short-term one. Within a one- to two-year period, the effectiveness of several training strategies might be compared, with the most successful one being chosen. To determine which defensive tactic is most effective, each player may use a different defensive strategy. Training is an ongoing process rather than a one-time strategy. Players must get frequent refresher training in concussion prevention techniques. Football concussions have been found to be decreased by doing this, which enhances overall performance. Regular training is also necessary for the coaches (Shanley et al., 2021).

Football players can avoid concussions in the medium term by using helmets that are designed properly. The effectiveness of helmets over the medium term may vary depending on the model, shape, make, and weather conditions. (Emery et al., 2017). These elements must be in place to implement a 1- to 2-year prevention approach, and a better helmet design must be created to prevent brain injuries. According to reports, helmet design has a significant impact on sports-related head injuries and concussion issues (Rowson et al., 2014). The prevalence of concussions when wearing various helmet designs can be investigated, and over one to two years, data can be gathered. The best possible prevention-focused design can then be used. Consistency in product performance and the

unpredictable effects of weather variations, however, may be noticed as restrictions.

### **Long-term (3–5 years) plan for improving the current inadequate condition (third level heading also)**

Long-term adoption of concussion prevention is necessary for its sustainability. The long-term preventative strategy will heavily rely on policy execution. One policy should ensure that no player can play without proper training on concussion prevention strategies. This will help the players be more knowledgeable on how to self-prevent concussions and avoid self-injuries to others.

Each policy needs to be monitored and assessed to see if it is achieving the intended results. Improvement of the current issues can be effectively ensured through monitoring and evaluation (M & E) in the next three to five years. If a specific preventive measure is discovered to be unsuccessful, it should be changed or improved. The policy should include specific regulations with associated fines or consequences for breaking them (Obana et al., 2021; Travis et al., 2021). To determine how this existing regulation is helping coaches and parents protect kids and teenagers from brain injuries and concussions, M&E on this issue is required. This will assist in deciding if such a policy should be adopted or not (Injury Center, n.d.).

A long-term concussion prevention plan may involve advances in helmet design technologies. This might entail conducting scientific research to develop a helmet with sensors that could detect impact and record it in real-time (Smith, & Jones, 2022). By removing the need for the victim to disclose before updating their concussion records, this research will help prevent repetitive concussions. To prevent another concussion while the patient is recovering, enough time might be allowed for their recovery. The updated records will also help with the formation and application of policies in this difficult situation (Smith, & Jones,

2022)

College football players can benefit from training patterns because it will help them understand how to prevent concussions with long-term consequences and give them a better defensive approach to concussion prevention (Miller, 2022). Several strategies for the prevention of the problematic situation of head injury and concussion had been discussed, but each strategy has a benefit without which it is not sustainable (Miller, 2022). Ignorance can be cured through sensitization. A better understanding of concussions and their effects will make it simpler to enact policies. College football players will benefit by reporting on time so that the right medication may be administered. Additionally, it will help children avoid suffering repeated concussions before fully recovering from the prior ones (Garnett, et al., 2021).

The beneficial effects of policy implementation are crucial. Individuals may exhibit more primitive actions in circumstances when rules are lacking. They will be able to behave in an orderly manner if they are aware of the consequences and fines that come with their behavior. By adhering to the game's regulations, concussions can be avoided, and performance can be improved. Additionally, it will give the parents of these kids and teenagers the confidence to let their kids completely engage in the activities, knowing full well that they are secure (Huang, et al., 2019).

## **DISCUSSION**

There are numerous policies and legislation in place to reduce the frequency and repeat of concussions in sports. These cover both primary and secondary policies. Main policy establishes legislation to limit concussions and brain injuries in sports, while secondary policy concentrates on early injury detection and treatment to lessen the impact of such traumas (Pickett, & Rojas, 2019). To avoid concussions, the NCAA (National Collegiate Athletic Association) has laws in place, such as penalties for

helmet-to-helmet contact or the use of a defenseless receiver, contact limitations, and a ban on high-risk formations. The government also requires education prior to participating in contact sports as a secondary preventive measure and prevents anyone with a history of concussions from doing so. Although these rules were thought to be admirable, the extent of their execution has been questioned because they were not always adhered to. One strategy that will ensure the issue of concussions is addressed is to ensure compliance and standardization (Pickett, & Rojas, 2019).

Children and teenagers who sustain concussions are the focus of laws that the state legislature has passed. Minnesota was the first state to enact legislation on concussions. Mississippi was the final state to pass concussion regulations in 2014. According to these laws, athletes who take part in contact sports must get concussion education, those who show signs of a concussion must be removed from the game, and participants must receive a concussion diagnosis before they may resume play (Baugh et al., 2015). According to the Centers for Disease Control and Prevention, parents and coaches should be aware of how the concussion policy affects children and teenagers. The CDC (Centers for Disease Control) (Centers for Disease Control) has suggested a multi-component strategy for educational activities as a concussion prevention technique (Centers for Disease Control and Prevention, 2022; National Football League, 2021). Limiting contact during practices will reduce concussion rates because, according to Register-Mihalik et al. (2014), practices frequently lead to concussions. According to the report, the Chicago School's strategy for controlling and preventing concussions will contribute to its reduction.

Through some important improvements at the local, national, and worldwide levels, the industry and sports professionals may play a big part in resolving this issue. All coaches should act professionally when enforcing rules of the game intended to avoid concussions. Sports concussion prevention and

protection gear should be offered by manufacturers of protective gear for football players, and these manufacturers should all have research and development departments. Teachers should teach students how to avoid concussions while playing sports and how to adopt quick healing procedures. Concussion reporting and identification requirements must be understood by professionals. Professionals will find it easier to make the necessary changes as concussion prevention advances locally, nationally, and internationally (Sarmiento et al. 2019).

This problem can be resolved and improved with the help of an occupational therapist, who has been said to be essential to concussion injury rehabilitation. They should therefore be included in the interdisciplinary therapy group. This is because, according to Harris et al. (2019), they are essential in determining the impact domains during concussions. To improve prevention and treatment strategies for reducing concussions in college football, new medical personnel comprised of interdisciplinary teams with the appropriate competence must be added.

Leaders, stakeholders, and individual practitioners all have various roles to play. The stakeholders should put the players' safety first and adopt any reforms that would help to fix the problems at hand. The team's performance will suffer due to the absence of exceptionally talented players; therefore, practitioners should be aware that concussions not only impact the players. Losses in viral games brought on by subpar performance may affect league revenue and erode investor confidence. They ought to make sure that safety helmets and other headgear are always accessible. Helmets must be of the right design for the best protection. They oversee making sure teams are informed about concussions and regularly trained in concussion management. Stakeholders must ensure that current laws are strictly followed and that better policies are added to remedy this issue (Ladwig, & McKenna, 2019).

## CONCLUSION

The importance of concussion prevention cannot be over emphasized as seen in the literature review and results of this research. Several options can be adopted in the prevention and management of concussions as was shown but the training pattern remains the best option as it had the highest weighted score. There is therefore the need for regular training of players on concussion prevention strategies, especially for themselves. Others such as policy implementation and helmet design have been shown to contribute to solving some of these problems. However, the combination of options will prove a highly effective strategy. To make prevention more effective, there is a need for short-, medium- and long-term adoption of these prevention strategies.

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**Appendices**

**Table 1: Weight for Each Option**

Options	Helmet Design A	Training Pattern B	Policy Implementation C
Helmet Design A (Rowson et al., 2014)		B 3	A 1
Training Pattern B (Shanley et al., 2021)			C 1
Policy Implementation C (Emery et al., 2017; Obana et al., 2021)			

**Table 2: Criteria and Results**

	Weight	Criteria				Results
	1	2	3	4		
Option	Least amount of political/ media pushback	Ease of measurability	Ease of implementation	Maximizing purpose	Raw score	Weighted score
Helmet Design	1	1	2	2	6	17
Training Pattern	3	2	2	2	9	21
Policy Implementation	2	1	1	3	7	19