
Concussions And High Impact Sports

When considering a topic for a literature review my attention was instantly drawn to something concerning sports. Along the lines of sport, I was most interested in injury, injury prevention and rehabilitation from those injuries. Throughout my time playing sports both recreationally and in an organized setting I saw my fair share of injuries ranging from dislocations of shoulders, broken bones, and quite frequently concussions. The sports that I played were quite high impact like hockey. The concussions caught my attention and that's what I rolled with. The idea of concussions and its relationship to sport is a topic that has a large pool of research that is only growing and will continue to grow. In sports, the conversations pertain to not only how to prevent them but also how they are received. When researching I developed the concept for this review which is the question of how concussions in high impact sports are received and the implications applied for prevention. The review is analyzing 9 articles that are concerning the topic of concussion in sport. These articles contain specific details that pertain to different aspects of the concussion discussion. The articles have been organized into three categories that are separated by the information available in each. These consist of firstly, the acquiring of the concussion in the varies high impact sports consisting of hockey, football, soccer and more. The second pool of importation is on the impacts of repeat victims and the long-term effects. The final section is the prevention of concussions through protective equipment and regulations implicated to protect the athletes.

Concussions in high impact sports

Concussions are among some of the most common injuries in athletes that play high impact sports of the likes of hockey, football, lacrosse and many more. The concussions are a result of multiple factors varying from the location of the hit, power of impact, and other physical objects in play (Delaney, Al-Kashmiri & Correa, 2014). When considering a sport like ice hockey, there are so many factors of the game that can play into a participant getting a concussion. The playing surface itself is surrounded by a rigid object in the form of the boards. Those boards act as another surface that can help to initiate a concussion. The rapid pace at which ice hockey is played doesn't help the case of a player when it comes to concussions. As a matter of fact, the rapid pace aids the concussions being received. When the player is brought to a halt by either a rigid object such as the boards or by another player and there is contact made with the helmet of the player, there is a risk of concussion due to the rapid change in velocity that can accelerate the chances of a concussion. Along with the velocity the boards have little to no elasticity unlike when the contact is made with another human. In football, it is much of the same case. The potential for hits that or direct head contact is very high, along with the potential for hits that are unexpected or hits in which a player is blindsided. These hits are especially dangerous as the receiving player has no time to prepare for impact and brace themselves to the incoming hit.

Through analysis of multiple sources, it was evident that concussions are among one of the most common injuries but as such, they still receive very little care when compared to injuries of other magnitudes (Goodman, Gaetz & Meichenbaum, 2001). In hockey, the most common ways that concussions were acquired were through contact with the helmet of a player with either the boards or a body part or piece of equipment of another player at high velocities (Delaney, Al-

Kashmiri & Correa, 2014). When looking at the other sports such as football and soccer they also have a high risk of contact about the head. This contact was seen as the lead cause of college football and soccer players (Delaney, Puni & Rouah, 2006). Along with the head contact being the most common, the temporal part of the head was also the most probable area to be impacted in soccer and football through either a hit in football or a header battle in soccer (Delaney, Puni & Rouah, 2006). When looked at more specifically it was found that statistically, contact with an opponent's head was the greatest mechanism of concussion within football players (Delaney, Puni & Rouah, 2006). In a similar fashion to hockey, football shares a rigid object that can aid in the contraction of a concussion in the form of a helmet. Although it is a piece of equipment made to protect the head it can also have a detrimental effect on the opposite fashion. The hard exterior makes a very dangerous weapon that can be used by a player to bring pain on to another player.

Repeat concussions and the long-term effects

Concussions although very detrimental to an athlete's health usually don't deter a dedicated participant's commitment or passion to their sport. This dedication can cause a participant to become a victim to a repeat concussion or a reaggravated concussion in the case of a concussion that is not fully recovered from. When a first concussion is sustained it subjects the individual to future repeats. This is very prevalent in younger athletes that play high impact sports like hockey, football, soccer, and more. The way that the first concussion also plays a large role in the probability of increased risk for a repeat concussion (Murphy et al., 2016). The concussions that are sustained as a result of a blunt force to the head such as a helmet on helmet collision have the largest probability of increases risk to repeat concussion (Murphy et al., 2016). When looking at an older audience like the NFL players the trend is not very different. Similar to the children discussed above NFL players are no strangers to the risks of concussion among other very serious injuries. When looking at repeat concussion it was even found that some athletes sustained a repeat concussion as early as just two weeks after sustaining a first concussion (Casson, Viano, Powell & Pellman, 2011).

Along the lines of repeat concussion, a UK group performed intelligence evaluations on various jockeys ranging from those who had never had a concussion up to others that were repeat victims (Wall et al., 2006). It was found that in multiple tests of cognitive capability, ranging from a Stroop colour-word test to basic math, the jockeys that had suffered multiple concussions performed significantly more poorly than those that had not sustained a concussion (Wall et al., 2006). They concluded that those disposed to multiple concussions showed lower accuracy in high-level attentional functioning tests (Wall et al., 2006). Among these conclusions, it was also stated that the increase in the number of sustained concussions directly impacted the severity of the long-term effects. Along with this, multiple concussions at a younger age had a larger effect on long term outcomes of the injuries. Along with decreased cognitive performance, multiple concussions can cause an impact on one's motor system. One of the measured aspects was the athlete's cortical silent-period duration. This was a measure of the delay in motor response. In those that had sustained multiple concussions, it was seen that there was a significant delay resulting in a larger silent period (Beaumont, Lassonde, Leclerc & Theoret, 2007). This signifies a long-term effect that is heightened by a repeat injury.

Concussion prevention through protective equipment and regulations of the sport

When playing a high impact sport along the lines of either hockey or football it is known that there is a lot of equipment used for the safety of the participants. This equipment ranges from shin pads in hockey to what is referred to as pads in football that are meant for upper body protection all the way to the different types of helmets that are used in both sports. When talking about hockey the helmet like in football is a piece of equipment used to protect the head. When thinking about the fact that the head holds one of the most important organs in the human body it is surprising that at one point hockey of all sports was played with no helmets at all and that included the goaltenders that were having a hard puck shot at them. It wasn't until goaltender Jacques Plante finally decided to cover his face that the league started to consider the safety of the player's heads.

When considering the role that helmets play in preventing a concussion it is amazing to see the advancements that have been made over time. The helmets that were once made of just leather now can prevent serious injuries. The helmets in both sports hockey and football are designed to slow down the impact of the brain with the skull after a hit to the head (Daneshvar et al., 2011). This reduction in speed of impact helps to protect against axonal injury caused by such movements of the brain (Daneshvar et al., 2011). The helmets are constructed to compress on impact as to prolong the duration of the impact to reduce the speed of the movement (Daneshvar et al., 2011). The helmets have developed over time to be more protective and better at reducing the risk of concussion among sports players that participated in high impact sports

Along with the developed equipment, there are also regulations and rules in each sport that are in place to reduce the incidents of concussion. In hockey, it is prohibited to attempt to lay a hit in which there is intent to injure. This includes a direct hit to the head with malicious intent and a lot of other hits that may place a player to an increased risk of injury as a result of that hit. When talking about football, a player cannot make a tackle that has one player making a direct helmet to helmet contact. Along with the rules, there are also punishments for those that disobey, and they can be quite serious as it is the safety of another that is at risk. In hockey, there is a penalty for minor infractions and can go up to suspensions for more severe instances. In football, there is more of the same in the form of flags, suspensions, and fines.

Summary

Throughout this review of literature about concussions, I was able to learn a lot. The ways that concussions can be sustained is a very large pool of information that varies from sport to sport and activity to activity. In hockey and football, it is a mechanism of high-velocity objects being brought to a halt through the impact of a rigid object or another human body in which contact is specifically being made with the head (Delaney, Al-Kashmiri & Correa, 2014). This combination of actions is the leading cause of concussions in sport. The application of a blunt force to the head and more specifically the temporal region has the greatest probability of risk of a concussion (Delaney, Puni & Rouah, 2006). When looking at reoccurring injury those that have been previously injured are at an increased risk for reinjury (Murphy et al., 2016). Along with that younger people are also predisposed to a greater risk of reoccurring injury. The ability to reduce the risk of a concussion has been increased over time as a result of protective equipment more specifically helmet being introduced into high impact sports. The protective equipment allows for the impact to be prolonged as to reduce the speed at which the brain moves within the cranium after a significant impact (Daneshvar et al., 2011). Along with

equipment, there are also rules and regulations that are implemented to protect the athletes. These rules and regulations come with punishments varying from flags and penalties to suspensions and fines. When first looking at the topic I chose a very broad field of research that pertained to the mechanisms of sustaining a concussion and how to prevent them. Through the review, I was able to widen my knowledge and understanding of the implications that concussions can have on someone. I now have developed an inquiry question that is, how can a reoccurring concussion be prevented to avoid the long term cognitive and motor effects through the improvement of protective equipment in high impact sports. This question and research done on it would allow for an improved understanding of how the mechanisms of the protective equipment impact the probability and risk factors associated with athletes previously diagnosed with a concussion.

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