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Youth Sport Concussion Management



Honors Thesis

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Department: Health and Sport Science

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Abstract

As knowledge about concussions increases and more is being discovered regarding the lasting effects of concussions, youth sport coaches need to be better informed and educated on the signs and symptoms, the management of concussions, and return-to-play procedures. This research examines what coaches of youth athletes (5-14 years of age) know about concussions and concussion management. Semi-structured interviews with coaches were conducted and analyzed in order to develop recommendations for effective training tools to help coaches identify and properly manage youth sport concussions. Results from the interviews found that coaches need more training on the long-term symptoms of concussions. The training should also include proper concussion management steps to take because coaches seemed to miss a few key steps in the management process. The results also indicated that a training should be required for parents and players.

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Introduction

Concussions are a cause for concern in sports and recreation. In particular, concussions in youth sports are a cause for concern because concussions can have a serious negative effect on a developing brain. This is why it is important to educate parents and coaches of young athletes on ways to prevent and manage concussions to keep these athletes as safe as possible.

A study done by the Center for Disease Control and Prevention found that recreation-related injuries with a diagnosis of Concussion or Traumatic Brain Injuries (TBIs) more than doubled among children between the years 2001-2012 (2017). Another study done by the Ohio Department of Health discovered that visits for sport related TBIs increased by 110 percent from 2002 to 2010 (2016). These studies show that as public concussion knowledge increases, more parents are starting to understand the dangers of concussions and are more likely to take their children in to get evaluated for a concussion. This also demonstrates that concussion information and training for parents and athletes is raising awareness of the seriousness of concussions. Educating parents and coaches is an important component of concussion management because they are the ones who have the most direct contact with these young athletes (Daprano et al., 2019). That is why it is important that they are the ones to be educated on concussions so that they can respond in a quick and proper manner.

The purpose of this study was to examine effective ways to train and educate coaches so they have the necessary information to allow them to be prepared and confident to respond to a head injury that could result in a concussion. This study

generated, from a coach's perspective, how they think concussion training succeeds or fails at preparing coaches for concussion related incidence with their players.

Literature Review

A survey administered after participating in the "Heads Up" training determined that current information and trainings are working. Seventy-seven percent of youth coaches said they were better able to identify concussion signs and symptoms in their athletes after having gone through the "Heads Up" material (Covassin et al., 2012). These results show promise but more still needs to be done to inform coaches on more than just identifying concussion signs and symptoms.

Other research related to coaches has examined the effects of concussion training, how much coaches are actually understanding from the training, and if they are conveying what they are learning to their athletes. A survey done by Haran and colleagues found that 42% of concussed athletes were not managed using proper guidelines, 19% did not immediately leave play, 29% continued play on the same day, and 27% were not assessed by qualified personnel (Haran et al., 2016). These results suggest that just because coaches have taken the training they do not always follow through with the proper guidelines. This may be for several reasons including but not limited to, the coaches do not recognize the concussion in the athlete, the athlete did not tell the coach about the concussion, or the coach decided that the athlete was fine to continue when they were not.

Rivara et al. found that 40% of high school athletes did not tell their coaches about receiving a concussion (2014). The results of another study found that athletes knew the symptoms and dangers of concussions but would remain in the game because they were unsure of the exact cause of pain, they wanted to keep playing, they were scared to tell coach, and they did not want to let the team down (Chrisman et al, 2013). The athletes said that because concussions are not a surface level body injury that can be easily seen, and the seemingly subjective diagnosis of concussions made them not willing to tell their coach. These athletes did not want to go through the arduous process of concussion protocol when many of them do not even think that they have a concussion. The athletes also mentioned how hard it is to talk to some of their coaches because they are scared of how their coaches would respond, be that upset or disappointed in the athlete, so to not have to deal with that response from the coach they just would not tell them. This study shows the importance of the need for coaches to be able to recognize the signs and symptoms of athletes and not rely on the athletes to inform them of their injury.

A 2015 study examined sport coach's ability to recognize all the different forms of concussion symptoms including physical, cognitive, or mental health symptoms. They found that coaches recognized 85.4% of physical symptoms, 92.4% of cognitive symptoms, and only 55.1% of mental health symptoms (Topolovec-Vranic et al.). The study concluded that more needs to be done to inform coaches of the cognitive or long-term symptoms of concussions, which include anxiety, depression, and/or irritability (Topolovec-Vranic et al., 2015). A similar study discovered that 90% of coaches correctly identified at least 5 of 8 symptoms but less than 50% understood the risk of a

second concussion and less than 25% knew that young players usually take longer to recover from a concussion than adults (White et al., 2014). This study's results are a good indicator of how little is known about youth concussions and how even less is being taught to coaches of young athletes.

Most of the research being done currently examines concussions in high school aged athletes but very little research has examined concussions in younger athletes. Studies regarding the effects of concussions in younger athletes are finding that younger athletes are more susceptible to concussions compared to adults, they are more likely to have long-term negative cumulative consequences with prolonged disturbances of brain function, and have a higher risk to develop second impact syndrome (Buzzi et al., 2016). That is why more age specific information needs to be given to coaches during training and more studies need to be done to see the most effective way to teach coaches about youth sport-related concussions, so that relevant information can be properly implemented when the circumstances arise.

Methods

The present study examined the most effective strategies to educate youth soccer coaches on sport related concussions. The interviews were conducted with youth soccer coaches who agreed to participate. This study utilized a semi-structured interview approach, analyzing responses for common themes across all the interviews. The interviews were used to understand what knowledge coaches have about concussion signs, symptoms, and management and what elements of concussion trainings are most effective in teaching coaches this knowledge.

Participants

This study utilized both convenience and snowball sampling. Soccer coaches of local leagues were sent an email requesting their participation in the study. Coaches who agreed to be interviewed signed a consent form allowing their responses to be recorded and used later for analysis. Coaches that participated were asked for the names of other coaches that might be willing to participate in this study. The participants consisted of eight youth soccer coaches from the Midwest United States who coached recreational and club soccer teams. Participants were coaches of soccer players ranging from 5-14 years of age. Table 1 gives the - pseudonyms of the coaches and demographic information of each coach.

Table 1

Coach Participant	Concussion History
Brad (B) is a club youth coach who has coached for 20+ years.	Has had two or three concussions but was never diagnosed.
George (G) has coached both youth, aged 8-13 years old, and high school. He has been coaching for 30+ years.	Has been diagnosed with several concussions.
Alex (A) has coached both club youth teams and high school teams.	Has been diagnosed with a concussion.
John (J) has coached club youth teams for 23+ years and has also taught certification training courses for soccer coaches.	No concussions recorded.
Mitchell (M) has coached both youth and high school teams, during his 18+ years of coaching.	Estimated having received ten to twelve concussions but none of them were diagnosed.
Steve (S) has coached both recreational youth teams and high school teams, during his 20+ years of coaching.	Has never received a concussion.
Dominic (D) has coached the younger high school age groups (U14). He has coached for 7+ years.	Has never had a concussion.

Travis (T) is a recreational youth coach.	Has never had a concussion.
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Data Collection

Semi-structured interviews with youth sport coaches were conducted and participants were asked questions such as:

1. *Tell me what you knew about concussions before becoming a youth sport coach.*
2. *Was this based on personal experience?*
3. *Tell me what you now know about concussions.*
4. *Tell me what you now know about concussion prevention.*
5. *Tell me what you know about concussion management.*
6. *What was most helpful in gaining knowledge about concussions?*
7. *Have you ever been diagnosed with a concussion?*
8. *How has your current knowledge about concussions changed your attitudes about concussion prevention, management, and recovery?*

The interview concluded by asking, *“Is there anything else you want to tell me about concussion(s) prevention and management that you think will help me better understand what training and resources should be available to youth sport coaches to help them better respond to these concussion related incidents?”* Questions for the interview were chosen from a review of the relevant literature on concussion knowledge and management.

Procedures

Researchers in this study first acquired IRB approval from the University of Dayton Review Board. Once the study was approved, coaches were identified by searching local soccer league websites and locating coaches email addresses to send an initial email request for participation. When a coach agreed to participate, a consent form was sent along with the plans on when and where to conduct the interview. The interviews lasted between 15-45 minutes depending on the extent of the coach's responses. The participants either met in locations that were the most convenient for them or were interviewed over the phone. Interview responses were transcribed for data analysis. All transcriptions were anonymous, and password secured so that only the researchers had access to the data.

Data Analysis

An inductive analysis process was used for interpreting the interview data. This involved searching the transcripts for meaningful fragments. These fragments were reviewed and used to develop a categorization scheme and matching codes. The responses to each individual question were coded for the common themes in the responses from each coach. These codes were then used to sort the data so the researchers could discover patterns and themes.

Three reviewers were used to eliminate potential bias and to ensure a high level of inter-rater agreement. The reviewers independently reviewed the transcripts in order to initially make sense of the data; then communicated with each other in order to identify and come to consensus on overarching categorical themes. Data was sorted into

appropriate categories for preliminary analysis. At that point, categorical themes were identified; if necessary, some of the themes were then been re-worked and re-coded. The data was analyzed again to ensure that all categories were identified. Next, sub-themes were identified for main categorical themes, where appropriate. In this way, an in-depth, holistic understanding of responses was obtained. Coding was then conducted to identify and extract the sub-category data and statements from the transcripts.

Results

Analysis of the interview data revealed common responses to the eight interview questions. There were also nine common themes that the coach's answers related to. The analysis of the eight questions will be discussed below, arranged by common themes.

Prior Concussion Knowledge

Most coaches had a very basic understanding of what a concussion was before the mandated concussion training. Many of them talked about knowing the severe symptoms like losing consciousness or being disoriented. Almost all the coaches said something about "in the old days"/ "back in the day" a blow to the head was not seen as a serious issue unless there was an obvious and severe symptom observed after the hit. Coach George recalled in his early days of coaching before any concussion training was required that

"If a kid knew where he was, maybe just got kinda knocked and felt like it was okay... went off three or four minutes later we might put them back into the game."

This quote emphasizes the point that in the years prior to required training a player would get their “bell-rung” and as long as the player knew where they were and were not disoriented that they could go back into the game. Some coaches also stated that they did not have any knowledge about concussions before training was required.

Acquisition of Concussion Knowledge

Since most of the coaches have been coaching for 15+ years, which is longer than the concussion training has been implemented into coach certification, these coaches learned from past experiences. Six of the eight coaches said that while they were growing-up or while they were coaching, they had witnessed someone concussed and seen how it was managed. Three of the coaches said they learned from watching trainers, and five said that they learned from dealing with their own players who were concussed. One coach even commented on what it was like to watch his daughter recover from a concussion.

Five of the coaches played when they were younger and some still play in adult soccer leagues. Each of these coaches stated that they learned from watching teammates receive concussions and from experiencing concussions themselves. Coach Alex talked about how much he learned from a concussion he received while playing in an adult soccer league,

“... it was nice to kind of firsthand experience it and then realize I can help a little bit more and understand what they’re [the players] saying.”

Three of the coaches mentioned having concussions themselves and most of the coaches explained how they probably had a concussion, but it was never diagnosed. The

coaches emphasized that after having taken the concussion training they were able to look back on the “bell-ringers” that they received and judge if that was actually a concussion. Some of the more experienced coaches talked about how before the concussion training, they learned general information about concussions from the first aid training that was required. Two of the coaches also said that knowledge of mental health and head injuries were part of their jobs. Both of those coaches worked in management positions where they had additional education on brain injuries and mental illness.

Frequency of Training

Most of the coaches mentioned taking the concussion training through the National Federation of State High School Associations (NFHS). This included a 1-hour video/slide show and a quiz at the end. Some of the coaches also mentioned having to view documents/PowerPoints. Two coaches said that they had to retake the trainings every year but most of the other coaches said that they had to retake it every 2-3 years.

Concussion Knowledge Gained from Training

Most of the coaches mentioned how the concussion training really showed them how serious concussions are to young athletes. Concussions can do a lot more damage to the brain and cause long term problems that the coaches did not previously understand.

Coach Travis said he learned,

“that they [concussions] are very serious... I mean I knew they were serious but not that one concussion could be as serious as it is. You typically think of repeated concussions is what’s the issue and the first one can be just as severe as

three concussions.”

Two of the coaches talked about learning general information from these concussion trainings such as what is actually happening to the body during a concussion and signs and symptoms of a concussion. Almost all of them explained that until the concussion training, they did not know that concussions have different levels of severity and that each person will experience concussions differently and exhibit different symptoms.

Coach Travis stated how he learned that,

“there’s a lot of different warning signs to watch out for not just the one or two that typically come to mind.”

Five of the coaches learned the added effects of a second or third concussion and the danger of multiple concussions. Coach Steve explained how the training helped him to see the importance of properly taking care of a concussed athlete especially with return to play and how he

“...can now look at the situation a little bit better and make sure that player does not put themselves in another vulnerable position at that second hit, is what’s crucial...” and how he “wants to win but not at the expense of somebody’s health.”

Learning Outcomes of Concussion Training

Many of the coaches talked about learning the general steps of how to manage a concussion, which includes what to do if a concussion is suspected, and the process of return to play after a concussion has been diagnosed. All the coaches made some mention

of erring on the side of caution or playing it safe if a concussion was suspected. Two coaches expressed how they learned to not rush athletes back to play because every athlete recovers at different rates and it is not safe to return to play before the athlete is ready. Coach John explained this when he said,

“It’s important that players that get concussions are fully cleared before they come back because the rate of a second concussion off of a first concussion or a third concussion off of a second concussion are significantly higher.”

Over half of the coaches talked about requiring a note from a physician before allowing the concussed athlete to return to physical activity. A few of them stated that they had a better understanding of being able to look at a player and confidently assess the symptoms and severity to know whether to let the player return to play or not. Coach Alex said that as a coach he is the first line of defense and knowing how important it is to use the training for

“grading what it is and relying on what you can read as a symptom.”

Many of the coaches had been high school coaches at one time and they talked about relying on a trainer to help assess the athletes. Coach Alex talked about using parents who are nurses and doctors to help because they also have great insight that could be beneficial to analyzing the athlete at the moment of the injury. Finally, the coaches also mentioned how after a game or practice they learned to talk to parents about taking their child to go get checked by a physician.

Most Helpful Aspect of Concussion Training

During the interviews the coaches were asked what they found was the most helpful part of the concussion training. The large majority of them said how helpful it was for the training to go into detail on signs and symptoms, and how to properly manage the situation that day. They said the specificity of the training was helpful, so they knew exactly what to look for and the step-by-step instructions on what to do to manage the concussion. Three of the coaches liked the information given on the recovery process, finding that very helpful so that they could then educate the concussed athlete on what to expect.

A few of the coaches liked how concise the training was because they said it gave needed information without being too long. Coach John liked the quiz at the end of the concussion training saying that it helped to make sure he was paying attention. Over half of the coaches mentioned appreciating the video style of the training because they are visual learners. Video training helped them remember the information and being able to actually see examples of what symptoms to look for helped them as well. Two of the coaches expressed how the case studies and examples were the most effective at helping them identify potential signs and symptoms of a concussion.

Changed Attitudes Post Concussion Training

The coaches were asked how the concussion training changed the way they approach coaching. Some of the coaches said that after the training they were more aware of the potential risks of concussions. In addition, coaches now look out for situations that could potentially produce an event that could lead to a concussion. Coach George said,

“You’re trying to not necessarily have training sessions that are putting players at

a little more risk.”

Later in the interview he described how he,

“would serve a ball 30-40 yards and guys would fight (for it) ... now the last four or five years when concussions started to become a problem, or became more aware, we stopped doing that kind of training.”

Many of the coaches said that learning about the severity of concussions was why they changed their approach to coaching young athletes. They did not want to be the reason their young athletes had long term damage because they did not properly manage a concussion. Coaches indicated that concussion training really instilled in them how the risk was not worth keeping a young athlete playing in a game. Coach Alex explained his thinking saying,

“I would hate to be a reason that... their brain just stops developing and that’s a lot to take in... do I wanna be the reason this player doesn’t reach their full potential?”

Concussion training helped them see the importance of being cautious when it comes to potential concussions.

Coach Training Suggestions

During the interviews with these coaches many of them touched on suggestions they thought could help improve concussion training. Further, the coaches offered suggestions that U.S. Soccer, the national governing body of soccer, could undertake to

help keep these young athletes safe. Some of the coaches advised how important it was to repeat concussion training every year so that coaches can be exposed to more information. Coach Mitchell suggested in-person, hands-on trainings so that coaches would be less likely to be distracted by their phones, their families, or other stimuli that might take their attention away from the trainings while taking them at home.

Several of the coaches mentioned requiring parents and athletes to take the same concussion training as the coaches. They also suggested teaching coaches how to properly inform parents and young athletes of the risks of concussions and proper return-to-play guidelines. The coaches emphasized the importance of educating parents and young athletes because if they do not understand the dangers of a concussion, especially multiple concussions, then it makes the coach's job harder when their decisions to keep a player safe is fought by the parents and athletes. Coach Brad illustrates how frustrating it is when a situation arises when parents,

“question why I'm sitting their kid for the rest of the game.”

Many of the coaches thought that requiring training for parents and athletes would also help improve communication between parents and athletes. Coach John mentioned not only having training for athletes but having additional training for those athletes who receive a concussion. This would help these younger athletes understand the dangers of a second or third concussion and give them information about additional preventative actions that could be taken to decrease the risk of another concussion. Further, a couple of coaches argued for increased training for referees since they have the power to remove an athlete from a game even if the coach disagrees.

Two coaches stated how boring it was to watch the exact same training video every time. They suggested changing the training video to increase attention during the training because the coaches would not think that they already know everything about the training. Coach Mitchell said that from his experience as a coach he learned how concussions symptoms can be experienced differently for each individual, so he advised adding more variety to the example training scenarios. Finally, two of the coaches said that it would be helpful if baseline testing was done for youth athletes instead of only at the high school level.

Soccer Header Rules

With the new rule on heading the ball many coaches had suggestions of how to change the rule to improve its effectiveness without causing other potential problems. Most of the coaches thought that the rule was too restrictive in preparing young athletes on proper heading technique. They thought it would be helpful to allow heading in practice at an earlier age. Several coaches argued that by the time youth soccer players were 13 years of age, the age players are permitted to perform headers in a game, they did not have enough practice to head the ball with proper technique. Some young athletes are scared of the ball which causes other dangers. Several of the coaches thought that practicing with a softer ball from close distances would be enough to improve header technique and have youth sport athletes become more comfortable with heading.

Two of the coaches said that changing aspects of the game might help to decrease the exposure to situations that cause collisions to the head. Coach George said that it would help to,

“eliminate goalkeeper punts, which I think takes a lot of the impact away.”

He also suggested changing or removing corner kicks. Other coaches wanted concussion training to include how to correctly teach proper heading technique just so every coach is teaching the same method and that it is the correct method. Coach John also said that including how to teach proper falling technique would be helpful to decrease head-to-ground related concussions.

Discussion

Interviews with youth soccer coaches revealed aspects of the training that are very helpful and other aspects that could be improved. The interviews also exposed some of the gaps in the coaches' knowledge about concussions. The results from these interviews indicate that while coaches have some understanding of correct steps to take for the management of concussions there are some aspects of the protocol that are not fully implemented. The necessity for a physician's note before the young athlete returns to physical activity is essential so that the athlete does not return before they have fully healed from the last concussion. Since only two of the eight coaches mentioned needing a physician's note before returning to activity it may be that they did not grasp the importance of this key point in the return-to-play section of the concussion training.

Another area of knowledge that is lacking is recognizing the long-term symptoms of a concussion such as depression, and anxiety. These findings are consistent with the results from a national Canadian survey of coaches that found that only 55.1% of participants knew the potential long-term symptoms of a concussion (Topolovec-Vranic et al., 2015). Another area of concern occurs when coaches do not talk with parents,

especially about having the athlete get reviewed by a physician. Coaches need to know to stress the importance of taking a young athlete in to be checked by a physician. Yet, only three coaches added that to their steps in managing a concussion. This finding is similar to the findings from an Australian survey distributed in emergency rooms that found that 27% of athletes were not assessed by qualified personnel (Haran et al., 2016).

It is important to acknowledge these gaps in coach's knowledge in order to understand where concussion trainings need to require more information or emphasize already discussed information. The results from the interviews also demonstrate that concussion training seems to be working. Concussion training has changed the way coaches approach training, practices, and games. It has also caused coaches to respond more cautiously and not take chances when there is a head injury that may potentially lead to a concussion. There is evidence that concussion training is having a positive impact on soccer related concussions.

Recommendations

Coach and Player Training Recommendations

Gaps in concussion knowledge of youth soccer coaches can be attributed to ineffective training and education. From analyzing the coaches' responses there are aspects of the training and management of youth soccer programs that can be improved. One of those aspects is that training needs to emphasize that a player cannot return to play without a note from a physician. Coaches should also be aware that athletes who suffer a concussion could have lingering long-term symptoms such as depression and anxiety. Thus, concussion training should stress the importance of having a player

suspected of suffering a concussion go to be checked by a qualified healthcare provider. The results showed that the participating coaches did not understand the importance of this key step in identifying if a concussion occurred.

Based on interview responses it also appears that coaches prefer that concussion training be required for more than just coaches. The training should also be required for parents and athletes. Many of the coaches agreed that right now they have very high liability but very little control when it comes to the young athlete's safety. Especially in younger age groups, coaches are often the only coach on the field trying to take care of 15-20 kids at one time. In these instances, coaches cannot always watch every child the whole practice or game. If something happens away from where most of the other athletes are or where most of the action is taking place the coach will not know an athlete has sustained a concussion unless the child tells their coach. Coaches are unsure how to teach these young athletes the importance of alerting their coach to a possible head injury/concussion. In addition, coaches only see these youth athletes 2-3 hours a week and have no idea what these athletes have done the rest of the week.

The coach also is limited because if something happens to a young athlete at the beginning of the game the coach has to both take care of that player while also making sure the others are safe. Based on the coaches' responses, they believe that requiring parents and athletes to take some type of concussion training will help to improve communication between coaches, parents, and athletes. This way everyone will know how to manage possible concussion related problems within the proper timeline. These coaches thought that having some type of training with the young athletes is important so they understand how serious a concussion can be as well as any successive concussions.

It is important for players to communicate with their coach and parents if they suspect they have received a concussion, whether that is during a game/practice or during other times off the sporting field.

Educating parents will also help coaches so parents can understand why a coach is making a concussion related decision and the parent will support the coach rather than question their judgment. Another recommendation is that it could be helpful to require training every year so that coaches have repeated exposure to the information. Changing the training video or doing in-person training may be another way to improve the effectiveness of the training. A section in the training on how the heading technique should be taught and a demonstration of low impact heading practice examples, such as using softer balls like nerf balls or deflated soccer balls, would also be helpful to coaches. Training on proper falling technique should also be added to soccer skills training to decrease the risk of head-to-ground related concussions.

Concussion Management Recommendations

During these interviews, coaches made suggestions on the soccer header rule and ways that it could be changed to improve the effectiveness of the rule as a way of decreasing youth concussions while also not putting these young athletes in danger later in their soccer careers. Practice of a skill takes time so that the execution of that skill is correct in form and that it is safe. From their responses, the coaches do not believe that the young athletes have enough time to practice heading before they are expected to perform it in a game situation. The coaches in this study recommended lowering the age allowed to practice heading to the age of 10 years old, with low impact practice. This will help players become more comfortable with the skill.

As several of the coaches explained young players are often scared of the soccer ball and then put themselves into other dangerous situations trying to either avoid heading or not doing it confidently. More practice even with modified parameters will give young athletes the practice needed to perform heading safely. For the age groups that are prohibited from heading the ball it would be helpful to take out aspects of the game that make heading important such as goalkeeper punts and corner kicks which could both be replaced with throws. These will decrease the need for heading by keeping the ball lower which would emphasize more body ball control.

Limitations

The limitations for this study included the number of coaches that were interviewed for this study. This is a limitation to the generalizability of the results. Further, participants were from Midwestern states and that limits the generalizability of the results to other regions of the United States.

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