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A Qualitative Study of Youth Football Coaches' Perception of Concussion Safety in American Youth Football and Their Experiences With Implementing Tackling Interventions

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Abstract

Due in part to concern about the potential long-term effects of concussion and repetitive head injuries in football, some programs have implemented tackling interventions. This paper explores youth football coaches' perception of football safety and their experiences implementing these interventions aimed at athlete safety. Using a qualitative approach, coaches were interviewed by means of a semi-structured protocol that covered: (a) demographics; (b) background and experiences; (c) personal relevance risks, safety, and benefits of youth football; (d) experiences with tackling technique; (e) experiences with mouth guard sensors; and (f) opinions on disseminating information on football safety. Most coaches felt that learning tackling at a young age helped prepare them for their playing later in life and believed that youth should begin playing tackle football at a young age. Coaches were mixed regarding their concerns about the risk for concussion and subconcussive head impacts. Still, most were receptive to changes in rules and policies aimed at making football safer. Findings from this study demonstrate that youth football coaches are important stakeholders to consider when implementing changes to youth football. Understanding coach perceptions and experiences may inform future efforts aimed to educate coaches on rules and policies to make the game safer for youth athletes.

Keywords

injury; tackle

A concussion, sometimes referred to as a mild traumatic brain injury (TBI), is caused by a bump, blow, or jolt to the head, or a hit to the body causing the head and brain to move rapidly back and forth (Centers for Disease Control and Prevention, 2019; Menon, Schwab, Wright, & Maas, 2010). This sudden movement can cause the brain to bounce around or twist in the skull, creating chemical changes in the brain and sometimes stretching and damaging the brain cells (Giza & Hovda, 2014). These changes in the brain may lead to short- or long-term clinical signs and symptoms (Giza & Hovda, 2014) that often fall into four categories: somatic symptoms (e.g., headache, nausea); changes in behavior and emotional functioning (e.g., irritability, sadness); cognitive symptoms (e.g., complaints of difficulty concentrating or slowed reaction time); and sleep problems (e.g., sleeping more than usual, trouble falling asleep) (Centers for Disease Control and Prevention, 2017). Concussion signs and symptoms may evolve over the course of an individual's recovery; however, the majority of patients will no longer experience symptoms within 4 months (Babikian et al., 2011; Barlow et al., 2010; Davis et al., 2017; Yeates et al., 2009). Still, while research is ongoing, a systematic review found that athletes with a history of concussion may be at increased risk for cognitive impairment and mental health problems later in life (Manley et al., 2017).

Between 2010 and 2016, an average of approximately 283,000 children were seen in a U.S. emergency department each year for a sports- or recreation-related TBI, including concussion (Sarmiento et al., 2019). Among males aged 0–17 years, football was associated with more than a quarter (26.8%) of the sports- and recreation-related TBIs and concussions captured in this estimate (Sarmiento et al., 2019). The leading mechanism for these injuries in football is tackling and other athlete-to-athlete collisions (Marar, McIlvain, Fields, & Comstock, 2012).

There are a number of educational products and trainings available to coaches on concussion (Sarmiento, Donnell, & Hoffman, 2017). This may in part be due to the passage of concussion in sports laws (between 2009 and 2014) in all 50 states and the District of Columbia that often require concussion education for coaches (Harvey, 2013; Harvey, Koller, & Lowrey, 2015) as well as policies in schools that mandate coaches receive concussion information or complete a preseason concussion education program (Centers for Disease Control and Prevention, 2013).

Concurrent with the growth and availability of educational efforts, Americans are increasingly concerned about the risk of concussion and repetitive head injury on an athlete's long-term health. Thus, there is increased receptivity among the public to strategies (e.g., age limits and tackling restrictions) that may reduce the risk for concussion and promote youth football safety (Chrisman et al., 2019; Dyck & Talty, 2016). A poll of 1,000 American adults conducted by the University of Massachusetts Center for Public Opinion found that the majority of respondents support changes to how youth football is played and also believe in delaying the start of tackle football for athletes until they reach high school

(Dyck & Talty, 2016). Similarly, Chrisman et al. (2019) surveyed a nationally representative sample of U.S. parents regarding their views on tackling and age restrictions for youth football. Authors in this study found that more than half (61%) of parents supported age restrictions for tackling (i.e., limiting tackle football to high school age athletes) and most (85%) supported policies or rules that limit tackling in youth football.

In response to the increasing concern about the potential long-term effects of concussion (such as cognitive and mental health problems; Manley et al., 2017) and repetitive head impacts in football, some youth football programs have implemented rule and practice changes aimed at protecting athletes (Waltzman & Sarmiento, 2019). These changes include contact restrictions (such as limiting contact/collisions during practices), rules to reduce the risk for injury (such as moving the kick-off line to reduce the number of kick-off returns), and techniques aimed at limiting the opportunities for head impacts (such as tackling strategies; Waltzman & Sarmiento, 2019). In 2015, the American Academy of Pediatrics released a policy statement that supported that proper instruction in tackling technique and learning the skills to evade and absorb tackles would be beneficial (Council on Sports & Fitness, 2015). However, there is a lack of evidence comparing different styles of tackling techniques that promote player safety. Two interventions focused on instituting changes to address safety concerns in youth football include USA Football's *Heads Up Football* (HUF; Kerr, Kroshus, Lee, Yeargin, & Dompier, 2018) and the *Chest, Arms, Shoulders, and Hands* (CASH) tackling system developed by Dartmouth College Head Coach, Buddy Teevens.

The HUF educational program began in 2015 and includes education on equipment fitting, tackling technique, strategies for reducing player-to-player contact, and concussion recognition and awareness. Athletes who are instructed in HUF learn to tackle by using a five-step process. The HUF program also incorporates the use of a player safety coach—a designated person from the team or program who is trained and then promotes and disseminates educational information in support of the HUF messages. Research by Kerr et al. (2018) suggests that implementation of the HUF educational program, when coupled with restrictions to tackling during practices, is associated with a reduction in injuries among youth football players. Additionally, Shanley et al. (2019) found that athletes on teams that used HUF had a significantly lower concussion rate and returned to full sports participation faster than non-HUF athletes.

Since the start of the 2017 football season, all U.S. football programs are required to also incorporate a hawk-style tackling technique along with HUF (HUF + Hawk). For the HUF + Hawk technique, athletes are taught to track the hip of the ball carrier and keep their shoulders square and remain in good posture while tracking. Using their nearest foot to the ball carrier, the tackler makes contact with their opponent by wrapping them up at their thighs and squeezing their chest. The tackler then takes five power steps to bring the ball carrier down to the ground while their head remains outside of the tackle.

Similar to the HUF program, the CASH system emphasizes the importance of concussion training for football coaches. However, the CASH system incorporates a different approach to tackling with the explicit goal of teaching the athlete to avoid any impact to the head during a tackle. To do this, the athlete executes a shoulder tackle with the head completely

removed from contact. There are three different types of tackles (high pec, mid front, or low top) and three different strike zones (high, mid, or low) where the athlete aims to make contact. The tackler begins by tracking either the thigh or the chest of the ball carrier and then during the tackle executes one of the three aforementioned tackles absorbing contact with the shoulder only. In addition, teams that use the CASH system are prohibited from engaging in full-speed contact with other athletes during practices.

Some teams and programs that use the CASH system also incorporate the use of a motorized tackling dummy (i.e., the Mobile Virtual Player [MVP]) into practices (CASH + MVP). The MVP can turn a full 360°, reach speeds up to 14–18 mph, and engage in sudden jerks and twists to simulate the real action of a youth football athlete (<http://www.mobilevirtualplayer.com/>). There are currently no published studies on the effectiveness of the CASH or CASH + MVP systems on reducing the risk for concussion and other injury.

As efforts and calls to institute programmatic changes to the game of youth football grow, it is critical to evaluate these strategies and consider football coaches' perceptions and experiences with these programs (Gould, Collins, Lauer, & Chung, 2007). Thus, using a qualitative approach, this paper explores youth football coaches': (a) perception of concussion safety; (b) experiences implementing tackling interventions; and (c) learning preferences.

Methods

Based on our current understanding of football and concussion prevention, this postpositive qualitative study was designed to gain insight into youth football coaches' perception of concussion and tackling interventions (HUF + Hawk and CASH + MVP) and how these factors may influence coaches' behaviors regarding athlete safety (Poucher, Tamminen, Caron, & Sweet, 2020). This allowed for in-depth discussions with participants, as well the opportunity to gain preliminary insights and meanings for football and concussion prevention topics that have not previously been examined in the literature.

Study Participants

Eighteen youth football coaches were recruited from a large cluster-randomized controlled trial on head impact exposure among youth football athletes (ages 6–14 years). Representation was ensured for both tackling interventions (nine HUF + Hawk coaches and nine CASH + MVP coaches).

Data Collection

Participants in this study were interviewed using a semi-structured interview protocol. This allowed for the study authors to collect a structured and consistent set of information about an interviewee's perceptions and experiences, while allowing the interviewer flexibility to adapt the protocol as necessary during the interview. The study authors, who had experience generating semi-structured interview questions and conducting interviews with a similar population and in a similar context, (Hurwitz & Borradaile, 2018) developed the questions. The interview protocols were pretested on a similar population that had experience with

youth football to assess flow, interpretation of questions, and estimated length of the interview.

The interview protocols consisted of up to six domains reflective of policy-relevant topics surrounding football and concussion safety and other domains of interest to the overall evaluation. These domains included (a) demographics; (b) background and experiences with contact sports; (c) perceived risks, safety, and benefits of youth football; (d) experiences with tackling technique training and implementation; (e) experiences with mouth guard sensor technology; and (f) personal sources of training related to football safety. In the first domain, *demographics*, standard demographic information, such as sex, race/ethnicity, and geographic location, were collected. In the second domain, *background and experiences with contact sports*, a trained moderator asked participants to describe their experiences with contact sports (e.g., tackle football, ice hockey), specifically their history as contact sport athletes, and the length of their involvement in coaching contact sports. Coaches who reported playing tackle football previously were asked their opinion about whether learning how to tackle as a youth prepared them for playing football later in life, for example in high school or college. In the third domain, *perceived concussion risks and benefits of youth football*, the moderator sought coaches' perceptions about their understanding of the risks and benefits afforded to youth who play tackle football. In the fourth domain, *experiences with tackling technique training and implementation*, coaches were asked questions about the study condition to which they were assigned. Coaches assigned to the treatment condition answered questions about their experiences implementing the CASH + MVP, while coaches in the control condition answered questions about their experiences implementing the HUF + Hawk system. In the fifth domain, *experiences with mouth guard sensor technology*, coaches discussed their experiences using mouth guard sensors throughout the season. In the sixth domain, *personal sources of training related to football safety*, coaches described their experiences receiving training on how to coach youth football, what resources they use for communicating issues about safety, and where they seek out those resources.

Two trained and experienced moderators conducted the semi-structured interviews with coaches. The moderators did not participate in developing the domains or questions. The moderators conducted telephone interviews with each coach, which lasted approximately 45–60 min. The advantages of telephone interviews over paper and pencil surveys include more flexibility when responding to questions; they are also less expensive and more convenient than in-person interviewing (Rupert, Poehlman, Hayes, Ray, & Moultrie, 2017). Two authors (K. Conroy and J. Grazi) set up the appointment times for the interviews based on moderator and coach availability. At the beginning of the interviews, the moderator read a statement that summarized the purpose of the interview, reminded coaches that their participation was voluntary, they could decline to answer any question, and that their information would remain anonymous. Before the moderator began recording the interview, all participants provided additional verbal consent stating they agreed to be audio recorded. The moderators recorded all interviews using a standard recording device. After completing the interview, the moderator securely uploaded the recording to DataGain, a vendor for transcribing research interviews. The New England Independent Review Board approved the study.

Data Analysis

Thematic analysis was used to analyze the focus group data (Braun & Clarke, 2012). A thematic approach was used to capture, code, and categorize the main themes from the data collected (Braun & Clarke, 2012). First, two authors (K. Conroy and J. Grazi) independently reviewed notes, audio recordings, and transcripts from all the interviews and separately generated a list of themes (Braun & Clarke, 2012). The authors did not hypothesize the themes prior to data collection; the themes were solely identified based on the data collected. The identified themes focused on the most common responses from coaches that were consistent across the majority of the interviews. This process was repeated until no new themes emerged. Next, the authors developed a combined list of themes they derived from the data and coded the interview transcripts based on both authors' input. Each author then coded the transcripts independently according to the agreed-upon themes, using a spreadsheet to record quotes. For instances where the code selection was uncertain, the study authors discussed their choices with one another and agreed mutually upon the correct code. After the initial coding, an additional layer of review and analysis was conducted by two additional authors (K. Sarmiento and D. Waltzman) who had experience with concussion and qualitative research. Using the methodology described above, these two authors reviewed the first round of coding alongside the interview transcripts and then met and reached final consensus on the codes and identified themes. No coding software was used in the analysis.

To ensure trustworthiness of the findings presented in this paper, we provided details on the research methods, processes, and study participants. To confirm the findings presented, we used two reliability methods: interrater reliability and triangulation. For example, we conducted two rounds of analysis using separate author pairs and shared a summary of the findings with experts in concussion research to gain their insights into whether our analysis and data interpretation were consistent with current literature and knowledge on this topic. We met frequently as an authorship team during the study planning, data collection and analysis, and manuscript writing phases of this project. All authors reviewed the study instruments, data analysis findings, and final manuscript and agreed that each was ready for use or publication.

Results

Demographics

All participants in this study were male, and the majority were self-reported to be European American (67%) and that they live in a suburban location (67%). Further details on the demographic characteristics of the coaches who participated in this interview study are provided in Table 1.

The qualitative results for this study are organized into the remaining domains contained in the interview protocol. The findings presented reflect the themes that emerged (Table 2). Selected quotes are also included that reinforced common responses received from participants.

Background and Experiences With Contact Sports

In the second domain, both HUF + Hawk and CASH + MVP coaches described their experiences with contact sports, their history as contact sport athletes, and the length of their involvement in coaching youth tackle football. If coaches reported playing youth tackle football previously, they were questioned on whether learning tackling at that age prepared them for playing football later in life, such as in high school or college. Based on these discussions with coaches, the following two themes emerged: (a) most coaches played multiple years of tackle football and started when they were young, and (b) coaches generally felt that starting the sport and learning tackling at a young age helped prepare them for playing football later in life.

Most coaches played multiple years of tackle football and started when they were young.—A total of 56% of coaches reported that tackle football was the main contact sport they participated in as youth. Of the coaches who played tackle football, the majority reported starting to play by the age of 10 years. The average number of years the coaches' played tackle football was 10 years. A total of 44% of coaches in the study also stated that they played tackle football in college and 22% reported playing semi-professionally.

Coaches generally felt that starting the sport and learning tackling at a young age helped prepare them for playing football later in life.—A total of 67% of coaches felt that learning tackle football as a youth helped prepare them to tackle appropriately later in their football playing careers (e.g., high school, college). One coach shared: "Like anything else, the sooner you learn the better you are. So, I learned at a young age the proper way to tackle, teamwork, all the good things that come along with ... play[ing] football."

Perceived Concussion Risks and Benefits of Youth Football

In the third domain, HUF + Hawk and CASH + MVP coaches reflected on the potential risks, safety, and benefits of playing youth football. Five themes emerged: (a) coaches were mixed regarding their concerns about the risk for concussion; (b) coaches varied in their feelings about subconcussive hits; (c) coaches supported rules and policies as a way to make football safer; (d) coaches reported that youth should begin playing tackle football at a young age; and (e) coach–parent and coach–athlete communication about football safety was limited.

Coaches were mixed regarding their concerns about the risk for concussion.—Less than half of the coaches (44%) were concerned about the risks posed by concussions. One coach acknowledged the risk for concussion in other contact sports by saying: "I think that there's a risk in any sport, not necessarily just youth football. I think that the chances of it happening, obviously are increased whether you play any type of sport, especially a contact sport."

Coaches varied in their feelings about subconcussive hits.—A total of 44% of coaches believed subconcussive impacts were not a risk to athletes' brain health. One coach disagreed with the potential for risk saying:

No, I don't. I don't think [hits to the head] are a major risk. No. I mean, aside from giving them a concussion, what's the problem, you know what I mean? Every other sport they're getting hit in the legs or the arms or the back. What's the difference with the head?

Other coaches felt that subconcussive hits were a risk. For example, a coach stated: "Yes, I think they're a risk. I think that repetitive hits to the head isn't a good thing at any magnitude whether it causes a concussion or not."

Coaches supported rules and policies as a way to make football safer.—All coaches reported being open to changes in rules and policies regarding tackling and were optimistic that they could contribute to improving safety. One coach made his argument by lending a historical perspective on the evolution of rules in football:

Rules definitely can make football safer. When the facemask first got involved in professional football, you were allowed to tackle by it. And now you can't do that. You're going to break somebody's neck. So, yeah, you could always modify the rules.

Coaches reported that youth should begin playing tackle football at a young age.—The majority of coaches (78%) believed youth should begin playing tackle football at or before the age of 8 years so that they learn proper tackling at a young age in order to reduce injury later. One coach described his firsthand experience:

I think the earlier the better only because their fundamentals are better, especially today. I mean ... [my son] played college football. He started playing when he was 6. And I've seen a progression in the safety from then, from him being 22 years old.

Coach–parent and coach–athlete communication about football safety was limited.—About a third of coaches reported they communicate football safety information through in-person meetings at the beginning of the season. A coach described these meetings as infrequent, occurring mainly before the first practice. The majority of coaches stated that they do not have ongoing conversations about football safety throughout the season. One coach shared:

In the beginning of the season I call the parent meeting. I read the warning on the helmets to the parents and to all the players. [I] just remind them—I reiterate what the helmets says on it—and tell them that this is a sport where you can get hurt.

Experiences With Tackling Technique Training and Implementation—In the fourth domain, coaches described the training they received as part of the HUF + Hawk or CASH + MVP interventions, as well as their experiences implementing their assigned intervention. Five themes emerged: (a) coaches believed implementation of the tackling

techniques was feasible and athletes' proficiency was high; (b) some coaches reported that age affected the athletes' ability to implement the techniques correctly; (c) coaches felt that the CASH + MVP system showed promise for reducing injury, but age-specific drills are needed; (d) coaches faced challenges using the MVP; and (e) coaches preferred in-person training but were mixed on preference between HUF + Hawk and CASH + MVP.

Coaches believed implementation of the tackling techniques was feasible and athletes' proficiency was high.: Most coaches (66% of HUF + HAWK and 78% of CASH + MVP) reported that implementing their assigned tackling technique with their athletes was feasible and easy. Rating his own performance, one CASH + MVP coach said, "I would mark myself a 9 or 10 [on implementing CASH]." Further, coaches (63% of HUF + Hawk and 42% of CASH + MVP) felt that their athletes could learn the technique, but ease of use varied by athlete. One HUF + Hawk coach said, "I think they [the athletes] were successful. On a scale I'd probably say 90 out of 100." Coaches who implemented their respective techniques also confirmed that their technique (e.g., CASH + MVP coaches only implemented CASH + MVP and vice versa) was the only tackling system they used with their athletes, suggesting a high degree of fidelity to treatment.

Some coaches reported that age affected the athletes' ability to implement the techniques correctly.: A third of HUF + HAWK coaches indicated that the younger athletes or those with less experience on their team had more trouble implementing the technique correctly. One coach remarked that the: "Natural instinct [of younger kids] is to tackle someone with their head down. So, some kids pick it up fast and some you work with basically the whole season."

A total of 33% of CASH + MVP coaches faced struggles with implementing components of the system (e.g., using the correct head positioning) remarking that their athletes were too young to understand certain concepts.

Coaches felt that the CASH + MVP system showed promise for reducing injury, but age-specific drills are needed.: All coaches who responded to the question thought CASH + MVP technique showed some or a lot of promise for preventing injuries. When reflecting solely on the MVP technology, 78% of coaches shared that they believe the MVP showed some or a lot of promise for reducing injury in youth football. Of those, most commented they felt this way as the MVP allows coaches to conduct full-speed drills while simultaneously eliminating the risk of injury for at least one athlete. According to one coach, the MVP does this by: "Saving the person, the live person that you would need to hold the ball to have tackle, but ... it's a negligible impact on the person actually doing the tackling."

To help support implementation, about half of the CASH + MVP coaches who provided suggestions wanted age-specific drills and programs (e.g., playbook, diagrams).

Coaches faced challenges using the MVP.: A total of 25% of CASH + MVP coaches did not feel the training on the MVP prepared them adequately enough before using the device with their team. Moreover, 67% of coaches who used the MVP stated that they were unable to use it consistently throughout the season. Reasons for inconsistent use ranged from having

a malfunctioning robot and rough field conditions that prohibited the robot's movement, to not having enough coaches or volunteers during practices who could help them control the MVP while the coach managed their athletes.

Most coaches (75%) reported that the MVP did not simulate a real player. Of these coaches, some expressed concern about how usage of the MVP affected their athletes' comfort level regarding tackling during games. These coaches felt that using the MVP limited their athlete's exposure to real-life hits and tackling. One coach stated their athletes were more hesitant to tackle during games, "[the MVP] hurt them because now when you get in the game it's a person now running."

Coaches preferred in-person training but were mixed on preference between HUF + Hawk and CASH + MVP: Coaches assigned to the CASH + MVP tackling technique participated in both the HUF + Hawk and the CASH + MVP trainings. Whereas, coaches assigned to the HUF + Hawk tackling technique participated solely in the HUF + Hawk training. All of the CASH + MVP coaches answered a question asking how the information presented to them prepared them to teach athletes how to tackle. The most helpful part of the training was seeing the technique performed, such as through the live on-field demonstrations and videos. One coach expressed his preference by stating: "Having a live person to go through and actually show you the [CASH] drills and show you the excitement of what they're trying to [teach], it was by far superior."

Coaches trained on both techniques were split on the quality of trainings received. A total of 44% of coaches felt the CASH + MVP and the HUF + Hawk trainings were of equal quality, whereas another 44% preferred the CASH + MVP training—primarily due to the in-person format.

Experiences With Mouth Guard Sensor Technology—In the fifth domain, CASH + MVP and HUF + Hawk coaches shared their experiences using the mouth guard sensors. Two themes emerged: (a) coaches claimed the presence of the mouth guard device did not influence their coaching, and (b) coaches confirmed they did not review the data from the mouth guard devices, per study protocol.

Coaches claimed the presence of the mouth guard device did not influence their coaching: Coaches reported that they did not change their coaching strategies in response to the mouth guard, such as changing the drills they would typically implement in practice or their approaches to concussion safety. One coach remarked: "No, I don't think it influenced my coaching approach. [...] I thought it was good they had them, and they were trying them."

Coaches confirmed they did not review the data from the mouth guards: As part of the evaluation, the study team made every effort to ensure the coaches were blind to the data collected. When asked if they reviewed the data from the mouth guard sensors, coaches confirmed they had not seen the data. One coach expressed the simplicity of this task: "[The mouthguard sensor data] uploaded and that was it."

Personal Sources of Training Related to Football—In the sixth domain, CASH + MVP and HUF + Hawk coaches described the best sources and methods for receiving information on football safety. During this discussion, two themes emerged:

- a. most coaches viewed their sports league as authority figures and
- b. coaches differed on the best method for receiving information related to safety.

Most coaches viewed their sports league as authority figures. Coaches reported using a variety of sources to learn about coaching youth football. Only 22% reported a professional organization as the main source of coaching information with others reporting unique sources. However, with respect to issues concerning safety, the majority look to their sports program or league as the authority figure. Two-thirds of coaches reported seeking information on safety directly from USA Football, and a third of coaches reported seeking it directly from their league commissioner.

Coaches differed on the best method for receiving information related to safety. Coaches were unsure about the specific type of materials they would like to receive related to football safety. Suggestions from coaches ranged from video materials to instructions regarding how to conduct live drills. For example, one coach stated this preference by saying: “I think that would be helpful because I think when people see stuff, I think everyone learns it easier when they learn it when they’ re looking right at it.”

In support, another coach also said: “I mean, in-person’s always better, I guess. But like I said, you can get a lot of information online and you can do it at your own time, you know? Like whenever you have free time.”

Coaches also preferred digital media but varied in how they preferred to receive information, citing websites (not social media specific), e-mails, and social media as the best methods to access information on safety.

Discussion

Findings from this study provide several insights into youth football coaches’ perception of concussion safety and their views and experiences with implementing two different tackling techniques.

Coaches’ Perception of Concussion Safety

While recent surveys and public opinion polls suggest that most Americans support age restrictions for youth football due to concerns about concussion safety, (Chrisman et al., 2019; Dyck & Talty, 2016) coaches in this study were generally not supportive of these changes. Despite reporting some difficulties in teaching tackle strategies to younger athletes, the majority of coaches interviewed reported that youth should begin tackling at a young age in order to teach proper technique and promote safe tackling. These findings suggest that youth football coaches may draw on their own personal experience when deciding on the appropriate age for athletes to begin tackle football. Similarly, Caron, Bloom, and Bennie (2015) found that coaches may gather much of their knowledge about concussion based on

their personal sports-related experiences. Future studies might further explore whether a coaches' personal experience may serve as a potential barrier to implementing tackling changes in youth football.

Less than half of coaches in this study were concerned about the risks of concussions and the potential effects of repetitive subconcussive head impact exposure on their athletes. In addition, many coaches did not feel football posed any greater risk for concussion than other contact sports. Thus, despite the availability of numerous education efforts and research demonstrating the increased risk for concussions among football athletes as compared with other sports, there remains a disconnect regarding the perceived severity (i.e., this could have serious consequences) and risk for concussion in football. Some health behavior theories suggest that an individual's views and perceptions are strong indicators of determining health behaviors (Glanz, Barbara & Lewis, 2002; Rogers, 1975; So, 2013). As such, coaches who perceive a higher risk of concussion among their athletes or are concerned about their long-term exposure to subconcussive head impacts, may be more likely to take precautionary measures, such as teaching strategies to limit head impacts. In addition, as demonstrated in a previous study, coaches' perceptions of severity or risk might influence the way they communicate with their athletes (Kroshus, Baugh, Hawrilenko, & Daneshvar, 2015). Coaches are a key influencer of athletes' concussion reporting and safety behaviors (Sarmiento et al., 2017) and are looked to as the main implementers of football safety programs. Further investigation into football coaches' risk perceptions may be beneficial. Assessment of theory-based behavior interventions that are inclusive of policy and environmental components may be most effective to address concussion safety (Conner & Norman, 2017).

Coaches' Experiences Implementing Tackling Interventions

Overall, youth football coaches in this study were receptive to changes in rules and policies that can help make football safer; however, they discussed potential barriers that may affect their implementation of the tackle safety interventions examined. For example, some coaches in this study indicated that their respective techniques were challenging to teach younger or inexperienced athletes. Moreover, while CASH + MVP coaches thought the technique showed promise for injury prevention, coaches expressed concern about the MVP not simulating an actual player. Further research might explore whether age-appropriate instruction and the need for ongoing training and support for coaches can help with implementation of the interventions.

Research based on age limits for body checking in ice hockey does not support the continuation of status quo in contact sports (Black et al., 2016; Emery et al., 2020; Emery & Black, 2019). Several studies have found that concussion rates dropped substantially once a youth ice hockey leagues prohibited body checking (Black et al., 2016; Emery et al., 2020; Emery & Black, 2019). However, as with football, the exact age of when to introduce body checking in ice hockey is controversial. Emery et al. conducted a cohort study in youth ice hockey players and found no difference in risk for injury or concussion rates between players with and without previous body checking experience (Emery et al., 2011). Still, the same study found that the rate of severe injury (>7 days time loss) was 33% lower among

the players at the elite level who had body checking experience as younger players compared with those who did not (Emery et al., 2011). As such, efforts aimed at increasing or delaying the age at which tackling is introduced may benefit an examination concussion rates in noncontact or flag versus tackle football athletes, as well as studies of concussion rates among older (high school) athletes who played contact versus noncontact football as youth.

Coaches' Learning Preferences

Given the increased availability and promotion of untested products and strategies claiming to prevent or reduce the effects of concussion, reaching coaches with evidence-based information is becoming more and more critical (Bachynski & Smoliga, 2019). Findings from this study demonstrate opportunities to improve education strategies for coaches on tackling techniques and other football safety information. First, coaches in this study preferred in-person, hands-on trainings for learning how to implement tackling techniques. Second, coaches in this study generally viewed their league as the main resource they go to for information pertaining to issues of football safety. To effectively disseminate important safety information, educational efforts may benefit from seeking buy-in or partnership with sports programs and use the sports program's channels as the primary source of dissemination. One strategy being used by USA Football to support football coaches with concussion education is the player safety coach model (Kerr et al., 2018). Through an examination of the effectiveness of the player safety coach model, Kerr et al. (2018) found that use of player safety coaches is inconsistently used by football programs, but that opportunities exist to optimize this strategy and provide support to coaches regarding concussion safety throughout the season. Further examination of how to integrate the use of the player safety coach model into the CASH + MVP system and to enhance it in the HUF + Hawk system may be beneficial.

Limitations

This study is subject to several limitations. First, participants did not have an opportunity to review nor reflect upon the interpretation of the data. Thus, the results presented are based on the authors' perceptions of the data collected (Poucher et al., 2020; Smith & McGannon, 2018). Second, as coding qualitative data can vary based on author experience and interpretation (Smith & McGannon, 2018), an additional layer of review and analysis was conducted. The second round of review served to help validate the findings, which may provide some confidence in the coding. Finally, given the sensitive nature of this topic and the possibility of social desirability bias, coaches may have felt the need to answer questions about concussion in a way they thought would be acceptable to the interviewer.

Conclusion

To our knowledge this is the first study to examine youth football coaches' views and experiences with implementing two different tackling techniques. Findings from this study support prior thinking that youth football coaches are important stakeholders to consider when implementing changes to youth football. Understanding coach perceptions and

experiences may inform future efforts aimed to educate coaches on rules and policies to make the game safer for youth athletes.

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Table 1

Self-Report Demographic Characteristics of Coaches

Characteristics	
Age (mean \pm <i>SD</i>)	41.9 \pm 6.5 years
Gender, <i>n</i> (%)	
Male	18 (100)
Race/ethnicity, <i>n</i> (%)	
European American	12 (67)
African American	3 (17)
Latino	1 (6)
No response	2 (11)
Geographic location, <i>n</i> (%)	
Suburban	12 (67)
Rural	5 (28)
Urban	1 (6)

Note. *N* = 18. Percentages may not sum to 100 due to rounding.

Table 2
Domains and Themes Generated From the Coaches' Interviews and Selected Quotes

Domain	Themes	Selected quotes
<p>Background and experiences with contact sports</p>	<ul style="list-style-type: none"> • Most coaches played multiple years of tackle football and started when they were young. • Coaches generally felt that starting the sport and learning tackling at a young age helped prepare them for playing football later in life. 	<ul style="list-style-type: none"> • "Like anything else, the sooner you learn the better you are. So, I learned at a young age the proper way to tackle, teamwork, all the good things that come along with ... play [ing] football."
<p>Perceived concussion risks and benefits of youth football</p>	<ul style="list-style-type: none"> • Coaches were mixed regarding their concerns about the risk for concussion. • Coaches varied in their feelings about subconcussive hits. • Coaches support rules and policies as a way to make football safer. • Coaches reported that youth should begin playing tackle football at a young age. • Coach-parent and coach-athlete communication about football safety is limited. 	<ul style="list-style-type: none"> • "No, I don't think [hits to the head] are a major risk. No, I mean, aside from giving them a concussion, what's the problem, you know what I mean? Every other sport they're getting hit in the legs or the arms or the back. What's the difference with the head?" • "Yes, I think they're a risk. I think that repetitive hits to the head isn't a good thing at any magnitude whether it causes a concussion or not." • "Rules definitely can make football safer. When the facemask first got involved in professional football, you were allowed to tackle by it. And now you can't do that. You're going to break somebody's neck. So, yeah, you could always modify the rules." • "I think the earlier the better only because their fundamentals are better, especially today. I mean ... [my son] played college football. He started playing when he was 6. And I've seen a progression in the safety from then, from him being 22 years old." • "In the beginning of the season I call the parent meeting. I read the warning on the helmets to the parents and to all the players. [I] just remind them—I reiterate what the helmets says on it—and tell them that this is a sport where you can get hurt."
<p>Experiences with tackling technique training and implementation</p>	<ul style="list-style-type: none"> • Coaches believed implementation of the tackling techniques was feasible and athletes' proficiency was high. • Some coaches reported that age affected the athletes' ability to implement the techniques correctly. • Coaches felt that the CASH + MVP system showed promise for reducing injury, but age-specific drills are needed. • Coaches faced challenges using the MVP. • Coaches preferred in-person training but were mixed on preference between HUF + Hawk and CASH + MVP. 	<ul style="list-style-type: none"> • "I would mark myself a 9 or 10 [on implementing CASH]." • "I think they [the athletes] were successful. On a scale I'd probably say 90 out of 100." "Natural instinct [of younger kids] is to tackle someone with their head down. So, some kids pick [HUF + Hawk] up fast and some you work with basically the whole season." • "Having a live person to go through and actually show you the [CASH] drills and show you the excitement of what they're trying to [teach], it was by far superior." • "[MVP saves] the live person that you would need to hold the ball to have tackle, but ... it's a negligible impact on the person actually doing the tackling." • "[the MVP] hurt them because now when you get in the game it's a person now running."
<p>Experiences with mouth guard sensor technology</p>	<ul style="list-style-type: none"> • Coaches claimed the presence of the mouth guard device did not influence their coaching. • Coaches confirmed they did not review the data from the mouth guards. 	<ul style="list-style-type: none"> • "No, I don't think [the mouth guard sensor] influenced my coaching approach. [...] I thought it was good they had them, and they were trying them." • "[the mouthguard sensor data] uploaded and that was it."
<p>Personal sources of training related to football safety</p>	<ul style="list-style-type: none"> • Most coaches viewed their sports league as authority figures. • Coaches differed on the best method for receiving information related to safety. 	<ul style="list-style-type: none"> • "I think that would be helpful because I think when people see stuff, I think everyone learns it easier when they learn it when they're looking right at it." • "I mean, in-person's always better, I guess. But like I said, you can get a lot of information online and you can do it at your own time, you know? Like whenever you have free time."

Note. HUF = Heads Up Football; CASH = Chest, Arms, Shoulders, and Hands; MVP = Mobile Virtual Player.