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## Background

As American football increases in popularity, greater attention is being given to head-related injuries and concussions caused by the high-impact sport. Looking at the helmet's structural safety and the way that football players use their helmets can be an integral part in preventing head injuries. Current strategies include penalizing players for high-risk behavior such as leading with their helmet or hitting an opposing player above the shoulder. A more passive and effective strategy would be to modify the helmet in a way to better protect the head of the players or even to change the playing style of the players.



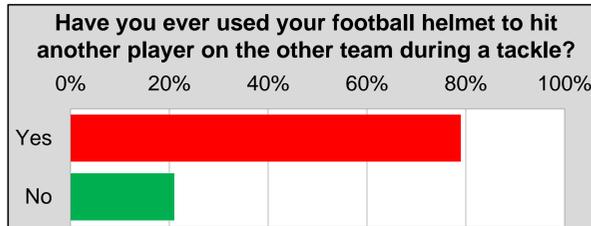
## Significance

This study looks to survey current high school varsity football players on how they use their helmets when playing and how certain helmet modifications would affect their style of play. By understanding how high school players intend to use their helmets and what they think of certain helmet designs, progressive steps can be taken to further reduce head injuries.

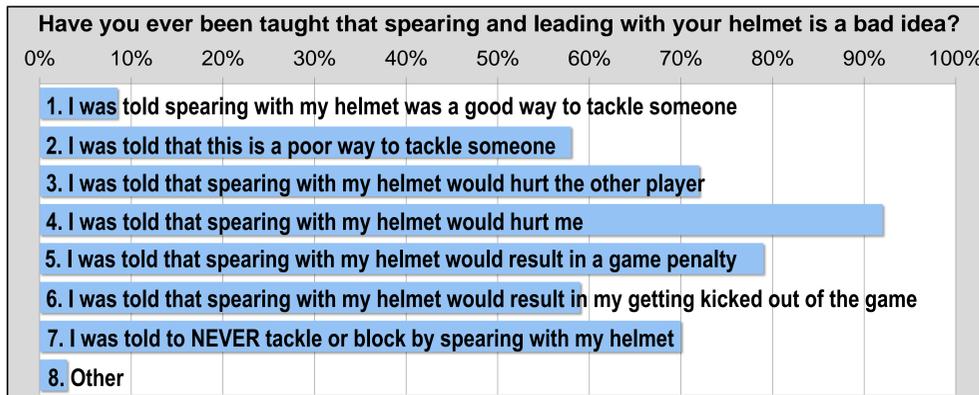
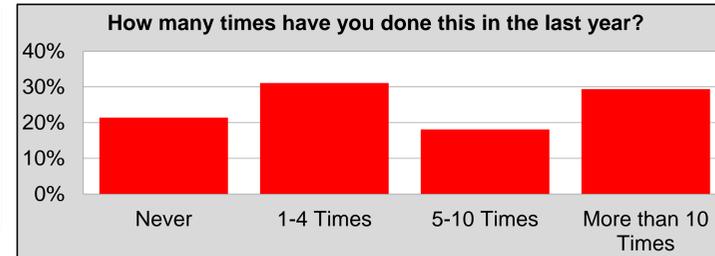
## Methods

Surveys were distributed to high school varsity football teams. Surveys asked players about the use of their helmets while playing and if modifications to the helmet (soft foam rubber on the outside of the helmet) would affect their style of play. The survey contained 11 multiple-choice questions. **A total of 177 players participated in the survey.**

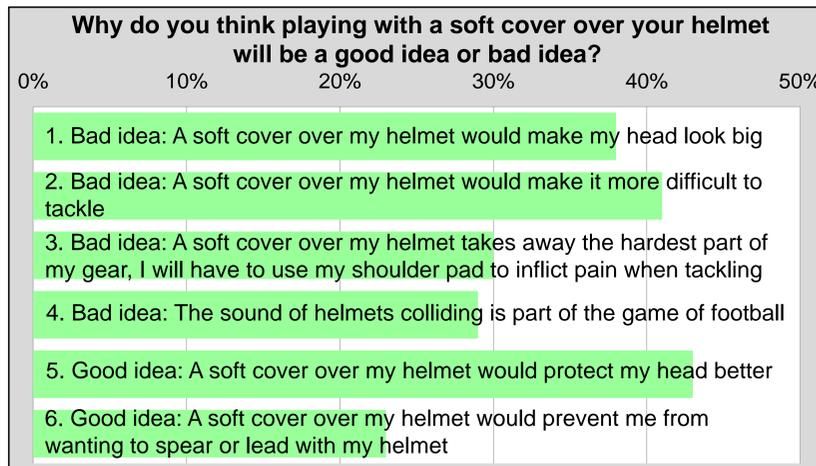
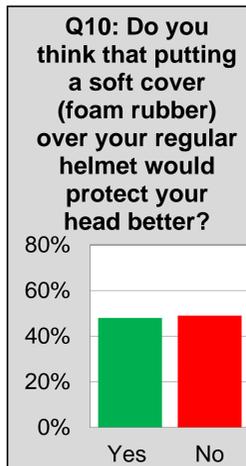
## Results ( n = 177 football players )



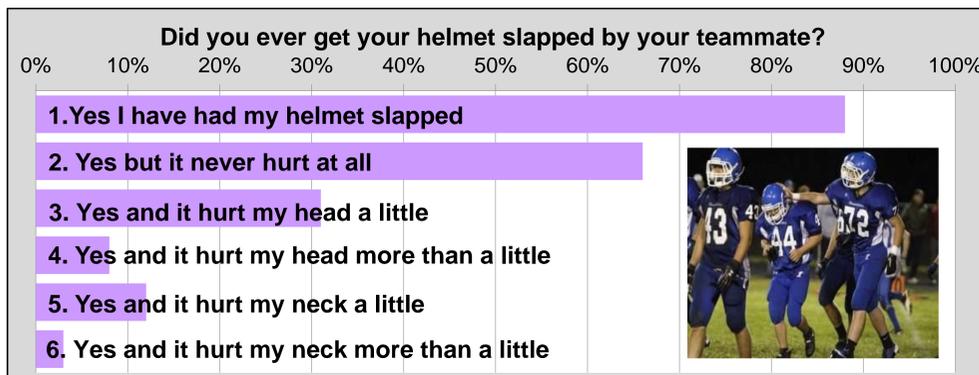
Of the 177 participants, **79% (n=139)** said that they have used their football helmet to hit another player while tackling or blocking them. **30% (n=52)** said that they have done this more than 10 times within the last year.



Only **9% (n=15)** of players were told that leading with your helmet was an effective way to tackle or block someone, while **58% (n=102)** or participants said they were told it was a poor way of tackling someone. Players also seem to know that tackling or blocking someone while leading with their head can potentially injure their opponent (**72%, n=127**, of participants) or themselves (**92%, n=162**, of participants). Players also know that leading with their heads can result in in-game penalties (**79%**) or getting ejected from the game (**60%**).



**48% (n=85)** of participants thought that putting a foam rubber cover over their original helmets would protect their heads better. When asked if playing with the soft cover over their heads is a good or bad idea, **38% (n=67)** said it is a bad idea because it would make their heads look big, **41% (n=72)** said it is a bad idea because it would make it harder to tackle or block, **30% (n=53)** said it is a bad idea because they would have to use their shoulder instead, **29% (n=51)** said it was a bad idea because the sound of colliding helmets is part of the game. **43% (n=76)** thought it would be a good idea because it would protect their helmet better and **23% (n=40)** thought it was a good idea because it would stop them from leading with their head.



Of the participants who answered, **88% (n=155)** said that they had their helmet slapped by a teammate although **66% (n=116)** said that it never hurt at all. **31% (n=55)** said that their head hurt a little, while only **8% (n=14)** said their head hurt more than a little. **12% (n=22)** said that their necks hurt a little while **3%** said their necks hurt more than a little.

When asked if they accidentally or purposefully hit an opposing player with their helmet (question 8), **36% (n=64)** said that it was an accident while **15% (n=27)** said they did it on purpose and **31% (n=55)** said that they or their opponent purposefully caused the head-to-head contact one or more times.

## Conclusions

Most of the young football players we surveyed use their helmets to block or tackle (**79%**), though the majority is taught they would be penalized or potentially injured if they do so. A little less than half thought that putting a soft cover over a regular helmet would help to protect their head better, yet only a small percent thought that the soft cover would prevent them from using their helmet to tackle (**23%**).

Although much less than the majority mentioned that their heads or neck hurt, after getting their helmet slapped in celebration, this could be a potential source of head injuries.



## Future Studies

- **Heavy Hand Impacts.** Current or former football players will strike a HITS helmet with their hand, measuring impact from a celebratory "head slap" that often occurs during games.
- **Different Types of Material.** Other dampening material such as cloth, leather, or rubber could be seen as a more effective way of injury prevention.
- **Complete Covering of Helmet.** Using a helmet that can measure the force of an impact, fitted exterior wrapping will be made to cover the entire helmet and

## Acknowledgements

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