

**Normal Brain**



**Advanced CTE**

[1]

# Remarks to the Port Jefferson Board of Education Regarding CTE and the District Football Program

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*(digital copy available at [www.pjcte.com](http://www.pjcte.com))*

Abstract: Recent studies add to evidence that repetitive brain trauma caused by symptomatic concussions -- as well as asymptomatic subconcussive hits to the head that do not cause symptoms -- results in degenerative disease of the brain (CTE) among high school and collegiate football players leading to the conclusion that the Port Jefferson Football Program produces a potential risk to our children's health and well-being which may be too great to chance.

Christopher Noblit  
Approximately 12-minutes  
January 9, 2018

I want to thank the Port Jefferson Board of Education for the opportunity to speak tonight. Our community is fortunate to have a noteworthy school district, and I want to thank each of you for your work to ensure that it remains a safe and rigorous academic environment.

I am a Port Jefferson resident and the father of two children who graduated from our high school. Neither of my children played football. I myself played football in grades 8 through 12 and, to the best of my knowledge; I do not suffer from CTE. My only interest in this matter is a genuine concern for the safety and the well-being of our community's children, and nothing more.

I have submitted a copy of these remarks, along with the works I've cited, to each board member who is present tonight. For those in the audience who would like to download a PDF copy of these remarks, please visit [www.pjcte.com](http://www.pjcte.com).

In addition, please note that these remarks borrow heavily from Ms. Tara Haelle's forbes.com article titled "Is Football Worth Gambling With High School and College Players' Brains?"<sup>[Citation 2]</sup> A copy of Ms. Haelle's article can be found herein, and which I urge everyone with an interest in this matter to read.

Boston University's CTE Research Center is a leading authority on degenerative brain disease and teaches that "Chronic Traumatic Encephalopathy (CTE) is a progressive degenerative disease of the brain found in people with a history of repetitive brain trauma (often athletes), including symptomatic concussions *as well as asymptomatic subconcussive hits to the head that do not cause symptoms*...CTE is not limited to professional athletes; it has also been found in athletes who did not play sports after high school or college...The symptoms of CTE generally do not present until years or decades after the brain trauma occurred...At this time CTE can only be diagnosed after death by postmortem neuropathological analysis...there is no known way to use MRI, CT, or other brain imaging methods to diagnose CTE."<sup>[Citation 3]</sup>

In her article, Ms. Haelle writes that "it is now well established that a career in professional football puts players at high risk for developing CTE, which results in severe mood and behavioral symptoms, depression, anxiety, suicidal thoughts, suicidal attempts, explosive anger and similar problems."<sup>[Citation 2]</sup> One study diagnosed 99% of NFL players studied as having suffered from CTE.<sup>[Citation 4]</sup>

Ms. Haelle goes on to write that "a recent 2017 study, published in The Journal of the American Medical Association (JAMA), adds to the available evidence. What's less clear is how much risk of CTE might exist for high school or college football players."<sup>[Citation 2]</sup> and "of the 202 deceased players examined in this study, two (2) played football before high school, fourteen (14) played only in high school and fifty three (53) played through college. Neither of the pre-high school players had evidence of CTE, but 21% of the high school players did, and 91% of the college players did."<sup>[Citation 2]</sup>

As Ms. Haelle writes, it is sobering to note that “56% of the college players in the study had severe CTE, with symptoms similar to those among the NFL players. The three high school players and the remaining 44% of the college players with CTE had mild cases. Considering high school and college players represent a majority of the mild cases, it’s worth noting how devastating even mild cases can be: 85% of players with mild CTE had clinical symptoms that worsened over time, and 96% had behavioral and/or mood symptoms. About two thirds (67%) had symptoms of depression and just over half (52%) had anxiety symptoms.”<sup>[Citation 2]</sup>

Please refer to Ms. Haelle's article (Citation No. 2), the 2017 CTE study published by JAMA (Citation No. 5), and the other attached reference documents for deeper examination of CTE.

Ms. Haelle writes that “Bennet Omalu, M.D., a forensic neuropathologist and chief medical examiner for San Joaquin County in California, first identified CTE in American football players when it had previously only been seen in boxers.”<sup>[Citation 2]</sup>

During a recent talk Dr. Omalu said this: “Adults are free to do whatever they want to do, as long as they have educated consent. But children, no. And we've always done that whenever we identify a possible risk factor. What we do as a society is protect children from being exposed to such risk factors. We do that with cigarette smoking. We did that with alcohol. Why not football, which is more dangerous? We wouldn't let children smoke a cigarette, but then send them to a football field to sustain concussions?”<sup>[Citation 6]</sup>

You will find Dr. Omalu's complete remarks in Citation No. 6.

It must be noted that are those who, driven by self-interest, have attempted to minimize and/or deny and/or manipulate the existence of, or study of, CTE.<sup>[Citation 7] [Citation 12]</sup> Others have tried to use the issue of football related CTE for political purposes.<sup>[Citation 8]</sup>

***Ladies and gentlemen, CTE is real. CTE is not a political issue. CTE is not fake news. CTE has been confirmed by real science, and it has the potential to have a very real and profound impact on the health and well-being of many of the children who participate in our district football program.***

Michigan State coach Duffy Daugherty once declared that “football isn't a contact sport, it's a collision sport,” and in fact every single play run by the Port Jefferson football team is designed to have children execute violent collisions with each other. I am certain there are some who might suggest that, since a baseball play, or a car accident, might also cause a concussion, would I also have us outlaw cars and baseball? These arguments are false equivalencies, and my answer is that if every single baseball play resulted in a violent collision (as does football) -- and if every single trip driven in a car resulted in a violent collision (as does football) -- *then yes...*I would apply my argument to cars and baseball.

The district's affiliation with St. Charles Hospital and Orthopedic Associates of LI to develop concussion management programs, work with the Impact Neurocognitive Assessment Tool, and the district's participation in the Center For Disease Control's "HEADS UP to Youth Sports" online concussion training -- while of value -- is often irrelevant because "more than half of high school athletes with concussions play despite their symptoms, and often their coaches aren't aware of the injury."<sup>[Citation 9]</sup> In fact, "athletes continue to underreport concussion even when they know the signs and symptoms and that they risk serious injury if they continue to play with a concussion or return too soon from injury."<sup>[Citation 10]</sup>

Furthermore, as a recent report stated, "There is still a culture among athletes that resists both the self-reporting of concussions and compliance with appropriate concussion management plans. It's a culture where the idea is to man up, to not let your teammates or coach down, and play with your symptoms...and because concussions are not graphic, like a bloodied nose or a broken leg, players hide their symptoms and continue to play."<sup>[Citation 11]</sup>

Concussion awareness, staff and athlete education programs, and management plans are important, but our children need us to stop concussions...not create and then manage them.

Our school district is noted for its academic achievement. Why are we devoting much needed financial capital to a sport which research suggests may well damage our children's brains and, as a result, their future emotional and intellectual well-being? It may be worth asking ourselves -- after being introduced to football by the Port Jefferson school district -- how many of our children continue on to play collegiate football which would increase their likelihood of acquiring CTE; is one child damaged not one child too many?

Perhaps it is time for our school district to consider reallocating the funds presently attached to football to other less damaging sports programs, sports which offer our children the same team and character-building benefits which are often attributed to American football.

I want to close by remembering that at last month's board meeting a football coach stood here and told us that in the past year our youth football program enrolled 50-plus children who played 16 games without one single concussion. I remind those who believe this statement that *asymptomatic subconcussive hits to the head do not cause symptoms. They cause CTE.* And, according to one survey; "69% of those with concussions reported playing with symptoms and 40% reported that their coach was unaware of their concussion."<sup>[Citation 9]</sup>

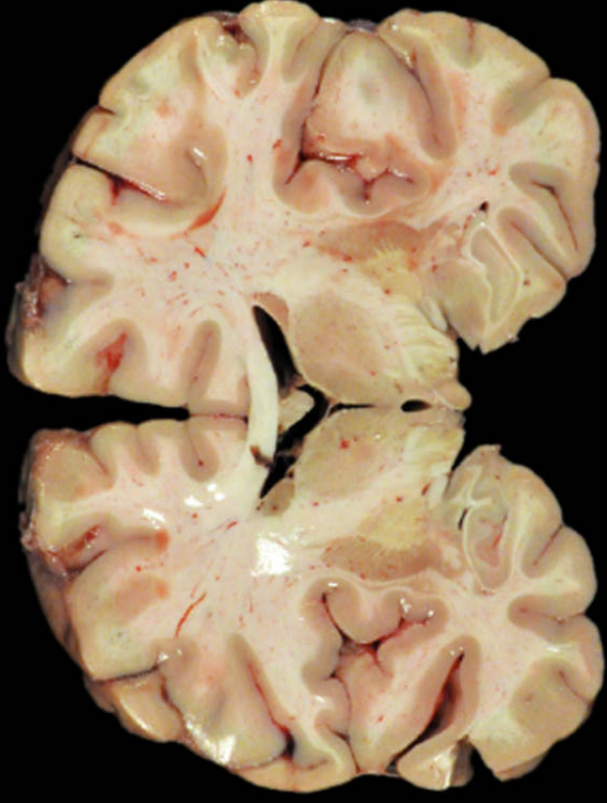
Ladies and gentlemen -- members of the board of education -- we have before us compelling and accumulating evidence that when we knowingly and willfully allow a child to play football, we are endangering that child. I believe that no adult -- not a parent, not a coach, and not a member of the board of education -- should make such a potentially life-altering decision for a child. I ask everyone to put aside our political bias, address this issue in good faith, start reading research, concentrate on our children's well-being, and consider discontinuing our district football program before we do any further damage.

Thank you for your time.

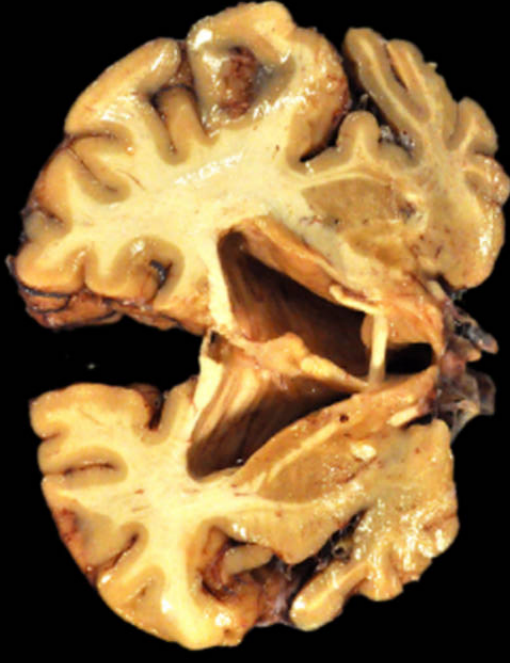
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**Advanced CTE**

[2]

[forbes.com](https://www.forbes.com)

## Is Football Worth Gambling With High School And College Players' Brains?

*Tara Haelle*

10-12 minutes

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Most media attention on a [new study](#) about chronic traumatic encephalopathy (CTE) in deceased football players focused on the NFL players. Certainly, the finding that 99% of NFL players in the study had CTE should get people's attention. But so should the findings about the other players in the study—including high school and college players.

CTE is a [progressive, degenerative disease](#) in which repetitive brain trauma leads to a build-up in the brain of a protein called tau and the death of brain cells. As featured in the film [Concussion](#), [Bennet Omalu](#), M.D., a forensic neuropathologist and chief medical examiner for San Joaquin County in California, first identified CTE in American football players when it had previously only been seen in boxers.

It's now well established that a career in the NFL puts players at high risk for developing CTE, which comes with severe mood and behavioral symptoms, depression, anxiety, suicidal thoughts or attempts, explosive anger and similar problems. The new study, published in *JAMA*, adds to that evidence. What's less clear is how much risk of CTE might exist for high school or college football

players.

Of the 202 deceased players whose brains were examined in the study, two played football before high school, 14 played only in high school and 53 played through college. Neither of the pre-high school players had evidence of CTE, but 21% of the high school players did, and 91% of the college players did.



*Tyler Lee's Jason Williams (34) is tackled by Cincinnati Colerain's Cobrani Mixon (33) and Calvin Dixon (45) during the fourth quarter of the McDonald's Ohio vs. USA Challenge at Columbus Crew Stadium, September 9, 2005, in Columbus, Ohio. Photographer: Jay LaPrete/Bloomberg News*

Before I outline the findings from those players, it's important to note the study's biggest limitation: all these athletes' brains were donated to the brain bank set up by the VA Boston Healthcare



System, Boston University School of Medicine and the Concussion Legacy Foundation. The bank only accepts brains from individuals who were exposed to repetitive head trauma, which includes playing American football at any level. But since they are donated, and only after death, obviously, these brains are not a random sample and cannot be used to represent all the brains of football players.

Further, brains from 53 college players and 14 high school players represent fractions of a fraction of the total player populations at those levels. “Annually, hundreds of thousands of athletes participate in collegiate football, and high school football participation is estimated to be over a million annually,” said Tyler C. Duffield, Ph.D., a pediatric neuropsychology fellow at Oregon Health & Science University’s Doernbecher Children’s Hospital. “Thus, it is difficult to make any definitive conclusions, generalizations or extrapolations to collegiate and high school populations that proportionally far exceed any NFL player sample.”

That said, 56% of the college players had severe CTE, with symptoms similar to those among the NFL players. The three high school players and the remaining 44% of the college players with CTE had mild cases. Because data for mild CTE were combined in the study, it’s not possible to separate out findings specifically about the high school or college players, who make up 55% of the 44 mild CTE cases.

Considering high school and college players represent a majority of the mild cases, it’s worth noting how devastating even mild cases can be: 85% of players with mild CTE had clinical symptoms that worsened over time, and 96% had behavioral and/or mood symptoms. About two thirds (67%) had symptoms of depression

and just over half (52%) had anxiety symptoms. A majority also showed the following symptoms:

- 89% demonstrated impulsivity.
- 69% felt hopelessness.
- 67% had an explosive temper.
- 67% had substance use disorders.
- 63% were verbally abusive toward others.
- 56% experienced strong suicidal thoughts.
- 52% were physically violent.

The most common cause of death among those with mild CTE was suicide, the way more than a quarter of those players died. In addition, 85% of those with mild CTE had cognitive and thinking problems, including poor memory in 73%, difficulty with attention or focus in 69%, and executive function issues in 73%. Executive function involves a range of skills necessary for day-to-day life, including planning, organizing, time management, multi-tasking, maintaining focus, memory and self-control.

Every individual with CTE in the study—including the high school and college students—had at least one mood, behavior or cognitive symptom. The positions with the greatest proportion of CTE were offensive and defensive linemen, linebackers and defensive backs.

These results certainly don't mean all high school and college players sustain brain damage from playing football. Again, these brains are a tiny sample of the overall number of players. And Duffield pointed out that research on high school players from the 1940s-1950s showed they had no increased risk of dementia,

Parkinson's disease or Lou Gehrig's disease (amyotrophic lateral sclerosis, or ALS) even though they played with less protective headgear and had less awareness about concussions or mild traumatic brain injury.

Research is mixed on head injuries in high school and college play, Duffield added, but the strongest evidence suggests that a player's mental health before an injury and their sleeping patterns and quality before and after the injury play a substantial role in their recovery and long-term outcomes.

"I think these two factors should be of greater concern for parents of high college athletes than potential development of CTE later in life," Duffield said.

His colleague, Jim Chesnutt, M.D., an associate professor of orthopedics, rehabilitation and sports medicine at Oregon Health & Science University, agreed that parents of high school football players should not necessarily become alarmed at these findings.

"The studies are significant for those who have been playing football and contact sports for years at the collegiate and professional level," Chesnutt said. "We are not yet sure if this applies to younger contact sport athletes, but we certainly would like to limit the number of head blows and injuries in athletes of all ages." He pointed out that state and national football leadership are working on that, with reduced full-contact practices and rules that decrease contact forces during kickoffs and have already shown improvements in injury statistics.

But is that enough to address concerns about subconcussive hits too? With subconcussive hits, the brain still sustains a hit, but the player has no symptoms. They happen more frequently than

concussions, but there's currently no way to track them, and it's not clear that concussions are necessarily more harmful than subconcussive injuries.

“There is growing concern that multiple subconcussive hits could possibly add up to impact negatively on cognitive function, but more studies clearly need to be done with youth to understand the negative impacts,” Chesnutt said.

It's unclear, though, what those studies might look like or how to design them. The biggest challenge of studying CTE is that it can only be diagnosed after death. That greatly limits how many people can be studied and prevents studying how CTE might progress over a lifetime, when it first appears, or what specific factors might directly cause it. Researchers can't look directly at the brain for possible effects from dozens or hundreds of subconcussive hits.

And that reality opens up enough doubt for me to observe a similar pattern over and over as I've followed this research for more than eight years and interviewed sports medicine doctors, many of whom played and loved sports too. First, they appropriately acknowledge the scarcity of research on younger players, the difficulty of understanding long-term effects from head injuries (especially on youth) and the importance of not translating findings in NFL players to high school or college players. Then they extol the virtues of team sports such as football.

Those benefits include physical activity, adult role models, teamwork, goal-setting and achieving and building resiliency, Chesnutt said. That's certainly true. But this common response—going from the limitations of the research directly to the benefits of football as a team sport—neglect the fact that many other sports

offer the exact same benefits without the substantial, if unproven, risk to the only organ in the body that cannot be repaired or replaced. All of football's benefits exist in basketball, volleyball, baseball, field and ice hockey and lacrosse, for example. Soccer also offers them with less risk when heading the ball is prohibited and fouls are aggressively penalized.

NFL players today accept a certain level of baseline risk when they sign on. The extent of that risk wasn't fully appreciated until Omalu's findings and subsequent research, but it took decades for those findings to come to light. Is it worth the risk now, however slight, that less severe but still substantial damage could be occurring to high school and college students whose brains haven't even finished developing yet?

Duffield described a recent patient he treated who had suffered a fifth concussion. They discussed whether the player should retire—which meant losing his scholarship and his only way to pay for college. But paying for a college degree shouldn't mean risking the longevity of a person's brain.

“For some individuals,” Duffield said, “playing sports is the most meaningful aspect of their life, and sometimes I wonder who are we as providers to take that away from them with all the positive aspects sports can provide athletes.”

As a journalist who has read these studies for years—and recognizes that the world of sports includes much more than just football—I sometimes wonder who we are as a society to risk taking away the futures of young athletes with all the other positive activities that offer just as much.

[3]

[bu.edu](https://www.bu.edu)

# Frequently Asked Questions about CTE

8-10 minutes

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## What is CTE?

Chronic Traumatic Encephalopathy (CTE) is a progressive degenerative disease of the brain found in people with a history of repetitive brain trauma (often athletes), including symptomatic concussions as well as asymptomatic subconcussive hits to the head that do not cause symptoms. CTE has been known to affect boxers since the 1920's (when it was initially termed punch drunk syndrome or dementia pugilistica).

In recent years, reports have been published of neuropathologically confirmed CTE found in other athletes, including football and hockey players (playing and retired), as well as in military veterans who have a history of repetitive brain trauma. CTE is not limited to current professional athletes; it has also been found in athletes who did not play sports after high school or college.

The repeated brain trauma triggers progressive degeneration of the brain tissue, including the build-up of an abnormal protein called tau. These changes in the brain can begin months, years, or even decades after the last brain trauma or end of active athletic involvement. The brain degeneration is associated with common

symptoms of CTE including memory loss, confusion, impaired judgment, impulse control problems, aggression, depression, suicidality, parkinsonism, and eventually progressive dementia.

In both sets of photographs below, the brain tissue has been immunostained for tau protein, which appears as a dark brown color. Tau immunostained sections of medial temporal lobe from 3 individuals:

### **How do you get CTE? Can I get CTE from one concussion/hit to the head?**

We believe CTE is caused by repetitive brain trauma. This trauma includes both concussions that cause symptoms and subconcussive hits to the head that cause no symptoms. At this time the number or type of hits to the head needed to trigger degenerative changes of the brain is unknown. In addition, it is likely that other factors, such as genetics, may play a role in the development of CTE, as not everyone with a history of repeated brain trauma develops this disease. However, these other factors are not yet understood.

### **What is a concussion?**

A concussion has occurred any time you have had a blow to the head that caused you to have symptoms for any amount of time. You do NOT need to have lost consciousness to have a concussion. These symptoms include blurred or double vision, seeing stars, sensitivity to light or noise, headache, dizziness or balance problems, nausea, vomiting, trouble sleeping, fatigue, confusion, difficulty remembering, difficulty concentrating, or loss of consciousness. A concussion has also occurred when a person

gets a “ding” or gets their “bell rung.”

### **What are the symptoms of CTE?**

The symptoms of CTE include memory loss, confusion, impaired judgment, impulse control problems, aggression, depression, anxiety, suicidality, parkinsonism, and, eventually, progressive dementia. These symptoms often begin years or even decades after the last brain trauma or end of active athletic involvement.

### **I recently had a concussion, and I am suffering from a number of the symptoms listed above. Do I have CTE?**

The symptoms of CTE generally do not present until years or decades after the brain trauma occurred or after one stops actively playing contact sports. While most concussion symptoms resolve within a few weeks, the symptoms can last for months or, in severe cases, even years. When this occurs, it is called [post-concussion syndrome](#). Post-concussion syndrome is different than CTE, and the symptoms of post-concussive syndrome usually resolve years or decades before the onset of CTE symptoms. If you believe you are suffering from either an acute concussion or post-concussion syndrome, contact your physician. For more information on concussions, visit the Concussion Legacy Foundation’s [Concussion Resources](#). For more information on physicians in your area who work with those suffering from brain trauma, please use the [Concussion Clinics](#) search tool.

### **If I have the symptoms of CTE, do I have the disease itself?**



Just because you have some or many of the symptoms of CTE does not necessarily mean that you have the disease itself. There are many possible causes of these types of symptoms. If you are having difficulties, you should speak with your primary care or specialist physician.

### **How is CTE diagnosed?**

At this time CTE can only be diagnosed after death by [postmortem neuropathological analysis](#). Right now there is no known way to use MRI, CT, or other brain imaging methods to diagnose CTE. The CTE Center is actively conducting research aimed at learning how to diagnose CTE during life. Find out more about [our research here](#).

### **Can I be evaluated at the BU CTE Center?**

The BU CTE Center is a research group. At this point in time we do not offer clinical services. The best first step, if you are seeking clinical evaluation, is to speak to your primary care physician. For more information on physicians in your area who work with those suffering from brain trauma, please use the [Concussion Clinics](#) search tool.

### **Can you refer me to a doctor?**

Unfortunately, as a small research group, the CTE Center is unable to keep a comprehensive list of doctors across the country who are familiar with brain injury and related issues. For more information on physicians in your area who work with those suffering from brain

trauma, please use the [Concussion Clinics](#) search tool.

### **Can CTE be cured? What can I do if I think I have CTE?**

Unfortunately, at this time there is no cure for CTE. However, the CTE Center is currently conducting ongoing [clinical research](#) aimed at discovering how CTE develops and progresses, risk factors for the development of the disease, and how to diagnose the disease during life. The symptoms of CTE, such as depression and anxiety, can be treated individually. If you believe you or a loved one may have CTE, please read through the [Living with CTE page](#) and talk with your physician. For more information on physicians in your area who work with those suffering from brain trauma, please use the Concussion Clinics search tool.

### **What's the difference between CTE and Alzheimer's Disease (AD)?**

Although there are some similarities between CTE and Alzheimer's Disease (AD), significant differences exist. The symptoms of CTE generally present earlier (in one's 40s) than those of AD (in one's 60s). The initial and most central symptoms in AD involve memory problems, while the first symptoms of CTE generally involve problems with judgment, reasoning, problem solving, impulse control, and aggression. In addition, these diseases are found to be different in postmortem neuropathological findings.

### **What can I do to help/how can I become involved in research?**

For more information on the CTE Center's current clinical research, [check out our LEGEND study](#). The CTE Center also has

a [brain bank](#) that studies postmortem brain and spinal cord tissue to better understand the effects of repeated brain trauma. Current and former athletes and military personnel of all ages and levels may be eligible to [pledge to donate their brain](#) (added link to pledge) and spinal cord to the BU CTE Center after death. Being a brain donor is similar to being an organ donor, and the procedure is done in such a way that the donor may have an open casket if desired. BU CTE Center personnel understand that this is a difficult time for the family of the donor, and they work hard to make the donation process as easy as possible for the family. For more information visit our [Brain Donation Registry](#).

**Do I have to be a high level amateur or professional athlete to participate in your research?**

No. The CTE Center welcomes athletes of all sports and levels to participate in our research. Although some studies are restricted to specific sports and levels, other studies are open to anyone with a history of participation in organized sports or military service.

**Can I participate in the Brain Donation Registry?**

If you have a history of participation in organized sports and/or a history of participation in the military, you may be eligible to participate in the brain donation registry. For more information, please contact the [Brain Donation Registry](#) coordinator Laney Evers at 617-414-1187 or by email at [levers@bu.edu](mailto:levers@bu.edu).

**Can I participate in the LEGEND study?**

If you have a history of participation in organized sports, you may be eligible to participate in the [LEGEND study](#). For more information, please contact the [LEGEND study](#) coordinator by email, [LEGEND@bu.edu](mailto:LEGEND@bu.edu).

[4]

[nytimes.com](https://www.nytimes.com)

## 111 N.F.L. Brains. All But One Had C.T.E.

*Sam Manchester*

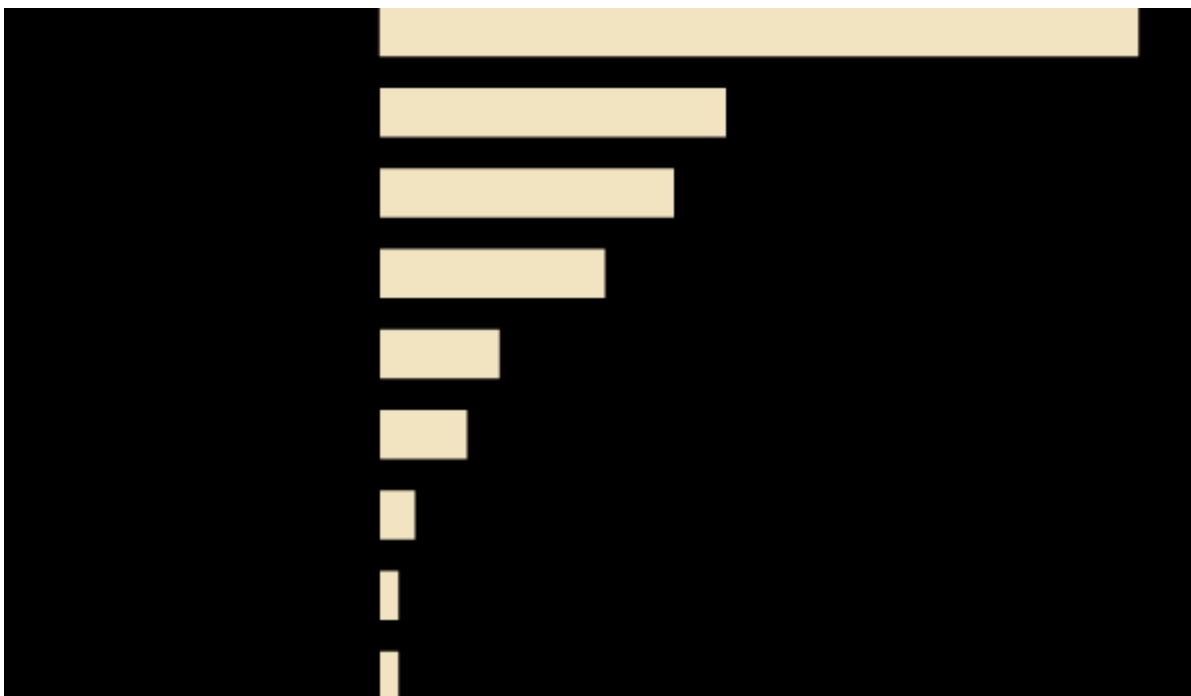
4-5 minutes

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Dr. Ann McKee, a neuropathologist, has examined the brains of 202 deceased football players. A [broad survey of her findings](#) was published on Tuesday in The Journal of the American Medical Association.

Of the 202 players, 111 of them played in the N.F.L. — and 110 of those were found to have chronic traumatic encephalopathy, or C.T.E., the degenerative disease believed to be caused by repeated blows to the head.

C.T.E. causes myriad symptoms, including memory loss, confusion, depression and dementia. The problems can arise years after the blows to the head have stopped.



44

Linemen

20

Running backs

17

Defensive backs

13

Linebackers

7

Quarterbacks

5

Wide Receivers

2

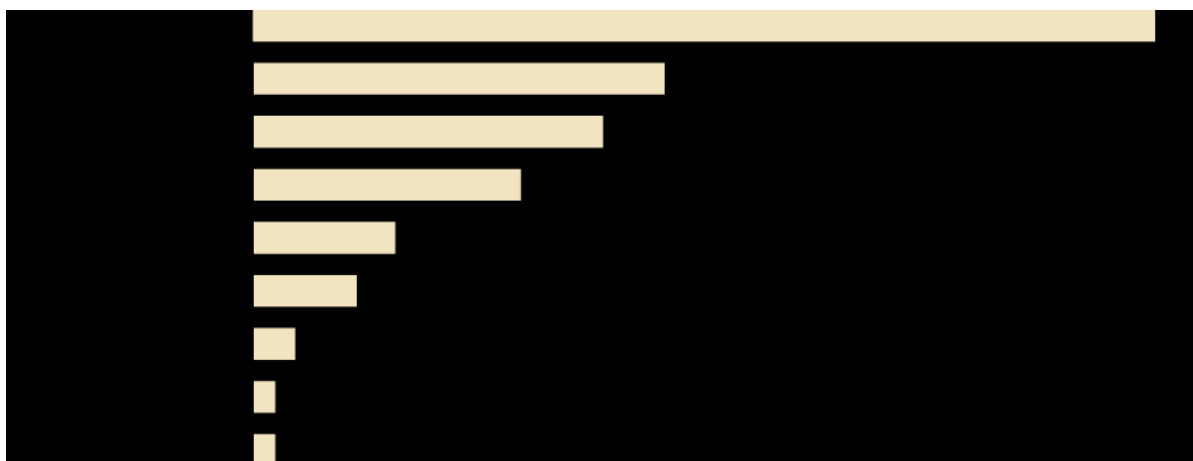
Tight ends

1

Place-kickers

1

Punters



44

Linemen

20

Running backs

17

Defensive backs

13

Linebackers

7

Quarterbacks

5

Wide Receivers

2

## Tight ends

1

## Place-kickers

1

## Punters

The brains here are from players who died as young as 23 and as old as 89. And they are from every position on the field — quarterbacks, running backs and linebackers, and even a place-kicker and a punter.

They are from players you have never heard of and players, like Ken Stabler, who are enshrined in the Hall of Fame. Some of the brains cannot be publicly identified, per the families' wishes.





The image above is from the brain of Ronnie Caveness, a linebacker for the Houston Oilers and Kansas City Chiefs. In college, he helped the Arkansas Razorbacks go undefeated in 1964. One of his teammates was Jerry Jones, now the owner of the Dallas Cowboys. Jones has rejected the belief that there is a link between football and C.T.E.

The image above is from the brain of Ollie Matson, who played 14 seasons in the N.F.L. — after winning two medals on the track at the 1952 Helsinki Games. He died in 2011 at age 80 after being mostly bedridden with dementia, his nephew told The Associated Press, adding that Matson hadn't spoken in four years.

Dr. McKee, chief of neuropathology at the VA Boston Healthcare System and director of the CTE Center at Boston University, has amassed the largest C.T.E. brain bank in the world. But the brains of some other players found to have the disease — like Junior Seau, Mike Webster and Andre Waters — were examined elsewhere.

The set of players posthumously tested by Dr. McKee is far from a random sample of N.F.L. retirees. “There’s a tremendous selection bias,” she has cautioned, noting that many families have donated brains specifically because the former player showed symptoms of C.T.E.

But 110 positives remain significant scientific evidence of an N.F.L. player’s risk of developing C.T.E., which can be diagnosed only after death. About 1,300 former players have died since the B.U. group began examining brains. So even if every one of the other

1,200 players had tested negative — which even the heartiest skeptics would agree could not possibly be the case — the minimum C.T.E. prevalence would be close to 9 percent, vastly higher than in the general population.

The N.F.L.'s top health and safety official has [acknowledged a link](#) between football and C.T.E., and the league has begun to steer children away from playing the sport in its [regular form](#), encouraging safer tackling methods and promoting flag football.

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### Original Investigation

July 25, 2017

# Clinicopathological Evaluation of Chronic Traumatic Encephalopathy in Players of American Football

Jesse Mez, MD, MS<sup>1,2</sup>; Daniel H. Daneshvar, MD, PhD<sup>1,3</sup>; Patrick T. Kiernan, BA<sup>1,2</sup>; [et al](#)

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## Key Points

**Question** What are the neuropathological and clinical features of a case series of deceased players of American football neuropathologically diagnosed as having chronic traumatic encephalopathy (CTE)?

**Findings** In a convenience sample of 202 deceased players of American football from a brain donation program, CTE was neuropathologically diagnosed in 177 players across all levels of play (87%), including 110 of 111 former National Football League players (99%).

**Meaning** In a convenience sample of deceased players of American football, a high proportion showed pathological evidence of CTE, suggesting that CTE may be related to prior participation in football.

## Abstract

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**Importance** Players of American football may be at increased risk of long-term neurological conditions, particularly chronic traumatic encephalopathy (CTE).

**Objective** To determine the neuropathological and clinical features of deceased football players with CTE.

**Design, Setting, and Participants** Case series of 202 football players whose brains were donated for research. Neuropathological evaluations and retrospective telephone clinical assessments (including head trauma history) with informants were performed blinded. Online questionnaires ascertained athletic and military history.

**Exposures** Participation in American football at any level of play.

**Main Outcomes and Measures** Neuropathological diagnoses of neurodegenerative diseases, including CTE, based on defined diagnostic criteria; CTE neuropathological severity (stages I to IV or dichotomized into mild [stages I and II] and severe [stages III and IV]); informant-reported athletic history and, for players who died in 2014 or later, clinical presentation, including behavior, mood, and cognitive symptoms and dementia.

**Results** Among 202 deceased former football players (median age at death, 66 years [interquartile range, 47-76 years]), CTE was neuropathologically diagnosed in 177 players (87%; median age at death, 67 years [interquartile range, 52-77 years]; mean years of football participation, 15.1 [SD, 5.2]), including 0 of 2 pre-high school, 3 of 14 high school (21%), 48 of 53 college (91%), 9 of 14 semiprofessional (64%), 7 of 8 Canadian Football League (88%), and 110 of 111 National

Football League (99%) players. Neuropathological severity of CTE was distributed across the highest level of play, with all 3 former high school players having mild pathology and the majority of former college (27 [56%]), semiprofessional (5 [56%]), and professional (101 [86%]) players having severe pathology. Among 27 participants with mild CTE pathology, 26 (96%) had behavioral or mood symptoms or both, 23 (85%) had cognitive symptoms, and 9 (33%) had signs of dementia. Among 84 participants with severe CTE pathology, 75 (89%) had behavioral or mood symptoms or both, 80 (95%) had cognitive symptoms, and 71 (85%) had signs of dementia.

**Conclusions and Relevance** In a convenience sample of deceased football players who donated their brains for research, a high proportion had neuropathological evidence of CTE, suggesting that CTE may be related to prior participation in football.

**Editorial**

Understanding Chronic Traumatic Encephalopathy

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## ‘Concussion’ doctor: No such thing as ‘making football safer’

*By Brett Cyrgalis*

4-5 minutes

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For Dr. Bennet Omalu, the future of football is not a debate.

To science’s most outspoken critic of the harmful effects of concussions, and whose life journey inspired the 2015 movie “Concussion” starring Will Smith, the demise of football is inevitable.

“Someday there will be a district attorney who will prosecute for child abuse [on the football field], and it will succeed,” Omalu said Monday night during a talk held by the New York Press Club in Midtown. “It is the definition of child abuse.”

There is no hedging in the way Omalu, a forensic pathologist, describes the science that led to his discovery of chronic traumatic encephalopathy (CTE), the disease that has affected so many former NFL players. It again has been in the spotlight after a recent study showed 110 of 111 former NFL players who had their brains donated for examination suffered from CTE.

“That study out of Boston simply reaffirmed something we have always known, that there is nothing like a safe blow to the head,” Omalu said. “If you play football, and if your child plays football,

there is a 100 percent risk exposure. There is nothing like making football safer. That's a misnomer."

When Omalu first brought his findings to the NFL, the league scoffed. Eventually, the courts forced the NFL to pay a \$1 billion settlement to former players who were suffering from the debilitating effects of playing the game. Omalu hardly blames the NFL, but rather the societal mores that dictate its popularity and the acolytes in the medical community who have inexcusably exchanged their integrity for their own economic benefit through their association with the league.

"There is nothing the league can do. The league is a corporation," Omalu said. "What do corporations do? Make money. They're not there to provide health care or perform research. That is not what they're there to do. They're selling product.

"If they feel the need to make any changes, they're making calculated changes that will enhance their bottom line."

Omalu's book "Truth Doesn't Have a Side" will be released Tuesday and it follows his journey from his native Nigeria to his breakthrough findings while performing an autopsy on Steelers' great Mike Webster. Omalu is striving to get through to parents who are thinking about letting their children play football. His belief is that no child under the age of 18 should be allowed to play sports with such proclivity for brain damage — and he believes the courts are eventually going to back him up.

"Adults are free to do whatever they want to do, as long as they have educated consent. But children, no," Omalu said. "And we've always done that whenever we identify a possible risk factor. What we do as a society is protect children from being exposed to such



risk factors. We do that with cigarette smoking. We did that with alcohol. Why not football, which is more dangerous?

“We wouldn’t let children smoke a stick of cigarette, but then send them to a football field to sustain concussions? So I think it’s time for society to tell the truth.”

Omalu did admit he didn’t think things were going to change overnight, and acknowledged there has not been a significant drop-off in participation in youth football. But just as it took the courts to force the NFL to compensate its former players, Omalu believes eventually the law cannot avoid what he sees as a clear-cut public risk factor for children playing football.

“The truth will always prevail,” he said, “but it may take a long time to come.”

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# The Disinformation Playbook | Union of Concerned Scientists

9-11 minutes

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- [The Fake](#)
- [The Blitz](#)
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Science helps keep us safe and healthy. The public safeguards that keep our drinking water clean and our children's toys safe rely on independent science and a transparent policymaking process. And we all rely on scientific information to make informed choices about everything from what we eat to what consumer products we buy for our families.

But the results of independent science don't always shine a favorable light on corporate products and practices. In response, some corporations manipulate science and scientists to distort the truth about the dangers of their products, using a set of tactics made famous decades ago by the tobacco industry. We call these tactics the Disinformation Playbook.

To be clear: most companies don't engage in disinformation. The deceptive practices that make up the Playbook are used by a small

minority of companies—and yet, as we show, they are found across a broad range of industries, from fossil fuels to professional sports.

Here are five of the most widely used “plays” and some of the many cases where they have been used to block regulations or minimize corporate liability, often with frightening effectiveness—and disastrous repercussions on public health and safety.

Companies underwrite a good deal of scientific research, and society often benefits from it. But bonafide scientific research demands a high degree of scientific integrity to ensure that results derive from the evidence, and not from a desire to meet a predetermined, non-scientific objective. People who have a financial stake in research outcomes should not publish in scientific journals without full and clear disclosure of conflicts of interest—especially when the results involve the safety or effectiveness of a company’s products.

To understand how “the Fake” works, read the examples, including the one about how Georgia-Pacific knowingly planted counterfeit science studies in legitimate science journals to try to undermine understanding of the lethal health risks posed by its former asbestos-containing product.

To evade these standards, some companies choose to manufacture counterfeit science—planting ghostwritten articles in legitimate scientific journals, selectively publishing positive results while underreporting negative results, or commissioning scientific studies with flawed methodologies biased toward predetermined results. These methods undermine the scientific process—and as our case studies show, they can have serious public health and safety consequences.

Companies and industry trade associations sometimes try to bury scientific information by harassing or intimidating scientists whose research threatens their bottom line. This coercion can take several different forms: our case studies show how corporations have threatened to defund scientists' research, interfere with their promotion or tenure, transfer them to other positions, or tarnish their reputations.

For a good example of "the Blitz," read the case study to see how the National Football League tried to intimidate scientists studying the evidence of a link between the game and traumatic brain injuries.

Some corporations have also sought to muzzle scientists by including gag orders in research or employment contracts, or through litigation and open records requests to tie up their time and resources, making universities less likely to support important, policy-relevant research.

Each of these tactics has the same goal: to silence scientists and stifle independent science. This behavior violates the spirit of scientific inquiry, which is open to all ideas and findings and inclusive of fellow experts looking to learn more about our world. Any efforts to make scientists feel threatened, or to discourage them from publishing or even continuing their research, are direct attacks on our country's scientific enterprise, compromising its ability to effectively serve the public.

As evidence emerges about a product's adverse effects, companies will sometimes try to undermine the science by falsely spreading doubt about the harm, deceiving the public and undermining the efforts of regulatory bodies to protect the public. A now-infamous

memorandum from a tobacco executive in 1969 captured this strategy well: “Doubt is our product, since it is the best means of competing with the ‘body of fact’ that exists in the minds of the general public.”

A classic case of “the Diversion” can be seen in an internal memo by a consortium of fossil fuel companies including Exxon and Chevron, that surfaced in a court case in 2014. According to the memo, the companies would achieve “victory” when “average citizens ‘understand’ (recognize) uncertainties in climate science” and when “those promoting the Kyoto treaty [to curb global warming emissions]... appear to be out of touch with reality.”

Our case studies show how corporations have deployed trade associations and front groups with innocuous-sounding names to undermine science, influence public opinion, and gain access to policy makers while maintaining the illusion of independence.

Working to manufacture doubt and create the appearance of uncertainty where little exists is a blatant abuse of the way independent science operates to develop knowledge and inform the public about threats to their health and well-being.

Many companies forge strong financial connections with university research departments with the legitimate goal of advancing public knowledge. Corporations sometimes sponsor academic chairmanships, sponsor students, or fund research. Arrangements like these can help companies improve their image by affiliating with a prestigious academic institution or professional society.

In a prime example of “the Screen” a new, Coca-Cola-funded research institute used studies funded by the company to argue that there was “strong evidence” that weight gain could be

prevented, not by reducing calorie consumption, “but maintaining an active lifestyle and eating more calories.”

Transparency and scientific independence are crucial in such relationships. As a group, industry-funded studies are more likely to produce results favorable to industry. This doesn't mean that corporate funding of scientific research will necessarily lead to biased results, but it underlines the need for full disclosure so that the objectivity of scientific literature can be adequately assessed.

As our case studies show, companies have sometimes exploited their academic alliances to influence research and spread misinformation that serves corporate interests while undermining science.

Like public interest organizations, many companies or industry trade associations lobby the government to help enact legislation favorable to their interests. Some companies, however, go so far as to undermine the way federal agencies use science to develop policy, pushing for changes that make it harder for agencies to fulfill their science-based missions, or using political connections to gain access to top-level agency officials. Such actions compromise the government's ability to protect the public.

Although the full story has yet to surface, a likely recent example of “the Fix” can be seen in the recent decision by EPA Administrator Scott Pruitt to overrule his own scientific advisors to allow continued use of the Dow Chemical company's pesticide Chlorpyrifos.

Unfortunately, a “revolving door” between industry and government presents a huge opportunity for people with industry ties and clear financial conflicts of interest to hold key decisionmaking positions.

Such officials can help develop policies that benefit a former or prospective employer, policies that may live on long after their departure.

While it's certainly reasonable for industry to participate as a stakeholder in policy decisions, transparency and public vigilance are needed to keep companies from using their deep pockets and powerful networks to promote policies that undermine scientific evidence and threaten public health and safety.

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[washingtonpost.com](http://washingtonpost.com)

## Trump knocks ‘softer’ NFL rules: ‘Concussions — ‘Uh oh, got a little ding on the head?’

*By Ben Guarino*

11-14 minutes

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Donald Trump boasted "We don't go by these new, and very much softer, NFL rules...our people are tough." (Jenny Starrs/The Washington Post)

When a Trump supporter returned to a rally in Lakeland, Fla., on Oct. 12, after requiring medical attention, Donald Trump boasted, "We don't go by these new, and very much softer, NFL rules. Concussions — 'Uh oh, got a little ding on the head? No, no you can't play for the rest of the season' — our people are tough." (Jenny Starrs/The Washington Post)

Donald Trump knocked the National Football League's rules about concussions, calling them "soft," during a Wednesday campaign rally in Florida. While speaking at an airport in Lakeland, Fla., the Republican presidential nominee witnessed a woman in the audience faint. First wondering whether she was a protester, and then asking whether there was a "doctor in the house," Trump said he was confident she would return to the rally.

When she came back, after being treated for passing out in the



tarmac heat, Trump boasted that his supporters were tough — tougher, even, than the safety rules in place to protect professional football players.

“That woman was out cold, and now she’s coming back,” Trump [said](#) from the podium. “See, we don’t go by these new, and very much softer, NFL rules. Concussions — ‘Uh oh, got a little ding on the head? No, no, you can’t play for the rest of the season’ — our people are tough.”

[\[40 percent of former NFL players suffer from brain injuries, new study shows\]](#)

Concussions, of course, are more than a little ding on the head. Repeated or severe blows to the skull, not uncommon in professional football games, may cause lasting injury. As The Post’s Travis M. Andrews [reported](#) in April, recent MRI scans of 40 NFL players found that 30 percent had signs of nerve cell damage. Florida State University College of Medicine’s Francis X. Conidi, a physician and author of the study, said in a statement that the rates of brain trauma were “significantly higher in the players” than in the general population. In the spring, the NFL [acknowledged](#) a link between football and degenerative brain diseases such as chronic traumatic encephalopathy, which is associated with symptoms such as depression and memory loss.

Trump’s remarks came at a time when the NFL has been under [intense scrutiny](#) for its high rate of head injuries, including lawsuits from thousands of former football players. Since 2009, when the NFL released its Game Day Concussion Protocol, the football league has been refining the way it handles injuries; one such rule is that players with suspected concussions must be removed from

the field. (Cam Newton, the Panthers' quarterback, sat out a game Monday night because of a concussion.) The NFL also recently announced a [\\$100 million initiative](#), split between developing new sports technologies and medical research, to make the game safer.

Morning Mix newsletter

Stories that will be the talk of the morning.

[\*\[Concussion symptoms cast uncertainty on Redskins' Jordan Reed and Su'a Cravens\]\*](#)

Experts and advocates condemned Trump's comments. George Washington University Law School's [Michael V. Kaplen](#), who specializes in the legal issues surrounding brain injury, told the New York Daily News that Trump's dismissal of the concussion protocol "demeans and disparages people with brain injuries." Each year, 2 million people in the United States suffer from a brain injury, he [said](#).

Every brain injury, including concussions, "should be taken seriously," Susan H. Connors, president and chief executive of the nonprofit group Brain Injury Association of America, [said](#) in a statement issued Wednesday. "BIAA is disappointed in Mr. Trump's ridicule of the NFL's concussion protocols and especially of his connotation that those who sustain a concussion are weak."

But this is not the first time the GOP candidate has been unimpressed with what he sees as weakness in modern football. During a Reno rally in January, as The Post reported, he [said](#), "football has become soft like our country has become soft."

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[reuters.com](https://www.reuters.com)

## High school athletes often playing with concussions

*Kathryn Doyle* 5 Min Read

5-6 minutes

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NEW YORK (Reuters Health) - More than half of high school athletes with concussions play despite their symptoms, and often their coaches aren't aware of the injury, according to a new study.

Most U.S. states have passed laws intended to prevent high school athletes from having a concussion go unrecognized and risking further danger by continuing to play, but legislation may not be enough, the researchers say.

Concussion symptoms include memory problems, headache, irritability or sleeping more than usual, according to the Centers for Disease Control and Prevention (CDC), and playing with these symptoms can lengthen recovery time.

"I think that currently the big problem is that kids hide their symptoms," said Dr. Frederick P. Rivara, who led the study at Harborview Injury Prevention and Research Center at the University of Washington in Seattle.

"The laws and attention to concussion have made coaches much more aware of the issues and I do believe that most coaches want to do the right thing," Rivara told Reuters Health. Playing with

symptoms increases the risk of a more serious brain injury, he said.

His team's study included male high school football players and female soccer players in Washington state during the 2012 season. At the beginning of the season, team coaches filled out questionnaires designed to assess their personal details and experience and their level of education with regard to concussions.

Athletes also filled out baseline questionnaires about their history of head injuries at the beginning of the season, and researchers contacted them and their parents weekly throughout the season to report the number of practices, games, head injuries and potential concussion symptoms.

Over one season, 11 percent of soccer players and 10 percent of football players sustained a concussion, based on the symptoms they reported.

According to the survey of 778 athletes, 69 percent of those with concussions reported playing with symptoms and 40 percent reported that their coach was not aware of their concussion.

"It's disappointing that so many young athletes with apparent concussions choose not to report their symptoms to coaches or even parents, but they are often highly motivated to avoid being removed from play," Keith O. Yeates, a pediatric traumatic brain injury researcher at Nationwide Children's Hospital in Columbus, Ohio, said.

"They may also downplay or not realize the risks associated with concussions," said Yeates, who was not involved in the new study.

Each year, U.S. emergency rooms treat more than 100,000 sports-related concussions in kids age 19 and under, according to the

CDC.

Rivara expected to see more concussions in football than in soccer, and was surprised at how common concussions seemed to be overall. But the previous studies that found more concussions in football were largely based on athletic trainer reports, and not athlete reports, he and his coauthors note.

Whether coaches had been educated in concussion symptoms and management did not seem to affect how likely their concussed players were to continue participating on the team, the authors report in the American Journal of Sports Medicine.

Washington was the first state to pass comprehensive concussion legislation aimed at high school athletes, the researchers write. The state's Zackery Lystedt Law, enacted in 2009, mandates coach education on concussions, and that parents sign an information sheet about concussions before kids can participate in the sport.

In addition, the researchers note, the law requires "removal of the athlete from practice or play at the time of a suspected concussion, and written clearance by a licensed health care provider trained in the evaluation and management of concussions before the athlete can return to practice or play."

To get more concussed players off the field, "we should focus on educating not only coaches but athletes and parents as well as to the symptoms and dangers of concussion," Yeates said. "We also need research to determine which educational strategies work, and better tools for identifying concussions on the sidelines," he said.

"Educating coaches is important but it may not be enough," Rivara said.

“One thing that needs to be done is to address the culture of sport, of winning at all costs, of ‘manning up’ and playing despite symptoms,” he said.

SOURCE: [bit.ly/1niEvIS](https://www.reuters.com/article/us-high-school-athletes-concussions/high-school-athletes-often-playing-with-concussions-idUSB...) American Journal of Sports Medicine, online February 25, 2014.

[10]

[momsteam.com](http://momsteam.com)

## Athletes' Resistance To Self-Reporting of Concussion Continues Despite Increased Education

14-17 minutes

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Athletes continue to underreport concussion **(1)** even when they know the [signs and symptoms](#) and that they risk serious injury if they continue to play with a concussion or return too soon from injury, say researchers in three recent studies. **(2,3,4)**

The findings suggest that efforts to change the culture of contact and collision sports and the attitudes of athletes towards reporting concussion through education, don't appear to be working, at least so far.



First up, a recent anonymous online survey of collegiate athletes revealed , despite increased concussion education, roughly the same degree of underreporting of concussion as in 2004. **(2)**

Researchers at the University of Pennsylvania reported that, among all varsity athletes who responded within two weeks to an e-mail from Penn's head athletic trainer (former MomsTEAM expert, [Eric Laudano](#)):

- 27% of athletes who self-identified as playing contact sports said they had hidden a concussion to stay in a game compared with 14% of athletes in noncontact sports;
- 54% of contact athletes said they would be extremely unlikely or unlikely to report a concussion in a game situation; and
- 30% of noncontact athletes said they were likely or extremely likely to report a concussion versus 20% for contact athletes.

"These findings were present despite strong educational efforts and knowledge of concussion symptoms among respondents and suggest that even educated athletes may not have changed their attitudes toward reporting concussion," the study noted.

Following these findings among college athletes comes a May 2013 study from researchers at Cincinnati Children's Hospital (**3**) of 120 high school football players, 30 of whom had suffered a concussion. The good news was that three quarters of those surveyed (82 out of 120) reported receiving prior concussion education, and that most could correctly recognize the principal [symptoms of concussion](#):

- headache (93.3%);
- dizziness (89.2%);
- difficulty remembering (78.3%);
- sensitivity to light/sound (78.3%);



- difficulty concentrating (75.8%); and
- feeling in a fog (52.5%).

Also encouraging was that 9 out of 10 recognized the risk of serious injury if they returned to play too quickly.

But here's the bad news:

- an astounding 91 percent felt that it was okay for an athlete to play with a concussion
- 75 percent said they would play through any injury to win a game
- 53 percent said they would "always or sometimes continue to play with a headache sustained from an injury,"
- Only 54 percent would "always or sometimes report symptoms of a concussion to their coach," and
- Only 4 in 10 would tell their coach immediately if they had concussion symptoms.

Most recently, a study by researchers at Wake Forest, the University of North Carolina at Chapel Hill, and A.T. Still University in Mesa, Arizona (4), found that, while athletes are generally knowledgeable about the [signs and symptoms of concussion](#), there is a "gross underreporting" of concussion events, with a large proportion of those surveyed indicating that they continued to participate in both games and practices while experiencing



symptoms.

"Most strikingly," writes Johna Register-Mihalik, Ph.D, LAT, ATC, Adjunct Assistant Professor in the Department of Exercise and Sport Science at the University of North Carolina at Chapel Hill, "athletes only indicated reporting 13% of events they considered bell ringers, which were likely concussive injuries." The concern, she writes, is that "athletes not reporting these bell-ringer events may have continued to participate or returned to participation too early, predisposing them to further injury." The underreporting rate of approximately 40% for perceived concussions was not substantially better than the 50% underreporting rate found in previous studies over the last decade.**(1,5,6)**

Consistent with the other studies, the reasons athletes gave for not reporting possible concussions were that they:

- did not think the injury was serious enough to report (70.2%);
- did not want to be removed from the game (36.5%);
- did not want to let down teammates (27.0%)
- did not want to let down coaches (23.0%);
- did not know the event was a concussion (14.9%); or

- did not want to be removed from practice (13.5%).

Unfortunately, most recent data, collected by from high school football players in Ohio and the Boston area after the 2014 season by researchers from Nationwide Children's Hospital, Columbus, Ohio, Harvard Medical School and Boston Children's Hospital **(11)** doesn't much progress in moving the dial towards a higher percentage of self-reporting. Only slightly more than half (56.4%) of those completing the survey who had sustained a concussion during the 2014 season had reported it, with the proportion of first-stringers who reported lower than non-first stringers (49.3% and 73.3% respectively).

The reasons for their failure to honestly report? No surprises here either. Of the players who did not report his or her concussion, the most common reasons, once again, were, first, "feeling it wasn't a serious injury (56.9%), and second, "didn't want to be pulled from competition (47.7%).

Thus, despite over a decade of education, by MomsTEAM and others, around half - and probably a lot more (the fact that only 38% of athletes in the sample responded to the questionnaire may reflect a selection bias; those who did not respond may have done so because they did not want to admit to their failure to report) - the dial hasn't moved in any significant way from the 50% who didn't report back in 2004.

Personal experience is same

All these findings are not at all surprising to me, based on my experience during the filming of MomsTEAM's documentary, "[The Smartest Team](#)." Nearly every football player, not to mention the athletic trainer, coaches, and parents, I interviewed for the film

freely admitted that they would not self-report concussion symptoms.

Here is just a sampling of what I was told:

- "I've got a pretty good rapport with the athletes here at Newcastle. They know I'm not trying to keep them out, or keep them from playing. ... There are kids who take hits all the time, they don't come and tell me, until someone else comes and tells me, and I don't know anything about it." (Damon Glass, Newcastle certified athletic trainer)
- "Their biggest fear is missing out." (Dale Berglan, Newcastle Athletic Director)
- "I have a friend on the line. He's the center. We were at practice one day, and he seemed really out of it. So, I told coach, and he got really mad. But I know it was going to help him in the long run." (Matt Meyer, Newcastle player).
- "They don't want to come out. They want all the playing time they can get. They don't want to come out for a couple of plays." (Colin Black, Newcastle player).
- "Unless it's really, really bad, and knocks me out. I probably won't play through that. But if I can get up and walk away from it, I'll probably keep playing. You see some dots, but then go away. So just keep playing through it. It's my senior year." (Cody Womack, Newcastle player)
- "It's my senior year. You can't afford to miss any games. You have to make the most of it, while you still can. 'Cuz as of now we only have two games promised left. And if we don't win one of the next two, then we don't go to playoffs." (Justin Ledford, Newcastle

player)

- "The football game. Making the playoffs, or the championship. That's one night. Are you going to take that, or you are going to take a lifetime of success?" (Robin Gibson, football mother)
- "They don't like to sit out because they are afraid they are going to lose their position. Unfortunately, that happens. We have a great team with a lot of great players, and if you are out any length of time, you have the potential of not being to start your position." (Chastity Corbin, football mother).

## **Are impact sensors a partial solution?**

All the recent studies are also consistent with a 2010 ESPN poll of players, coaches, parents and athletic trainers in 23 states (7) which found that players - the ones whose brains are being rattled and who are putting themselves at risk of adverse long-term health consequences from concussions - are still the group *least* concerned about concussions.

When asked whether, if a star player got a concussion, they would rather lose the state title game as he sat out than win it because he chose to play with a concussion, more than half (54.1%) of the 300 players in the ESPN survey said they would play the star compared to 9% of athletic trainers, 6.1% of parents, and 2.1% of coaches.

All of this is leading an increasing number of experts to argue that the best way to address the problem of underreporting may be to try a multi-pronged approach: try to [change the culture](#) through education - which, as in trying to change any culture, especially as one as entrenched and likely hard-wired as the win-at-all-costs culture of resistance to injury reporting, is going to take a long, long

time - and, at the same time, perhaps not rely so heavily on the athletes themselves, game officials or sideline observers to identify concussed athletes, but to use technology in the form of [impact sensors](#) to improve identification of athletes with possible concussion and remove them from play for concussion assessment on the sports sideline. **(8,9,10)**

The scientific community, however, is sharply divided over the value of sensors in improving the rate at which athletes suspected of having sustained a concussion are identified on the sports sideline. Many argue that impact sensors, at least at this point, are not the answer. Johna Register-Mihalik, Ph.D, LAT, ATC, Adjunct Assistant Professor in the Department of Exercise and Sport Science at the University of North Carolina at Chapel Hill, and lead author of one of the most recent study finding "gross underreporting" of possible concussions by high school athletes **(4)**, tells MomsTEAM that she does not recommend their use in concussion detection because "the science, although a growing field of information, is just not quite there in how these may best be used from a clinical standpoint and across all sport settings."

She notes that, "As it stands, there is no absolute threshold for concussive injury and while these sensors may identify individuals who receive a certain type of hit or impact, we do not yet know if those impacts not identified by a set threshold may lead to concussion." Register-Mihalik expressed concern that the sensors "may provide a false sense of security, in that 'if the sensor didn't go off, I must not have a concussion.'" (although she found it "encouraging" that players in *The Smartest Team* were receptive to having sensors in helmets because they would make it harder for them to hide their concussion symptoms,)

"There is certainly potential for this type of technology to have great implications in the identification of concussion as the science advances," says Register-Mihalik, but, she argues, "we need more scientific and unbiased evidence of their ability to detect concussion before they are widely used and recommended in all settings. Until that time, there are some good examples of identification techniques of having trained observers, a parent advocate and continuing to promote concussion education that we know will increase identification rates.

As I have also found working with a variety of different impact sensors over the past four football seasons, both at the high school level and the past two seasons at the youth level, they are still a largely unproven technology, and their cost has not come down, and their reliability has not gone up, to the point where widespread adoption is practical or likely anytime soon. In the meantime, trying to change the culture, from one of resistance to reporting, to one of safety, to working with athletic trainers, coaches, parents, and athletes to create an environment in which athletes feel safe to honestly self-report experiencing concussion symptoms - to not just increase concussion knowledge but to translate that knowledge into action by changing *attitudes* by all stakeholders towards concussion reporting.

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*Most recently updated October 23, 2015*

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## 'Don't Tell Coach': Playing Through Concussions

*Jan Hoffman*

7-8 minutes



*By the time he graduated high school, Chris Coyne, a defensive end and tight end on his school team, had sustained five concussions, not all from football.*

Nausea, sensitivity to bright lights, headache: Chris Coyne knew right away that the helmet-to-helmet hit during football practice had given him a concussion. His fifth, in fact.

So he knew just what to do.

He reasoned that, since only 10 days remained in the season and he was both team captain and a senior at Staples High School in Westport, Conn., he would tough it out. He had played through worse concussions.

So he avoided the school's athletic trainer and ducked direct looks from his coach, either of whom might have noticed that he was dazed.



*Mr. Coyne quit football only after sustaining a sixth concussion during preseason practice in his freshman year of college. Now a junior, he says this is the first year he has felt symptom-free.*

“I put pressure on myself to do well and not to let my teammates down,” said Mr. Coyne, now a junior at Yale.

Mr. Coyne, a 6-foot-3 defensive end and tight end, was supposed to continue playing football in college. But during preseason practice freshman year, he got a sixth concussion. His symptoms were so severe and protracted that he had to rely on an independent note-taker and take Ritalin for wandering attention for three semesters. He was finished with football.

An [extensive report](#) about sports-related concussions in young people, released last week by the Institute of Medicine and the

National Research Council, made recommendations that included bolstering research, collecting data, examining injury protocols and educating the public. But the report identified one particularly stubborn challenge: the “culture of resistance” among high school and college athletes, who may be inclined to shrug off the invisible injuries and return immediately to the field.

“There is still a culture among athletes,” the report said, “that resists both the self-reporting of concussions and compliance with appropriate concussion management plans.”

Dr. Frederick P. Rivara, a pediatrician at the University of Washington’s Seattle Children’s Hospital and a vice chairman of the committee that produced the report, said, “It’s a culture where the idea is to man up, to not let your teammates or coach down, and play with your symptoms.” Because concussions are not graphic, like a bloodied nose or a broken leg, players “hide their symptoms and continue to play.”

Even so, Dr. Rivara said, one of the report’s recommendations — to teach athletes, coaches, school districts and parents about the possibility of exacerbating the effects of a concussion if an athlete returns to the field hastily — “can start right now, before research.”

Concussions vary widely, and the prognosis depends on age and on the location and force of the injury, as well as on other, less quantifiable factors. Most concussions resolve within a few weeks, but more severe ones can have long-term complications, including problems with memory and concentration, particularly if subjected to continuing trauma. If an athlete incurs a second concussion before the first one has healed, the consequences may be compounded.

But educating athletes about concussions is one thing. Changing the convictions of a culture that values playing through pain is quite another.

One obstacle is the adolescent belief in invincibility. “We all knew concussions were bad,” said Mr. Coyne, who frequently speaks to athletic organizations and youth teams about [his cautionary tale](#). “But we didn’t believe in the severity: ‘It won’t happen to me. I can play through one.’ ”

In May, [a small study](#) of 119 high school football players by doctors at the Cincinnati Children’s Hospital Medical Center found that more than 75 percent could identify the symptoms of a concussion, including headaches, dizziness and sensitivity to light and sound. And 92 percent of the players knew they risked serious injury if they returned to the field too quickly after a concussion. Yet only 54 percent said they would report such symptoms to their coach, and 53 percent said that even if they had a headache from an injury, they would continue to play.

A [recent study](#) in The Journal of Pediatrics found that cheerleaders also under-reported concussion symptoms.

Awareness about the potential seriousness of concussions, particularly on developing brains, has increased markedly in the last few years. Most states have baseline legislation mandating concussion education for athletes and coaches. But at the same time, the allure of athletic success has grown among young people — not only because of the possibility of college scholarships, but because of the salaries and celebrity status conferred upon star professional athletes.

“There’s a machismo to sports, whether you’re male or female,”

said Dustin J. Fink, an athletic trainer who supervises a dozen sports at Mt. Zion High School, in Illinois. “It’s most often seen in professional sports, where they are celebrated for being warriors and champions, for doing everything they can to stay on the field and play.”

That message trickles down to parents and children, said Mr. Fink, who writes [a blog](#) about concussion research. “My dad would say, ‘Play unless you can’t walk.’ And with some injuries, like broken fingers, you can play through the pain. But once your brain is hurt, it’s hurt. Yet what gets instilled in the child is, ‘You play no matter what.’ ”

As an athletic trainer at other junior high and high schools, “I’ve seen coaches who tried to be the decision-maker with injuries,” Mr. Fink said. “They need that win, so they will try to override the athletic trainer or manipulate the athlete to get back in the game.”

He added that Mt. Zion coaches did not behave in this manner.

Mr. Fink did say he had begun to see some change in the culture in recent years. When he pulled a student from a game because of a concussion, he said, parents and other coaches used to say, “What do you know? It’s no big deal!” Now, more often, he hears, “Thank you, we’ll get it checked out.”

Mr. Coyne, whose concussions came not just from football but from hitting his head on a pole standard during a high jump and from rough-housing in the locker room, said that this, his junior year, was the first in which he felt symptom-free and did not have to rely on extensive accommodations.

He is majoring in political science and economics, and longs to return to sports. But his football days are over, and he hasn’t been

medically cleared for his next choice, volleyball.

Another possibility? “I love skiing,” he said. “I haven’t hit my head hard in skiing for years.”

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## N.F.L.-Backed Youth Program Says It Reduced Concussions. The Data Disagrees.

*Alan Schwarz*

14-17 minutes







*Members of the New Britain Jr. Hurricanes practicing in 2013. The team is one of thousands of youth football teams that have adopted the Heads Up Football program, which has been sold as an effective means of reducing injuries. Kike Calvo/Associated Press for National Football League*

As increasing numbers of parents keep their children from playing tackle football for safety reasons, the National Football League and other groups have sought to reassure them that the game is becoming less dangerous.

No initiative has received more backing and attention than [Heads Up Football](#), a series of in-person and online courses for coaches to learn better safety procedures and proper tackling drills. The N.F.L. funds and heavily promotes the program. The league and U.S.A. Football, youth football's governing body, which oversees the program, have sold Heads Up Football to thousands of leagues and parents as having been proved effective — telling them that an independent [study](#) showed the program reducing injuries by 76 percent and concussions by about 30 percent.

That study, published in July 2015, showed no such thing, a review by The New York Times has found. The research and interviews with people involved with it indicate, rather, that Heads Up Football showed no demonstrable effect on concussions during the study,

and significantly less effect on injuries over all, than U.S.A. Football and the league have claimed in settings ranging from online [materials](#) to congressional [testimony](#).

As the 2016 youth football season dawns, the revelation will most likely fuel skeptics of football's claims of reform, and discourage parents who want solid information about the sport's risks for their children.

“Everybody who is involved in trying to improve the safety of youth sports, when parents such as myself are so desperate to have effective solutions, has the responsibility to make sure that any information that they are putting out to the public is accurate, is comprehensive, and is based on legitimate science,” said Elliot F. Kaye, the chairman of the United States Consumer Product Safety Commission, who has worked with U.S.A. Football and the N.F.L. on improving helmet safety. “It does not appear that this met that standard.”





*N.F.L. Commissioner Roger Goodell greeting children in a Heads Up Football league in Fairfield, Conn., in 2013. The N.F.L. is the primary source of operating funds for U.S.A. Football, youth football's governing body. Jessica Hill/Associated Press for National Football League*

Representatives of U.S.A. Football and the N.F.L. said in interviews that they had been unaware that their claims of Heads Up Football's effectiveness were unsupported by the study, which was conducted by the Datalys Center for Sports Injury Research and Prevention through a \$70,000 grant from U.S.A. Football.

"U.S.A. Football erred in not conducting a more thorough review with Datalys to ensure that our data was up to date," Scott Hallenbeck, the executive director of U.S.A. Football, said in an email to The Times. "We regret that error." He added that the material would be removed from the organization's print and online materials, and that "our partners and constituents" would be notified

of the errors.

Brian McCarthy, an N.F.L. spokesman, said that the league would also include updated information from now on.

Both U.S.A. Football and the league said that the questionable data and conclusions were actually preliminary results provided by Datalys five months before the study was published. The lead researchers for Datalys, Thomas Dompier and Zachary Kerr, confirmed in interviews that, despite knowing that the final paper contradicted their preliminary claims, they did not inform U.S.A. Football of this until last month, one day after speaking with The Times.

Mr. Dompier, the president of Datalys, said in an interview: “We’re the ones that put out the numbers. We’re the ones that kind of blew it.”





*Scott Hallenbeck, right, U.S.A. Football's executive director, speaking at a news conference in 2014 with Charlotte Jones Anderson, chairwoman of the N.F.L. Foundation, and Mr. Goodell. John Raoux/Associated Press*

In an email, Mr. Kerr said that the company had released the early data because, “The results were so compelling, we felt morally obligated to make the youth football community aware of the results.”

### **Conflicting Data**

The N.F.L. and its players' union formed U.S.A. Football in 2002 to oversee the sport and help it grow among children ages 6 to 14. But participation has dropped precipitously in recent years, from [3 million](#) in 2010 to about [2.2 million](#) last fall — a decline generally attributed to concerns about injuries, particularly to the brain.

In 2013, in consultation with the N.F.L., U.S.A. Football started Heads Up Football, whose primary goals were to improve safety

and reassure parents. The program requires one “player safety coach” per team to attend a clinic that focuses on concussion recognition and response, blocking and tackling techniques, proper hydration and other safety topics. A team’s other coaches must take online courses in those subjects as well.

In March 2014, the N.F.L. gave U.S.A. Football \$45 million, in large part to get more youth leagues to adopt the program.

While U.S.A. Football is said to operate independently from the N.F.L., the league is its primary source of operating funds, and some researchers consider the two almost indistinguishable.

### ***Ken Stabler and C.T.E.***

*The family of Ken Stabler, the former Raiders quarterback who died in July at age 69, speaks about his life and the effects of C.T.E., which was diagnosed posthumously.*

*By MARGARET CHEATHAM WILLIAMS on February 3, 2016. Photo by Al Messerschmidt/Associated Press. [Watch in Times Video »](#)*

“In my mind, U.S.A. Football and the N.F.L. are one,” said Dawn Comstock, a professor of epidemiology and the primary researcher into high school sports injuries at the [Colorado School of Public Health](#). “If I’m talking with one about something involving youth

football safety, my perception is I'm talking to both.”

Dr. Comstock said that in July 2014, Jeff Miller, the N.F.L.'s senior vice president for health and safety policy, and David Krichavsky, then its director of player health and safety, asked her to propose some studies that would, she said, “highlight the potential positive aspects” of youth football's safety initiatives and provide “a potential positive take-home message for parents.” Dr. Comstock said that she had provided some ideas but that the league did not pursue.

Mr. McCarthy, of the N.F.L., said in an email on Monday, “Our only interest is in research that will help us determine the efficacy of these and other programs and how we can make the game safer.”

Also in 2014, U.S.A. Football asked Datalys, an Indianapolis-based firm that handles all of the N.C.A.A.'s injury research, to monitor injury rates during that fall season among six youth leagues that used Heads Up Football and four leagues that did not, covering more than 2,000 players.

In February 2015, Datalys gave U.S.A. Football the results: Leagues that used Heads Up Football had 76 percent fewer injuries, 34 percent fewer concussions in games and 29 percent fewer concussions in practices.





*The N.F.L. has actively promoted the Heads Up Football program since it began in 2013. During a preseason game that year, Atlanta Falcons wide receiver Darius Johnson, left, tried to outmaneuver Jacksonville Jaguars cornerback Lionel Smith. John Bazemore/Associated Press*

In U.S.A. Football's [blog post](#) announcing that the safety program “reduces injuries,” Mr. Dompier said: “This is compelling data. I am actually surprised by the strength of the association but completely confident in our findings.”

These figures were prominently reported in the [news media](#) and on [websites of youth leagues](#) as a means to show parents that Heads



Up Football was scientifically sound. N.F.L. promotional materials have called the program “The New Standard in Football;” a page in its 2015 Information Guide is headlined, “Study Finds U.S.A. Football Program Advances Player Safety.”

But last summer, when The Orthopaedic Journal of Sports Medicine [published](#) Datalys’s formal paper on the study, the paper did not include the same injury and concussion figures. Its data actually told a far different story about Heads Up Football’s effectiveness.

Rather than looking at Heads Up Football leagues in one category, the paper instead split them into two groups: those that did or did not also belong to Pop Warner Football, a division of youth leagues that has added its own rules to mitigate injuries. Pop Warner leagues have disallowed certain head-on blocking and tackling drills and drastically reduced full-contact practice time, measures that were not a part of U.S.A. Football’s program.

As it turned out, only leagues that adhered to Pop Warner’s rules saw a meaningful drop in concussions. Leagues that used Heads Up Football alone actually saw slightly higher concussion rates, although that uptick was not statistically significant. The previously reported drops were clearly driven by a league’s affiliation with Pop Warner, not Heads Up Football.

Similarly, Heads Up Football leagues saw no change in injuries sustained during games unless they also used Pop Warner's practice restrictions. The drop in practice injuries among Heads Up Football-only leagues was 63 percent, but combined with in-game injuries, the total reduction became about 45 percent — far less than the 76 percent presented by U.S.A. Football and the N.F.L. for the past year and a half.

The authors did not address how the paper's data contradicted their preliminary conclusions from five months before. Regarding the fact that Datalys did not inform U.S.A. Football or the N.F.L. of the discrepancies, Mr. Kerr said in an email: "Datalys stands by our decision to release preliminary data in our Feb 2015 release because if we prevented even one youth football player from suffering an injury (sprain, fracture, strain, severe contusion, or concussion), then the release was a success."

There are other instances when Datalys has presented data to the public that differed from its scientific papers.

A "[Youth Football Fact Sheet](#)" for the public on the Datalys website lists the most common injuries sustained by youngsters, as determined by a separate study it conducted for U.S.A. Football three years ago. But it has significant differences from the list in [a](#)

[paper the company published last year](#), also in The Orthopaedic Journal of Sports Medicine. For example, the paper’s listing for “Nervous System (stinger),” which comprised 4.2 percent of injuries, does not appear on the fact sheet; that slot is filled instead by “Wind Knocked Out” (4.1 percent), a category that does not appear in the paper.

Mr. Dompier said in an email that the category for stinger — where a blow to the spine causes extreme pain and numbness through the arms — was renamed Wind Knocked Out because both are neurological injuries, and the latter would be more recognized by parents.





*The former N.F.L. coach Bill Cowher in 2013 during a Youth Military Football League practice. The youth league is one of many leagues to have adopted the Heads Up Football program, which is funded by the N.F.L. Mark Von Holden/Associated Press for National Football League*

### **Credit, With a Caveat**

A spokesman for U.S.A. Football, Steve Alic, said that research conducted outside Datalys has shown the effectiveness of Heads Up Football. He cited the Fairfax County public school system in Virginia, which has seen a 24 percent decrease in total injuries and a 43 percent drop in concussions since adopting the program in 2013.

Bill Curran, the county's director of student activities and athletics, confirmed those numbers and praised Heads Up Football's safety initiatives for contributing to them. He added that Fairfax County went well beyond the Heads Up program, though, in ways that included drastically reducing full-contact practice time during the season to 90 minutes per week, whereas before, he said, "we probably had some teams doing 90 minutes in a single practice."

"I give them a huge amount of credit," Mr. Curran said of U.S.A.

Football's efforts. "But it takes a hell of a lot more than going to their website and taking the online courses and getting accreditation."

As the 2016 season approaches, the faulty pronouncements about the research continue to be cited by youth [programs](#) and football officials as evidence that Heads Up Football makes football safer, especially regarding concussions. During a high school sports conference in Alabama last week, a coach presented a glowing slide show about the program to fellow coaches and athletic directors, unaware that many of the numbers and statements were not supported by the data.

Last May, coaches from Columbia High School in Maplewood, N.J., invited some eighth-graders interested in playing football to a meeting in the cafeteria.

"They basically said they teach Heads Up Football, which reduced head injuries and concussions," said Jacob Kasdan, one of the students who attended the meeting. "I think they're struggling to find enough players."

Jacob went home and asked if he could play this fall. His father declined to sign the forms.