Sports Litigation Alert

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Head Injuries in Youth Football – What is the Future of the Sport?

By Charles Gfeller

Approximately 5 million athletes play organized football in the United States.[1] This number breaks down as follows: 2000 NFL players; 100,000 college players; 1.3 million high school players, and 3.5 million youth football players.[2] Concussions have been a focal point of recent discussions and media coverage with regard to sports at all levels. In particular, there has been a rash of tragedy at the high school, college, and professional levels. The recurring story-line features a current or retired athlete who is either debilitated or dead because of a head injury suffered on the field.

Troy Aikman, a Pro Hall of Fame quarterback, whose career was shortened because of multiple concussions, recently addressed the issue of concussions in football and was quoted as saying, "the long-term viability, to me anyway, is somewhat in question as far as what this game is going to look like 20 years from now."

Youth football, which accounts for approximately 70 percent of all those who play the sport, has received far less coverage, and the storylines tend to be more anecdotal – until now….

A recent study, published in the *Annals of Biomechanical Engineering*, entitled "Head Impact Exposure in Youth Football," by Ray W. Daniel, Steven Rowson, and Stefan M. Duma, from the Center for Injury Biomechanics, Virginia Tech-Wake Forest University, sheds a new and alarming light on the impacts seen in youth football. The goal of the authors was to investigate head impact exposure in youth football, with an eye toward increased understanding of when and how these impacts occur, so that educated decisions can be made to minimize the exposure of head impacts in youth football. The authors utilized a custom-made, 12 accelerometer array placed inside the helmets of seven players ranging in age from 7-8 years old during every practice and game for one entire season. A total of 748 impacts were recorded from the seven players throughout the season. Each player averaged 107 impacts during the season.

Interestingly, the majority of the high level impacts took place during practices. In fact, of the 38 impacts that measured above 40g, 29 occurred during practice. This is inapposite with the statistics found at the high school and college levels, where severe impacts typically occur during games. Impacts to the sides of the helmet accounted for 36 percent of all recorded impacts and were the most common type of impact. Impacts to the front of the helmet accounted for 31 percent of all impacts, with the top and rear of the helmet seeing 18 percent and 14 percent of all impacts respectively. The authors found that while impacts with head accelerations sufficient to cause concussions are more frequent at the college and pro levels, youth football can produce such accelerations as well.

As noted by the authors, head impact exposure experienced in football has two parts – frequency and

1 "Head Impact Exposure in Youth Football," by Ray W. Daniel, Steven Rowson, and Stefan M. Duma, from the Center for Injury Biomechanics, Virginia Tech-Wake Forest University, *Annals of Biomechanical Engineering*, February 3, 2012.

2 "Head Impact Exposure in Youth Football," Daniel, Rowson, and Duma, citing Guskiewicz, K.M., N.L. Weaver, D.A. Padua, and W.E. Garrett, Jr., Epidemiology of concussion in collegiate and high school football players, *Am. J. Sports Med.* 28:643-650, 2000.

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magnitude. Both frequency and magnitude increase as a player progresses to higher levels of play. This is, in part, because the higher the level of play, the more often a player plays, and also because with greater size comes greater magnitude of impact.

The authors of the Virginia Tech-Wake Forest study further analyzed their data by noting that with the youth players who were studied, the impacts were most frequently to the side of the helmet. In fact, the percentage of side helmet impacts was substantially higher on a percentage basis than those experienced by high school and college players. Likewise, at the youth level, the impacts to the rear of the helmet were a substantially lower percentage than those observed in high school and college players. The authors attributed this to the differences in style of play as well as the fact that youth players tend to fall to the side when tackled. Additionally, the helmets used by youth players are similar in size and mass to those used by adults. However, the neck muscles of 7-8 year old children are far less developed than those of high school and college players, which according to the authors, may result in youth players being more susceptible to helmet-ground impacts while being tackled than high school or college players.

So what does this all mean?

To begin with, the authors of the study recognize that their study has certain limitations, including (1) small sample size, and (2) limited age range of those studied. They recognize that a more comprehensive study, involving more than seven players, as well as a broader range of ages, would be beneficial. However, their study is the first to report on the head impact biomechanics of youth football.

Two significant points are taken from this study. First, despite the fact that youth football players are smaller and slower than their counterparts at the high school or college level, high impact collisions still occur. A parent should not be fooled into thinking that just because a child is playing youth football, the impact of the collisions will necessarily be minor. Second, since the study reveals a higher incidence of high impact hits during practice, rather than game situations, coaches must re-think how they conduct practice.

The authors conclude that head impact exposure in youth football, particularly at higher severities, can be reduced through evaluating and restructuring practices. This can be achieved through teaching proper tackling techniques and minimizing drills that involve full contact; and instead, focusing on practicing fundamental skill sets needed in football at these young ages."[3]

In a typical youth football practice, it is common to see a coach line two players up in a head-to-head fashion and instruct them to hit each other. This likely leads to high impact collisions that are not seen as often in game situations, where the player with the ball is more likely going to be chased down and hit from the side. Coaches need to incorporate more game-like scenarios into their practices in order to change the statistics collected by the Virginia Tech-Wake Forest researchers. Coaches also need to re-focus on educating young football players on how to properly tackle in order to minimize helmet-to-helmet collisions.

In light of this study, Jon Butler, the Executive Director of Pop Warner football, suggested to *ESPN.com* that coaches limit contact drills to one-third of all practice hours. Pop Warner teams typically practice six hours a week, so this would mean only two hours of contact drills during practice.

Given the results of this study, there will likely be additional studies relating to youth football, as well as other youth sports. As the authors of the study pointed out, by learning more about the biomechanics of head impacts at the youth sports level, we can implement change designed to lower the frequency and severity of these hits. Education of coaches, players, and parents, with real statistical backing, can help prevent the types of injuries that we are now too often reading about in the news.

3 "Head Impact Exposure in Youth Football," Daniel, Rowson, and Duma.

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