The Impact of Playing a High School Sport on Later Life Outcomes

By: Nitika Gupta
Mentored By: Dr. Dylan Small
Overview

- Mini Discussion
- NFL Concussion Settlement
- Background
- Significance
- Aim
- Hypothesis
- Methods
- Findings
- Roles
- Lesson Learned
Discussion

• Playing a sport has several pros and cons
Concussions in High School Sports: Are They Worth the Risk? Should School Football Be Banned?

Massachusetts Bill Would Ban Tackle Football Until After Seventh Grade

Should High School Football Be Banned?
Is high school football so dangerous that it needs to be banned?

Debate over youth tackle football an extension of country's polarized politics

High school football’s existential crisis

Doctors Debate If High School Football Should Be Banned Due to Concussion Risks
Dr. Bennet Omalu

Mike Webster
## NFL Concussion Settlement

<table>
<thead>
<tr>
<th>AGE AT DIAGNOSIS</th>
<th>ALS</th>
<th>DEATH w/CTE</th>
<th>PARKINSON’S</th>
<th>ALZHEIMER’S</th>
<th>LEVEL 2</th>
<th>LEVEL 1.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under 45</td>
<td>$5,000,000</td>
<td>$4,000,000</td>
<td>$3,500,000</td>
<td>$3,500,000</td>
<td>$3,000,000</td>
<td>$1,500,000</td>
</tr>
<tr>
<td>45-49</td>
<td>$4,500,000</td>
<td>$3,200,000</td>
<td>$2,470,000</td>
<td>$2,300,000</td>
<td>$1,900,000</td>
<td>$950,000</td>
</tr>
<tr>
<td>50-54</td>
<td>$4,000,000</td>
<td>$2,300,000</td>
<td>$1,900,000</td>
<td>$1,600,000</td>
<td>$1,200,000</td>
<td>$600,000</td>
</tr>
<tr>
<td>55-59</td>
<td>$3,500,000</td>
<td>$1,400,000</td>
<td>$1,300,000</td>
<td>$1,150,000</td>
<td>$950,000</td>
<td>$475,000</td>
</tr>
<tr>
<td>60-64</td>
<td>$3,000,000</td>
<td>$1,200,000</td>
<td>$1,000,000</td>
<td>$950,000</td>
<td>$580,000</td>
<td>$290,000</td>
</tr>
<tr>
<td>65-69</td>
<td>$2,500,000</td>
<td>$980,000</td>
<td>$760,000</td>
<td>$620,000</td>
<td>$380,000</td>
<td>$190,000</td>
</tr>
<tr>
<td>70-74</td>
<td>$1,750,000</td>
<td>$600,000</td>
<td>$475,000</td>
<td>$380,000</td>
<td>$210,000</td>
<td>$105,000</td>
</tr>
<tr>
<td>75-79</td>
<td>$1,000,000</td>
<td>$160,000</td>
<td>$145,000</td>
<td>$130,000</td>
<td>$80,000</td>
<td>$40,000</td>
</tr>
<tr>
<td>80+</td>
<td>$300,000</td>
<td>$50,000</td>
<td>$50,000</td>
<td>$50,000</td>
<td>$50,000</td>
<td>$25,000</td>
</tr>
</tbody>
</table>
$681,928,955
## NFL CONCUSION SETTLEMENT

IN RE: NATIONAL FOOTBALL LEAGUE PLAYERS' CONCUSSION INJURY LITIGATION
No. 2:12-md-02323 (E.D. Pa.)

### SECTION 11

## MONETARY AWARD PAYMENTS

<table>
<thead>
<tr>
<th>Status by Confirmed Qualifying Diagnosis</th>
<th>Number</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Notices of Monetary Award (Dollars Shown are Before Holdbacks)</td>
<td></td>
<td>$681,928,955</td>
</tr>
<tr>
<td>(a) Death with CTE</td>
<td>78</td>
<td>$92,919,026</td>
</tr>
<tr>
<td>(b) ALS</td>
<td>37</td>
<td>$98,187,130</td>
</tr>
<tr>
<td>(c) Alzheimer's Disease</td>
<td>292</td>
<td>$135,160,307</td>
</tr>
<tr>
<td>(d) Parkinson's Disease</td>
<td>130</td>
<td>$79,742,205</td>
</tr>
<tr>
<td>(e) Level 2.0 Neurocognitive Impairment</td>
<td>144</td>
<td>$134,265,367</td>
</tr>
<tr>
<td>(f) Level 1.5 Neurocognitive Impairment</td>
<td>263</td>
<td>$141,654,920</td>
</tr>
</tbody>
</table>

[https://www.nflconcussionsettlement.com/](https://www.nflconcussionsettlement.com/)
Background

• American Tackle Football is known for head injuries specifically **Chronic Traumatic Encephalopathy (CTE)**

Source: Adapted with permission from Dr. Jorge Barrio et al., PNAS
As of July 2017, **110 out of 111** brains showed chronic traumatic encephalopathy.
Background

• A systematic review of potential long-term effects of sport-related concussion (Manley et al, 2017)
  • Showed association between NFL Players and Long-Term Effects but not amongst High School Players
Background

- Association of Playing High School Football With Cognition and Mental Health Later in Life (Desphande et al, 2017)

- Among men who graduated from Wisconsin high schools in 1957, playing high school football was **not** adversely associated with cognitive impairment or depression later in life.
Aim

• Repetitive head injury is observed in other sports such as boxing, wrestling, rugby, hockey, lacrosse, soccer, skiing and more.

• Analyze the effects of playing a sport in high school on later life outcomes amongst students who graduated high school in the 90/2000s.
Significance

• Certain individuals demand banning American Tackle Football in School

• Determine if other sports share a similar risk

• Facts about CTE (frequency, hits to the head, onset)
Hypothesis

- Playing any high school sport that involves head contact does have a risk of leading to cognitive impairment or depression.
Methods

- Survey sent: https://upenn.co1.qualtrics.com/jfe/form/SV_5zgmy3jgYsvDtcN
Methods

• Confirm with yearbook
Data

• 82 Participants
• Confirm participation for 80 participants
• Schools involved:
  • 67 from Rutgers Prep
  • 15 from Wyomissing High School
• Sex
  • 50 male
  • 32 female

• Sports Listed
  • American Tackle Football, Swimming, Track & Field, Cross Country, Soccer, Baseball, Lacrosse, Basketball, Cheerleading, Wrestling, Volleyball, Tennis, Golf, Bowling and Street Hockey
Results

• After confirming with yearbook.
Part 2
Methods

• National Longitudinal Study of Adolescent to Adult Health (Add Health)
  • Combines longitudinal survey data on respondents’ social, economic, psychological and physical well-being
  • Followed 10k participants since 1994
  • Links between adolescent experiences and adult health outcomes
  • Wave VI
Methods

• National Longitudinal Study of Adolescent to Adult Health (Add Health)
  • Complete Application 6 months in advance
  • Must be a PhD, MD or other terminal degree and work in an eligible institution
  • Meet funding requirements → subcontract
  • Must describe
    • Significance
    • Approach
    • Innovation
    • Investigators
    • Environment
Methods

- Sample Questionnaire
Methods

• Impact on Later Life Outcomes
  • Add Health Behavioral Health Study
  • ALS, Alzheimer’s, Parkinsons, etc.
Methods

• Analysis
  • Eliminate confounding factors
  • Demonstrate a correlation between sports and later life outcomes
Limitations

• Part 1
  • 1997 yearbook missing
  • A lot of cross referencing
  • Cannot confirm certain sports (spring, outside of school)
  • Small Sample

• Part 2
  • Will not receive data for a long time
  • Hopefully there is a large sample of each sport played
Role in the Project

• Confirm sports played with Yearbooks
• Future
  • Assist in writing the proposal to Add Health
  • Analyze the data from Add Health using R
Lessons Learned

• Add Health
• CTE
• Creating a questionnaire
• R
Lessons to be Learned

• Analysis using R
• Writing a proposal to Add Health
• Formal writing for paper submission
Thank you!

• Dr. Dylan Small
• Jordan Weiss
• Sameer Deshpande
• Amanda Rabinowitz

-----------------------------

• Joanne Levy
• Safa Browne
• Ashley Anumba
• Leonard Davis Institute
• University of Pennsylvania
Questions?
Thank you!