Effects of Time in Competition, Phase of Play, and Field Location on Injury Severity in High School Football

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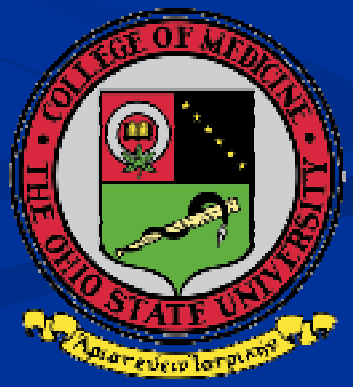


Background

- Over 1 million US high school athletes play football
- High school football competition injury rates as high as 26.4 per 1,000 player-competitions have been reported
- The potential effect of competition intensity on injury severity has not been studied

Objective

- To evaluate the effects of competition intensity on injury severity in high school football

- Specific aims
  - Calculate injury rates by severity
  - Describe injury epidemiology by severity
  - Investigate the potential effect of time in competition, phase of play, and field location on injury severity

Data Collection & Analysis

- Data collection:
  - High School RIO™ (Reporting Information Online) conducted prospective football injury surveillance during the 2005-06 school year
  - Nationally representative sample of 100 US high schools
  - ATCs logged in weekly to report athlete exposure (AE) and injury data
- Data analysis
  - Injury rates
  - Weighted injury proportion ratios (IPR)

Definitions

- AE: 1 athlete participating in 1 practice or competition
- Injury:
  - Occurred during participation in an organized high school football practice or competition
  - Required medical attention
  - Resulted in ≥1 days play loss
- Injury severity:
  - Mild (1-6 days of play loss)
  - Moderate (7-21 days of play loss)
  - Severe (>21 days of play loss)

Competition Intensity Surrogates

- Time in competition:
  - Beginning
  - Middle
  - End/overtime
- Phase of play:
  - General play
  - Kickoff/punt
- Field location:
  - Middle of the field
  - Red/end zone

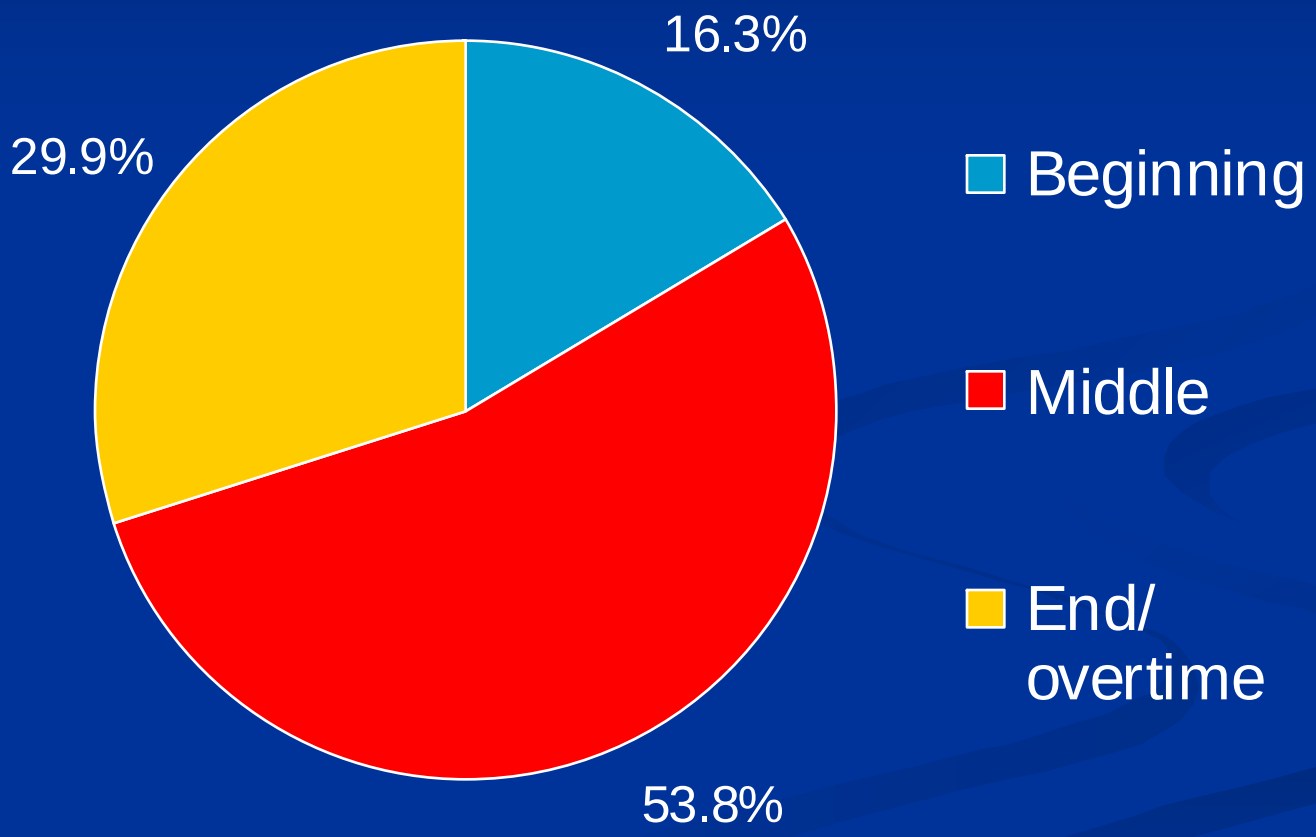
Competition Injury Rates

	# Injuries	AE	Injury Rate (per 1,000 AE)	National Estimate
Overall	**992**	**82,059**	**12.09**	**280,919**
Mild	440	82,059	5.36	125,900
Moderate	294	82,059	3.58	84,675
Severe	177	82,059	2.16	51,869

Most Common Injuries

- **Mild:**
  - Lower leg/foot/ankle sprains/strains (19.5%)
  - Concussions (8.5%)
- **Moderate:**
  - Lower leg/ankle/foot sprains/strains (21.7%)
  - Concussions (21.0%)
  - Knee sprains/strains (11.0%)
- **Severe:**
  - Knee sprains/strains (22.3%)
  - Arm fractures (21.4%)

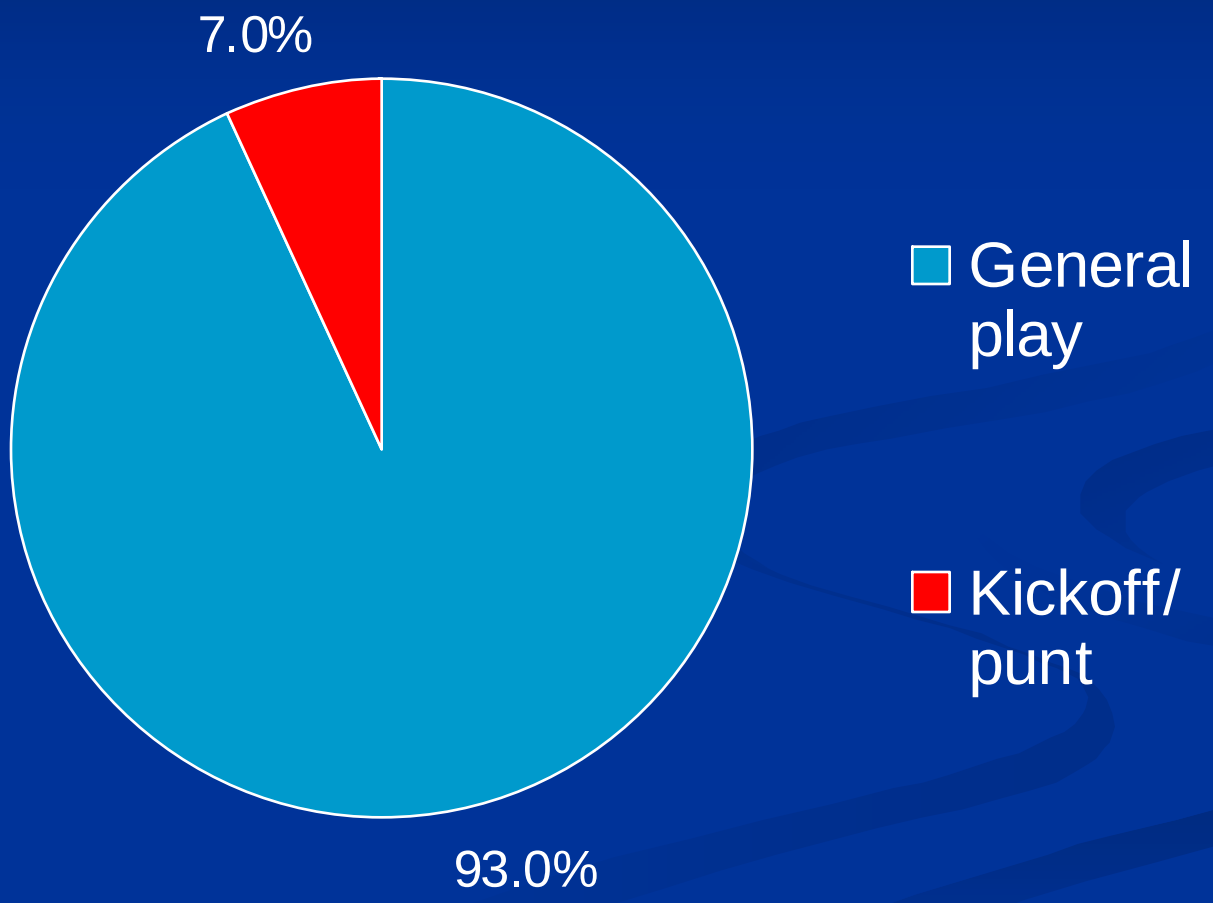
Time in Competition



Time in Competition

- Proportion of severe injuries:
  - Beginning (22.6%) and middle (22.8%)
  - End/overtime (12.4%)
  - IPR = 1.83, 95% CI: 1.25-2.69
- Proportion of concussions:
  - Middle (12.3%) and end/overtime (14.2%)
  - Beginning (6.3%)
  - IPR = 2.07, 95% CI: 1.11-3.88

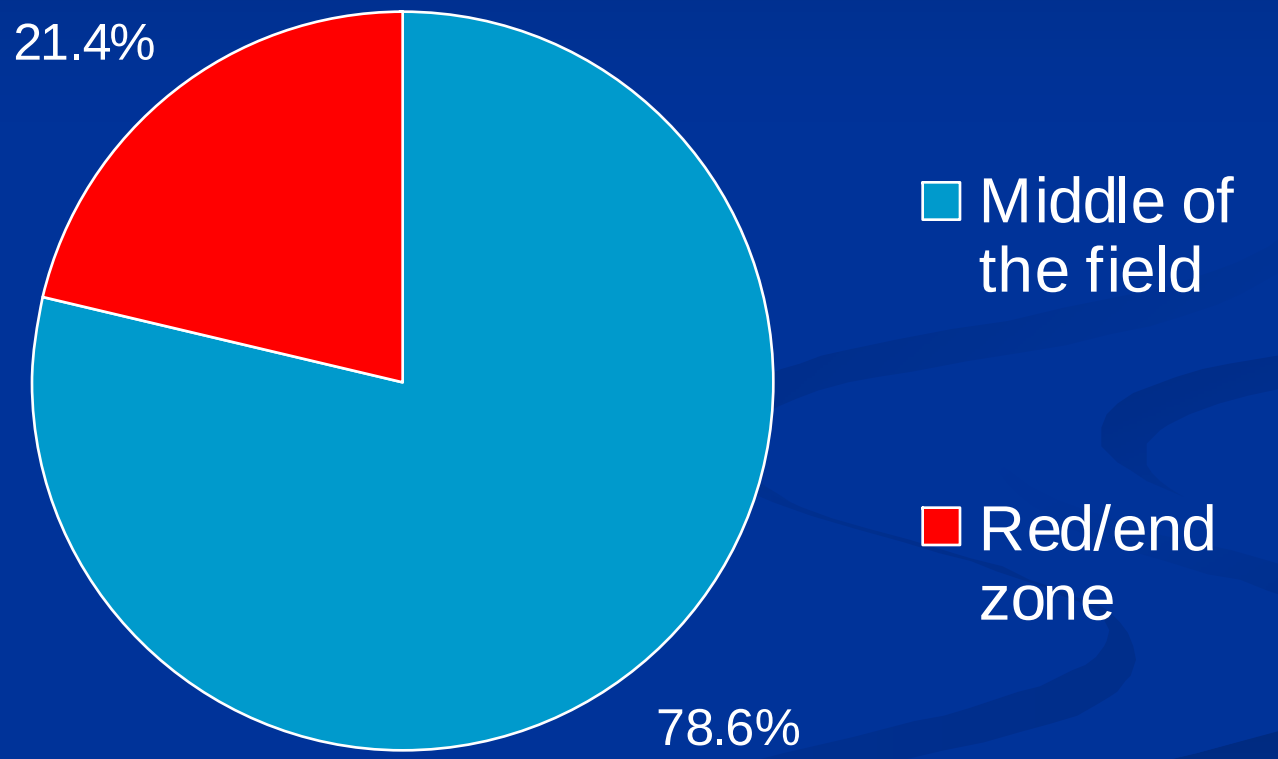
Phase of Play



Phase of Play

- Proportion of severe injuries:
  - Kickoff/punt: 32.7%
  - General play: 19.3%
  - IPR = 1.69, 95% CI: 1.07-2.68
- Proportion of concussions:
  - Kickoff/punt: 20.3%
  - General play: 10.9%
  - IPR = 1.86, 95% CI: 1.05-3.30
- Proportion of foul play-related injuries:
  - Kickoff/punt: 5.4%
  - General play: 1.0%
  - IPR = 5.62, 95% CI: 1.46-21.70

Field Location



Field Location

- Little variation between field location and injury severity, injury diagnosis, presence of foul play, and need for surgery

Injury Prevention

- Coaches should devote an adequate amount of time rehearsing kickoff and punt plays during the controlled practice environment
- Ensure that all players participating in competition, particularly kickoff and punt, are in optimum physical fitness and are able to execute proper form while blocking, tackling, and taking hits
- Coaches should stress the importance of fair play during kickoff and punt and referees should be vigilant for illegal activity during these times

Limitations

- Only high schools with an NATA-affiliated ATC were eligible to participate
- There is no known methodology for directly measuring competition intensity
- Because variable-specific exposure was not known (e.g., time spent in red/end zone vs. middle of the field, etc.), variable-specific injury rates could not be calculated

Conclusion

- High School RIO™ is the largest, most nationally representative study of US high school football injuries to date
- Competition injuries are more severe during kickoff/punt and during the beginning and middle of competition, indicating a potential relationship between competition intensity and injury severity
- Future research must quantify the relationship between potential surrogates of competition intensity (e.g., field location, time in competition, phase of play, etc.) and actual physiological and emotional measures

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