Improving concussion education in youth sport

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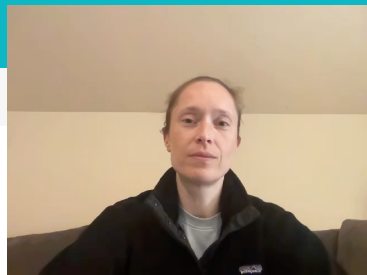
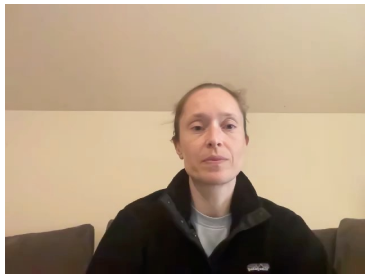


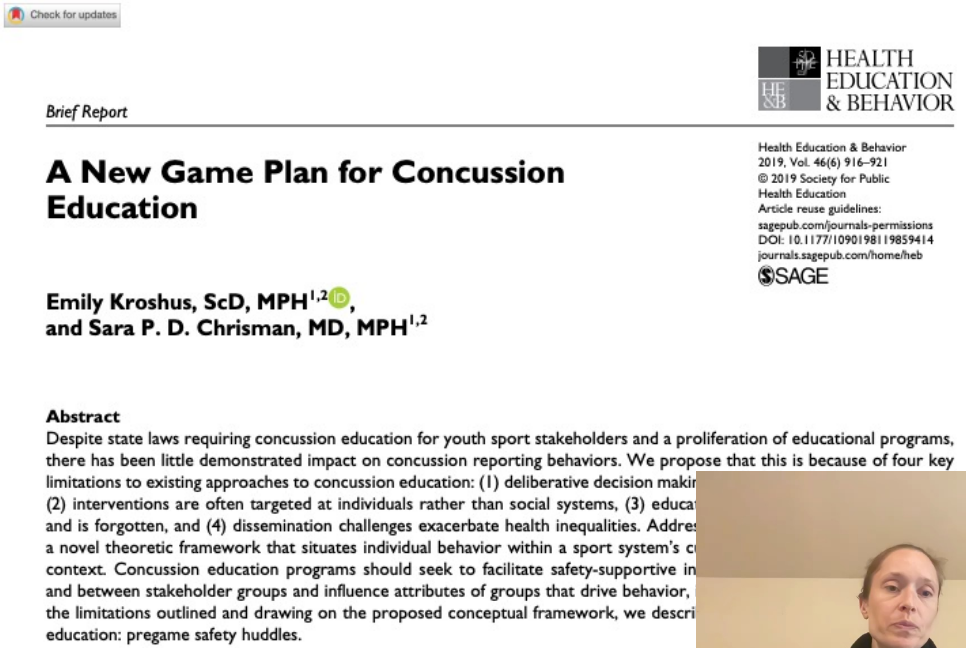
Background

- Youth in contact sports have a high risk for concussion
- Up to 50% do not report symptoms
- Perceived team and coach norms are key determinants of concussion reporting



Limitations to current approaches to most concussion education

- Assume deliberate decision making
- Targeted at individuals rather than systems
- Only once in the preseason
- Challenging to disseminate and thus may increase inequity



Check for updates

HEALTH EDUCATION & BEHAVIOR

Brief Report

A New Game Plan for Concussion Education

Health Education & Behavior
2019, Vol. 46(6) 916–921

DOI: 10.1177/1090198119859414
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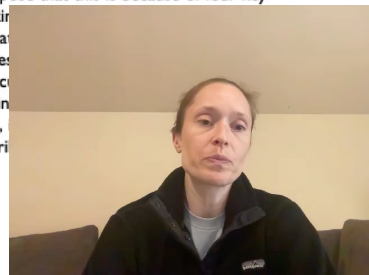
SAGE

Emily Kroshus, ScD, MPH[1,2], and Sara P. D. Chrisman, MD, MPH[1,2]

Abstract

Despite state laws requiring concussion education for youth sport stakeholders and a proliferation of educational programs, there has been little demonstrated impact on concussion reporting behaviors. We propose that this is because of four key limitations to existing approaches to concussion education: (1) deliberative decision maki
(2) interventions are often targeted at individuals rather than social systems, (3) educa
and is forgotten, and (4) dissemination challenges exacerbate health inequalities. Addre
a novel theoretic framework that situates individual behavior within a sport system's c
context. Concussion education programs should seek to facilitate safety-supportive in
and between stakeholder groups and influence attributes of groups that drive behavior,
the limitations outlined and drawing on the proposed conceptual framework, we descri
education: pregame safety huddles.



New theory?

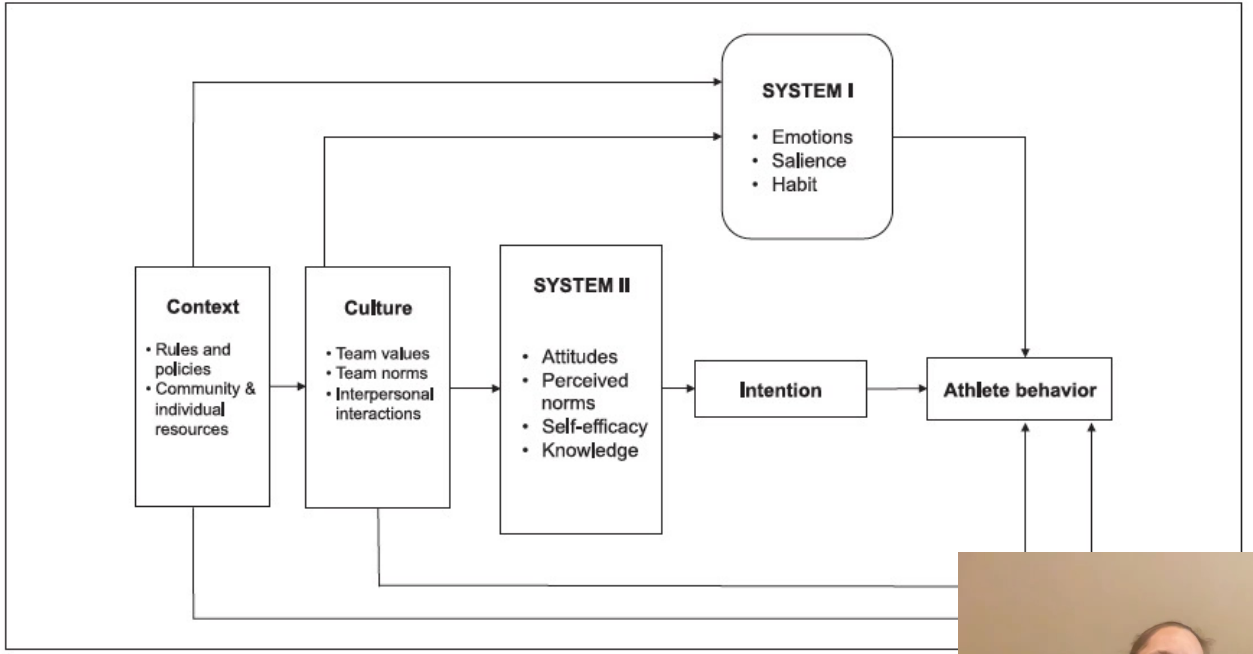
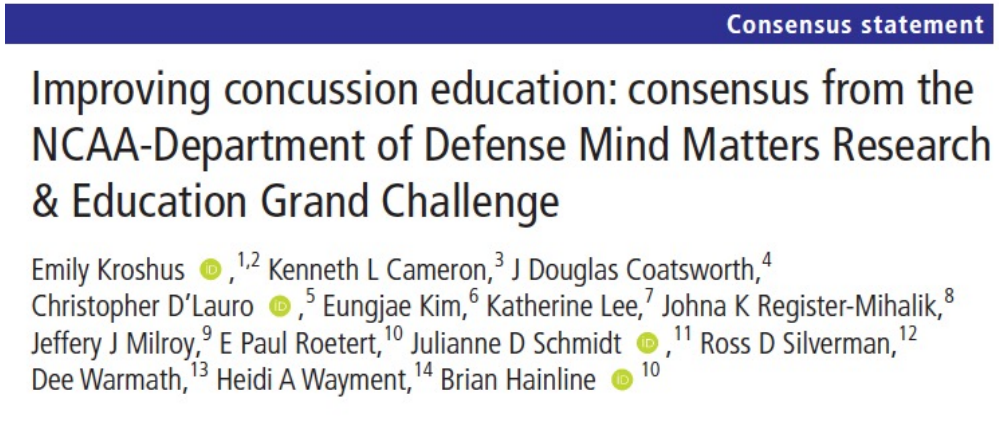


Figure 1. Conceptual framework describing influences on athlete concussion reporting behavior.

Kroshu

Consensus recommendations for improving concussion education

- Content of education
- Dissemination and implementation
- Team-level processes
- Organizational processes

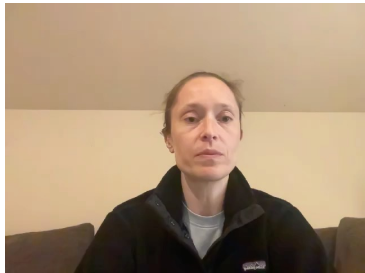


Consensus statement

Improving concussion education: consensus from the NCAA-Department of Defense Mind Matters Research & Education Grand Challenge

Emily Kroshus ,[1,2] Kenneth L Cameron,[3] J Douglas Coatsworth,[4] Christopher D'Lauro ,[5] Eungjae Kim,[6] Katherine Lee,[7] Johna K Register-Mihalik,[8] Jeffery J Milroy,[9] E Paul Roetert,[10] Julianne D Schmidt ,[11] Ross D Silverman,[12] Dee Warmath,[13] Heidi A Wayment,[14] Brian Hainline [10]

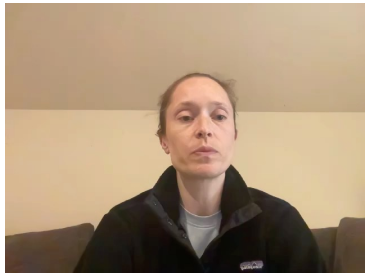
Br J Sports Med: first published as 10.1136/



Consensus recommendations: content of education

Content should directly address. . .

- The potential dilemma athletes experience related to reporting
- Short-term benefits of early symptom disclosure
- What is known about possible long-term manifestations of concussion
- Locally-relevant steps to take if a concussion is suspected (e.g., policies, resources)



Consensus recommendations: dissemination and implementation

- Educational approaches should be engaging, interactive, and foster discussion
- Messaging should be shared on a regular basis and in a variety of ways (e.g., there is magic bullet at a single time point)

Consensus recommendations: team-level processes

- Provide education that addresses the role athletes can play in encouraging peers to disclose possible symptoms (i.e., bystander messaging)
- Provide opportunity for team members and coaches to discuss and establish team values that are supportive of concussion symptom disclosure.

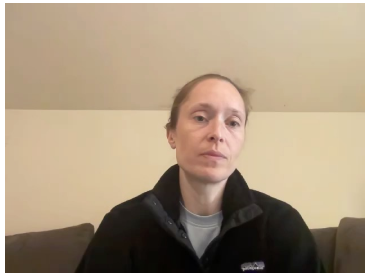
Consensus recommendations: organizational processes

- Collaborate with organizational stakeholders to identify and address organizational barriers to symptom disclosure
- Evaluate the effectiveness of concussion education approaches selected on symptom disclosure
- Communicate in a deliberate manner institutional values that emphasize safety and its importance in athletic performance.

Putting theory and recommendations into practice:

Pre-Game Safety Huddles (!)

CDC U01CE002880 (MPI: Kroshus/Chrisman)













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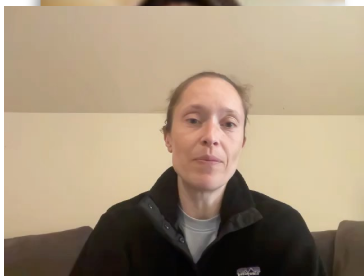
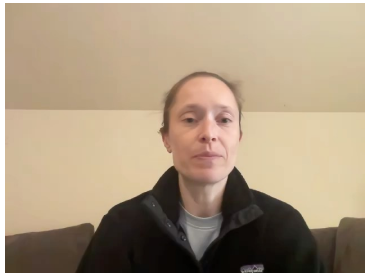


Pregame Safety Huddles

1. Create time and space for safety communication
2. Affirm shared values regarding safety
3. Humanize the other team



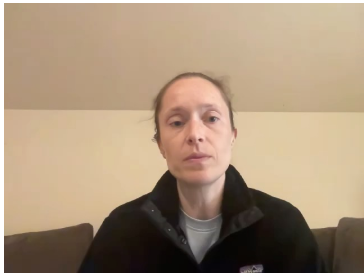
Goals of Pregame Safety Huddles

1. Improve concussion identification
   - Decrease concussion morbidity (Secondary prevention)
2. Minimize number and force of collisions
   - Decrease concussion incidence (Primary prevention)

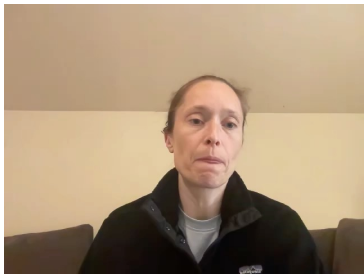
Huddle content (core components)

1. Affirm a collective responsibility that no athlete play while concussed

2. Affirm a collective commitment to sportsmanship (i.e., not engage in dangerous and illegal collisions)

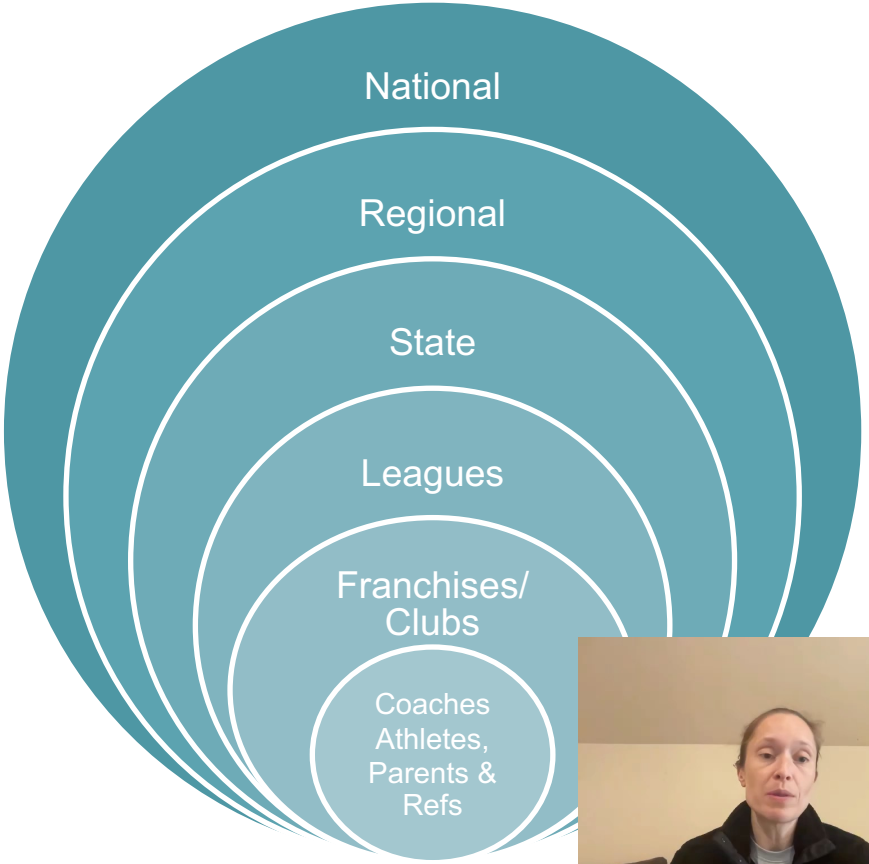


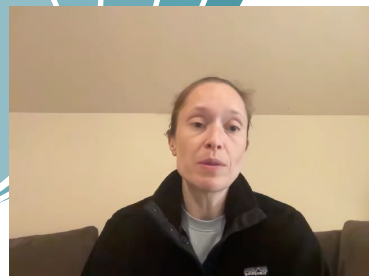
Development process



Community engagement

- Collaborated with 20 unique organizations
- Coaches, parents, referees, athletes, league administrators and other key stakeholders





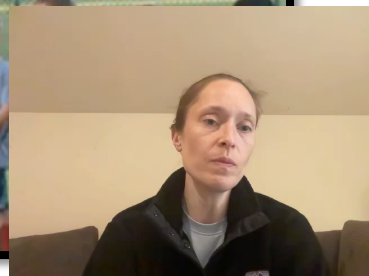
Community-engaged process of refining huddle content and structure

412

Games

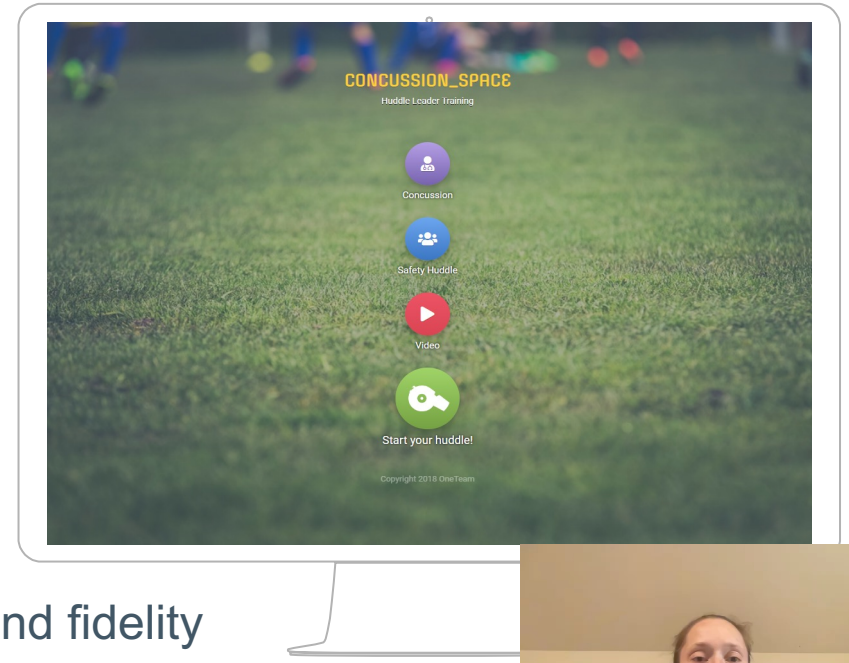
473

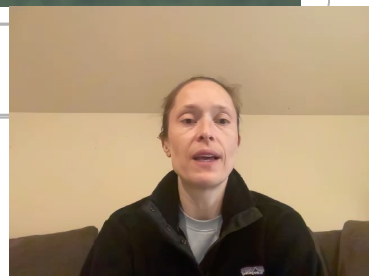
Huddles



Implementation strategy and support

- League adoption
  - Leadership engagement/champion
  - Compatibility
  - Structural characteristics
- Huddle leader training
  - Adaptability
  - Complexity
  - Source
- Cues to action
- Assessing implementation adoption and fidelity





CONCUSSION_SPACE

HUDDLE CONCUSSION RESOURCES ABOUT

Huddle up for concussion safety!

Concussions happen. Pre-Game Safety Huddles are a brief and flexible way to get everyone on the same page about concussion safety.

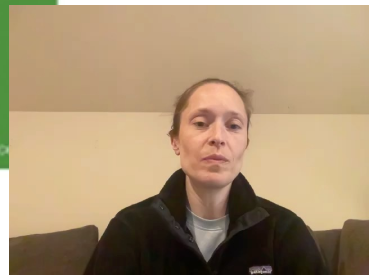
HOW TO LEAD A HUDDLE

LEARN ABOUT CONCUSSION


00:02

HOW	do concussions happen?	Concussions can happen when you get a bump, blow, or jolt to the head (or body).
WHEN	should you tell someone?	If you crash into someone (or something) and you're not feeling right, come out and get checked out.
WHY	should you report?	Concussions can be dangerous and make you play worse.
WHO	makes sure no one plays with a concussion?	It's on all of us to make sure no one plays with a concussion.
WHAT	are we here to do?	Respect each other, respect the game!

learn more at concussionspace.org

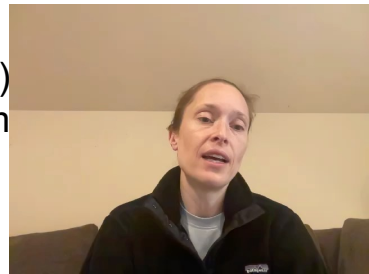


RCT

Primary outcome: Concussion Reporting Intentions

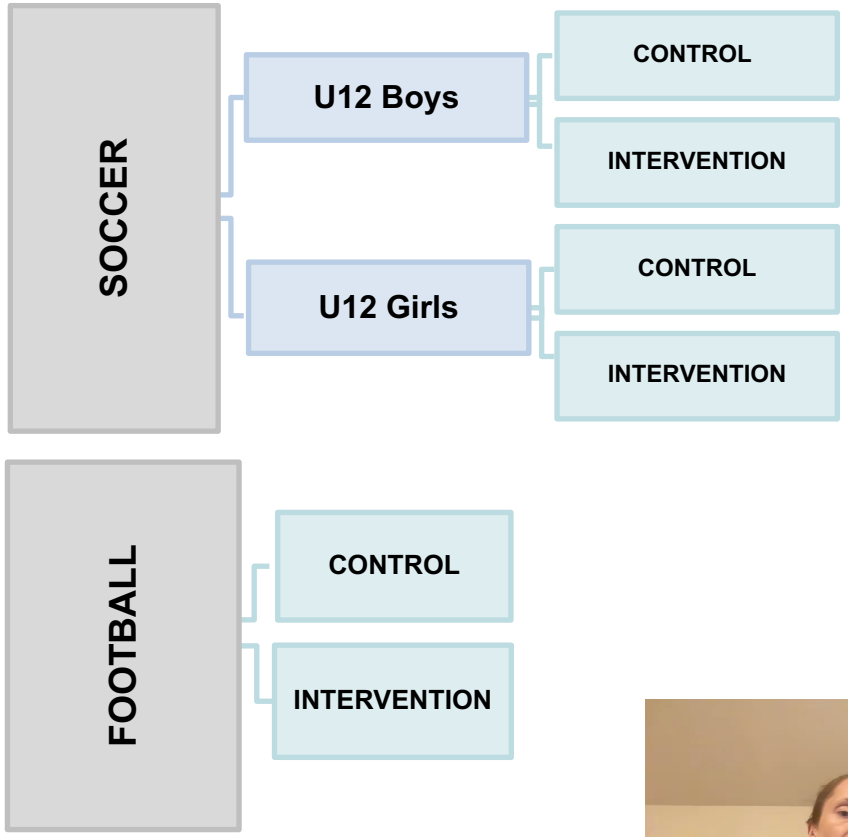
- If I felt dizzy after a bump or fit to the head, I would tell my coach right away. . .
  - Even if the team was counting on me to play
  - Even if I really wanted to keep playing
  - Even if it was a close game
  - Even if my team would be down a player

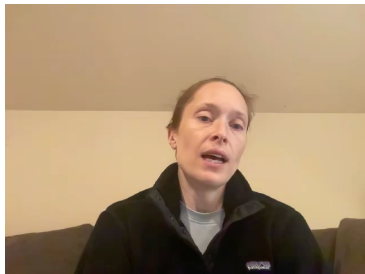
Response options: never (0), once or twice (1), sometimes (2), often (3), always (4)
→Score reported as item-level mean (for individuals that have 2 or more items com
possible range of 0-4



RCT: Fall 2019

- Recruit leagues
- Assign brackets to Intervention or control
- Sample within brackets
  - 22 survey teams
    - ✓ 12/33 Intervention
    - ✓ 10/28 Control





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CDC CENTERS FOR DISEASE CONTROL AND PREVENTION

GEORGIA SOUTHERN UNIVERSITY

Process outcomes

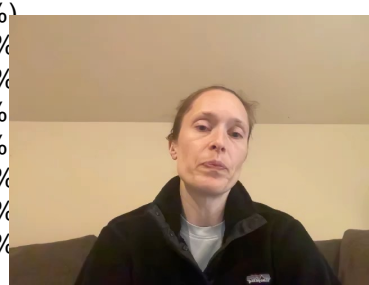
Huddle percent complete	Boys' Soccer	Girls' Soccer	Football	Total
100	1	3	1	5
90-99	2	1	0	3
80-89	2	4	3	9
70-79	1	0	0	1
60-69	2	0	1	3
0-60	2	0	2	4
Total	10	8	7	25

Athlete demographics (n=339)

	Intervention Group n=184	Control Group n=155	p-value
Age (years)			0.058
9-10	26 (14.1%)	29 (18.7%)	
11-12	98 (53.3%)	69 (44.5%)	
13-14	22 (12.0%)	31 (20.0%)	
Missing	38 (20.7%)	26 (16.8%)	
Race			
White	90 (48.9%)	68 (43.9%)	
Black	8 (4.3%)	8 (5.2%)	
Asian	10 (5.4%)	14 (9.0%)	
American Indian	1 (0.5%)	0 (0.0%)	
Native Hawaiian/Pacific Islander	2 (1.1%)	1 (0.6%)	
Other	12 (6.5%)	11 (7.1%)	
Multiple races	18 (9.8%)	15 (9.7%)	
Missing	43 (23.4%)	38 (24.5%)	
Ethnicity			
Not Hispanic	91 (49.5%)	81 (52.3%)	
Hispanic	19 (10.3%)	14 (9.0%)	
Missing	74 (40.2%)	60 (38.7%)	
Language other than English at home?			
No	101 (54.9%)	95 (61.3%)	
Yes	29 (15.8%)	23 (14.8%)	
Missing	54 (29.3%)	37 (23.9%)	
Sport			
Boys Soccer	52 (28.3%)	40 (25.8%	
Girls Soccer	53 (28.8%)	36 (23.2%	
Football (boys)	79 (42.9%)	79 (51.0%	
History of concussion			
0	114 (62.0%)	94 (60.6%	
1+	26 (14.1%)	28 (18.1%	
missing	44 (23.9%)	33 (21.3%	

Coach characteristics (n=22)

	Intervention Group n=12	Control Group n=10
Coach gender		
Male	10 (83.3%)	7 (70.0%)
Female	2 (16.7%)	2 (20.0%)
Coach age (years)		
24-29	3 (25.0%)	1 (10.0%)
30-39	3 (25.0%)	1 (10.0%)
40-49	5 (41.7%)	4 (40.0%)
50-55	0 (0.0%)	3 (30.0%)
Years coaching, mean (SD)	8.7 (6.5)	11.6 (11.1)
Coach race. Non-white	3 (25.0%)	1 (10.0%)
Coach ethnicity, Hispanic	0 (0%)	1 (10.0%)
Coach age (years), mean (SD)	37.3 (9.2)	44.4 (8.9)
Level of education		
Some college but no degree	0 (0.0%)	1 (10.0%)
Associate degree (2-year)	1 (8.3%)	1 (10.0%)
Bachelor's degree (4-year)	9 (75.0%)	5 (50.0%)
Master's degree	1 (8.3%)	1 (10.0%)
Professional degree (JD, MD)	1 (8.3%)	1 (10.0%)
Most competitive level sport played?		
Amateur	1 (8.3%)	0 (0.0%)
College Club, Premier in H.S.	1 (8.3%)	0 (0.0%)
Div. 1 NCAA	1 (8.3%)	0 (0.0%)
High School	2 (16.7%)	3 (30.0%
High school & select	0 (0.0%)	1 (10.0%
Professional	1 (8.3%)	0 (0.0%
Select	1 (8.3%)	0 (0.0%
Semi-Pro	2 (16.7%)	1 (10.0%
College	3 (25.0%)	3 (30.0%
Competitive club/college club	0 (0.0%)	1 (10.0%

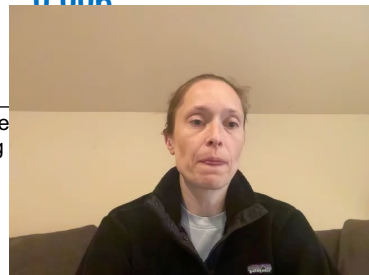


Results: Concussion reporting intention (CRI)

Adjusted score for Concussion Reporting Intentions (CRI) scale at season's end, overall and for key subgroups of interest.

	mean CRI Score (95% CI)		Difference (95% CI)	p-value
	Intervention	Control		
Overall:	**3.00 (2.77-3.24)**	**2.51 (2.26-2.76)**	**0.49 (0.11-0.88)**	**0.011**
By Sport:				
Soccer	**3.13 (2.85-3.4)**	**2.57 (2.19-2.95)**	**0.56 (0.05-1.07)**	**0.033**
Football (male only)	2.83 (2.31-3.35)	2.45 (2.05-2.85)	0.38 (-0.43-1.19)	0.36
By Gender:				
Female (soccer only)	3.0 (2.62-3.37)	2.55 (2.08-3.01)	0.45 (-0.21-1.11)	0.18
Male	**3.08 (2.74-3.41)**	**2.43 (2.1-2.76)**	**0.64 (0.08-1.21)**	**0.024**
By Age:				
9-10 years (soccer only)	**3.26 (2.77-3.75)**	**2.14 (1.62-2.66)**	**1.12 (0.32-1.92)**	**0.006**
11-12 years	2.99 (2.72-3.27)	2.6 (2.27-2.93)	0.39 (-0.08-0.87)	
13-14 years (football only)	2.67 (1.95-3.39)	2.63 (2.07-3.18)	0.04 (-0.87-0.95)	

Mixed effects linear regression models used to estimate the difference in score between intervention and control groups at the end of their re
seasons. ll analyses are adjusted for baseline score, coach gender and age, team gender, and youth age, and account for nested clustering
team via random effects (except in cases where analyses were stratified by the corresponding variable).

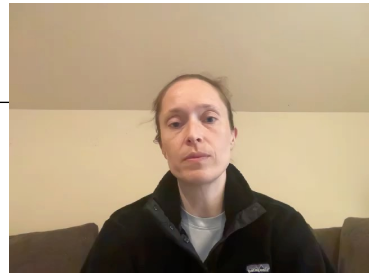


Exploratory outcome: reporting behavior (under-powered)

Unadjusted rates of safe behavior among those reporting a blow to the head during the season, at the end of the season:

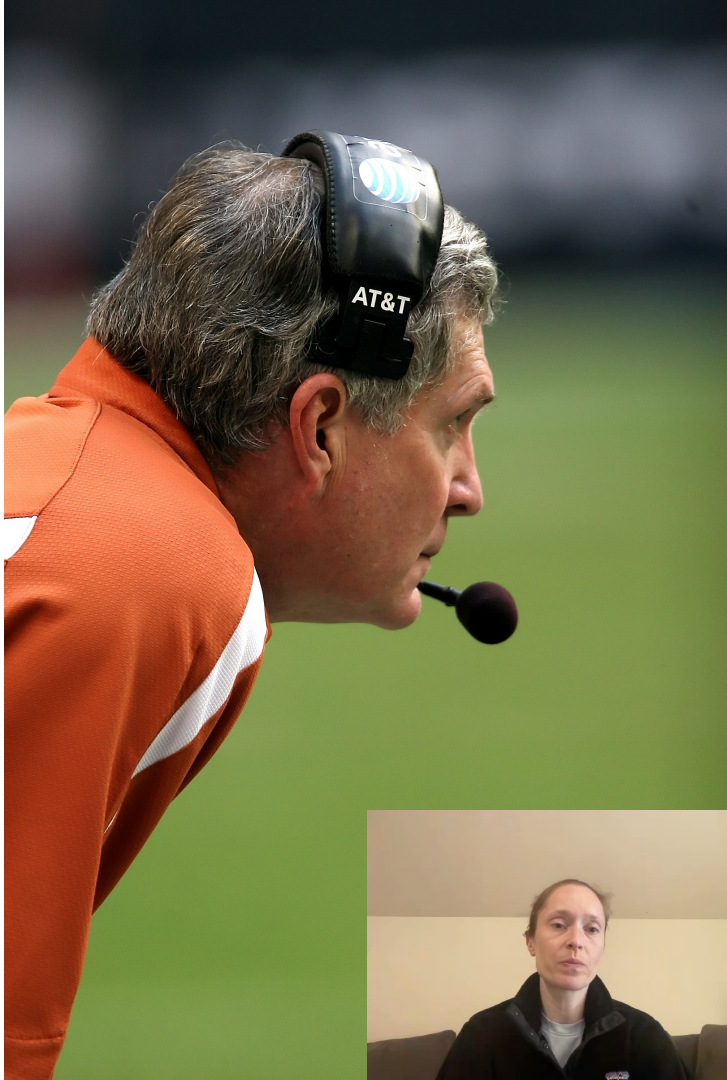
	Intervention Group n (%)	Control Group n (%)	p-value
Experienced a blow to the head	32 (100)	28 (100)	
Did you tell anyone about how you were feeling?			0.49
No (not safe)	7 (21.9)	10 (35.7)	
Yes, OR They already knew	22 (68.8)	16 (57.1)	
Missing	3 (9.4)	2 (7.1)	

Note: no baseline differences in reporting between conditions



Qualitative work

1. Implementation barriers and facilitators
2. Barriers and facilitators to concussion communication
3. Beliefs regarding “good” and “bad” physical contact



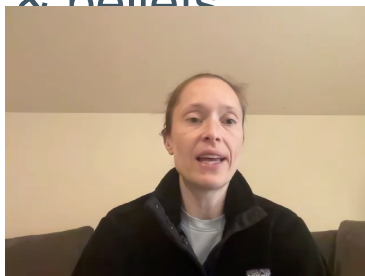
Implementation experiences

Facilitators:

- Complexity
- Cost
- Compatibility
- External change agents

Barriers:

- Compatibility
- Networks and communication (e.g., league to club to coaches)
- Readiness for implementation
- Coach knowledge & beliefs

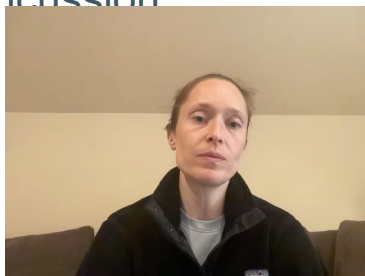


Conclusion

- Concussion education needs to be re-conceptualized from an intervention at a single time point to a sustained conversation over time that engages all stakeholders and affirms values/norms supportive of concussion disclosure.

- Low resource approaches to concussion education are important for equitable reach and sustainability.

- Pre-Game Safety Huddles are a feasible and acceptable low resource educational intervention that address core consensus recommendation about concussion education
  - They are also the most effective intervention currently evaluated



Thank you!

- ekroshus@uw.edu
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THANK YOU!

Extra Slides + Topics

Qualitative Interviewing

Scripts (CFIR vs old script), Future Trainings, etc.

Box.com + Best Practices for Data Sharing

Conceptual model

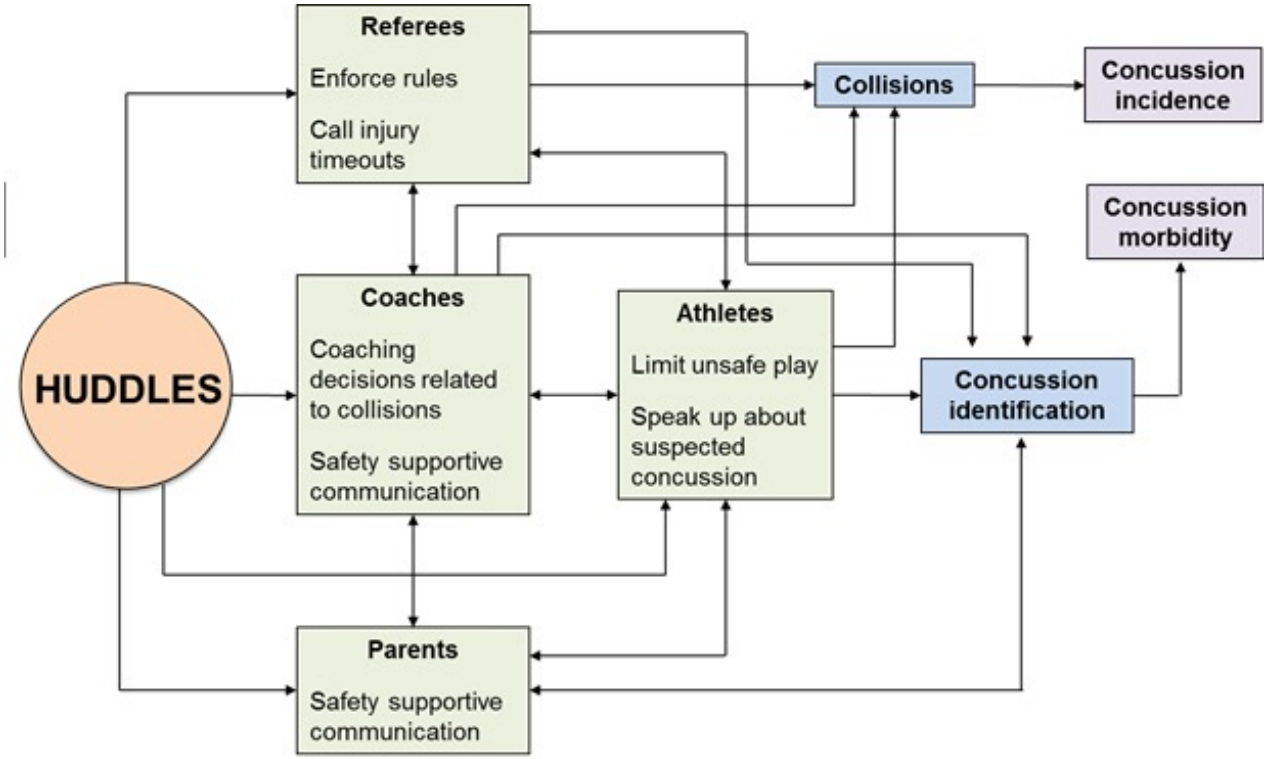

Figure 3. Conceptual model illustrating process by which Safety Huddles influence concussion incidence and concussion morbidity.

Jump Start on Papers + Presentations

Measure development

- Literature review to generate preliminary item pool
- Cognitive interviews with target population (n=31)
- Pilot testing of surveys at tournaments (n=291)
  - Reduce number of items
  - Assess reliability
  - Assess convergent and discriminant validity

Primary outcome: Concussion Reporting Intentions

- If I felt dizzy after a bump or fit to the head, I would tell my coach right away. . .
  - Even if the team was counting on me to play
  - Even if I really wanted to keep playing
  - Even if it was a close game
  - Even if my team would be down a player

Response options: never (0), once or twice (1), sometimes (2), often (3), always (4)

Secondary outcome: Injurious behavior

- In the heat of the moment, how likely would you be to…
  - Make a play to stop an opponent that has a HIGH chance of causing the opponent head injury
  - Make a play to stop an opponent that has a SMALL chance of causing the opponent a head injury

Response options: not at all likely (0), not very likely (1), a little bit likely (2), somewhat likely (3), very likely (4)

Secondary outcome: Injurious behavior

- In the heat of the moment, how likely would you be to…
  - Make a play to stop an opponent that has a HIGH chance of causing the opponent head injury
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Goals of Pregame Safety Huddles

1. Improve concussion identification
   - Decrease concussion morbidity (Secondary prevention)
2. Minimize number and force of collisions
   - Decrease concussion incidence (Primary prevention)

Secondary outcome: Intent to engage in play with HIGH risk of head injury

	Percent reporting likely or very likely at end of season (95% CI)		RR (95% CI)	p-value
	Intervention	Control		
Overall:	0.38 (0.29-0.48)	0.41 (0.32-0.51)	0.93 (0.61-1.41)	0.74
By Sport:				
Soccer	0.30 (0.17-0.42)	0.31 (0.19-0.43)	0.96 (0.5-1.84)	0.90
Football (male only)	0.43 (0.38-0.47)	0.55 (0.43-0.67)	0.77 (0.58-1.04)	0.08
By Gender:				
Female (soccer only)	0.21 (0.06-0.37)	0.31 (0.1-0.52)	0.69 (0.28-1.68)	0.41
Male	0.41 (0.34-0.48)	0.52 (0.41-0.63)	0.78 (0.55-1.11)	0.17
By Age:				
9-10 years (soccer only)	0.37 (0.18-0.56)	0.26 (0.15-0.37)	1.4 (0.71-2.77)	0.33
11-12 years	0.37 (0.29-0.44)	0.42 (0.31-0.53)	0.86 (0.59-1.26)	0.44
13-14 years (football only)	0.46 (0.3-0.62)	0.56 (0.4-0.71)	0.83 (0.53-1.28)	0.39

All analyses are adjusted for coach gender and age, team gender, baseline response, and youth age, and account for clustering by team (except in cases where analyses were stratified by the corresponding variable).

Intent to engage in potentially dangerous play (SMALL risk)

	Percent reporting likely or very likely at end of season (95% CI)		RR (95% CI)	p-value
	Intervention	Control		
Overall Study Population:	0.62 (0.49-0.76)	0.54 (0.43-0.65)	1.15 (0.79-1.68)	0.45
By Sport:				
Soccer	0.52 (0.36-0.68)	0.36 (0.17-0.55)	1.44 (0.73-2.82)	0.29
Football (which is male only)	0.71 (0.69-0.73)	0.72 (0.67-0.78)	0.98 (0.88-1.09)	0.71
By Gender:				
Female (which is soccer only)	0.41 (0.28-0.53)	0.51 (0.29-0.72)	0.8 (0.44-1.45)	0.46
Male	0.67 (0.49-0.84)	0.64 (0.46-0.82)	1.05 (0.63-1.76)	0.86
By Age:				
9-10 years (which is soccer only)	0.76 (0.25-1.27)	0.19 (0.05-0.33)	4.02 (1.07-15.14)	0.039
11-12 years	0.59 (0.43-0.75)	0.65 (0.5-0.8)	0.91 (0.58-1.43)	0.69
13-14 years (which is football only)	0.77 (0.63-0.91)	0.63 (0.55-0.72)	1.22 (0.97-1.53)	0.09

All analyses are adjusted for coach gender and age, team gender, baseline response, and youth age, and account for clustering by team (except in cases where analyses were stratified by the corresponding variable).

Concussion communication with athletes by adult stakeholders

- Personal experiences with concussion affect safety beliefs
- Organizations do not provide clear messaging about role in concussion safety
- Concern that talking about concussion could provoke fear

Communicating about physical contact

- Coaches can describe good and bad physical contact
- Specific to the sport, concrete easier for kids to understand than “play fair”
- Some concerns that talking about ”bad” contact could affect competitiveness