

An Evaluation of Minnesota's Youth Sports Concussion Legislation

Student: Alina Yasis

Faculty Mentor: Francis X. Shen

Background

The short and long term effects of concussions, particularly those resulting from participation in contact sports like football or hockey, have been widely discussed in recent research and in the mainstream media (Chrisman et al., 2014). Recognizing the dangers of concussive injuries, all 50 states have now enacted legislation to protect the brain health of their youth athletes (Chrisman et al. 2014, Tomei et al. 2012, Cook et al. 2014). Minnesota passed its Youth Sports Concussions law in 2011, which aims to protect “athletes of all ages in all sports”, and “requires all coaches to follow the rule ‘When in doubt, Sit them Out’” as well as "requires written “Return to Play” approval from a medical provider trained in concussion management" (Minn. Stat. Ann. § 121A.38).

My Undergraduate Research Opportunities Program (UROP) proposal asked two specific research questions: First, focusing on the White Bear Lake Area School District (WBL), how knowledgeable are parents about concussions? Second, using a statewide online sample of Minnesota parents, What are the effects of different descriptions of concussions on the likelihood of parents to enroll their children in contact sports? This short report summarizes the results from the parental survey in WBL, and also describes the research design developed for the statewide parent online experiment (for which data is still being collected).

1. Parent Concussion Knowledge Survey in White Bear Lake

Methods. My study explored parental knowledge of concussions in a convenience sample of parents of high school students at White Bear Lake High School in Minnesota. To begin, I established productive communications with WBL's Athletic Director, and upon his agreement to pursue a research partnership began the IRB approval process. The IRB required me to complete CITI training, and fill out an "exempt category 2 application" pertaining to surveys/interviews and two appendices, J and M. Appendix J declared me, an undergraduate, the primary investigator in this study. I contacted the WBL school district's Assessment and Accountability Coordinator, who after I provided him a copy of the survey, informed consent and debriefing documents, signed the Letter of Authorization and District Permission Letter required by the IRB in Appendix M. I received IRB approval on August 22, 2016 (Study ID: 1608E92483) and UROP funding on September 6, 2016.

In the 10 weeks since receiving UROP funding, I developed a survey based on Shenouda et al.'s (2012) study in Washington state on the effects of the state's concussion legislation one year after it was passed. To administer the survey, I attended six varsity games (two volleyball, two soccer, and two football games; Table 1) at White Bear Lake Area High School South Campus. Parents were recruited at these events, and in total, 93 parents completed the 11-question survey.

Results. Overall, there seems to be sufficient parental knowledge regarding concussions in WBL: 99% correctly self-reported that concussions were a type of traumatic brain injury, 95% identified all concussions as serious, and 93% knew that most concussions occur without a loss of consciousness (Table 2). Furthermore, 93% highly agreed that what seems to be a mild bump or blow to the head can be serious

(Table 3). These results were consistent with findings in Washington state, varying only by a few percentage points (Shenouda et al. 2012).

The survey asked parents to evaluate symptoms of concussions from the point of view of a coach and from the point of view of a parent, and indicate if they would keep a child who had just experienced a bump, blow, or jolt to their head or body out of play, return them to play, or if it was too close to call. Over all of the symptoms, 79% reported they would definitely keep a child out of play from the perspective of a coach, compared to 88% from the perspective of a parent (Figure 1). From the parent perspective, participants indicated that symptoms like ‘sensitivity to light’ (18%), ‘feeling sluggish, hazy, foggy, or groggy’ (17%), and ‘does not “feel right” or is “feeling down”’ (24%) made return to play too close to call (Table 4). From the coach perspective, participants indicated that symptoms like ‘forgets an instruction’ (44%), ‘is excessively hungry’ (40%), ‘complains of being hot or cold’ (47%), and ‘answers questions slowly’ (24%) make return to play too close to call (Table 5).

While the parents seem knowledgeable about symptomatic concussion information, there are still gaps in knowledge when it comes to the law. 78.13% of parents knew that according to Minnesota’s 2011 Concussion Law, “a youth athlete who has been removed from play may not return to play until the athlete is evaluated by a licensed health care provider trained in the evaluation and management of concussion”, and only 68.75% of parents knew that “players must receive written clearance from a licensed healthcare provider” (not a volunteer) to return to play (Table 6). 87.5% of parents knew that a parent or legal guardian was not allowed to clear an athlete to return to play if a trained professional was unavailable (Table 6).

Regarding the structure of concussion assessment and data collection, evidence of gaps emerged. Only 48% of parents agreed that their “youth sports program collects information on all suspected concussions from practice sessions and games”, but approximately 92% agreed that their programs have written policies and procedures about head injuries, and that they have access to accurate information regarding sports-related head injuries (Table 6).

Overall, 17% of parents across the three sports responded with a comment that they had an experience with a youth sports head injury since 2011 (Figure 2). Notably, the incidence rate was higher in soccer (20%) and football (22%) compared to volleyball (6%).

2. Statewide online sample of parents

To complement the deep-dive in WBL, I designed an experiment on the Qualtrics online platform, examining concussion-framing effects on Minnesota parents’ decisions to involve their children in contact sports. Subjects are self-identified residents of Minnesota who have school-aged children. Subjects are being recruited and paid using the Amazon Mechanical Turk service.

The basic logic of my experiment is as follows. Each parent participant will be asked to read one news article about concussions, and will be randomly assigned to one of four groups. All participants will read the same article; the only difference between groups is exposure to a different noun for ‘concussion’. Group one will read ‘traumatic brain injury’. Group two will read ‘traumatic brain injury’ and ‘chronic traumatic encephalopathy’. Group three will read ‘concussion’. Group four will read ‘concussion’ and ‘chronic traumatic encephalopathy’. After reading the article, participants will be

asked to indicate if they would or would not allow their child to partake in the following competitive contact sports: football, hockey, soccer, volleyball. Additionally they will be asked to provide an explanation for their answer. This will shed light on the likelihood of parents to involve their child in certain contact sports given the language that was used in the news article to describe a 'concussion'. For purposes of this report, data are still being collected and analyzed.

Conclusion

Youth sports concussions are a health challenge across the country (Marar et al. 2012), and data from the Minnesota Department of Health reveal that, even with the concussion law in place, thousands of Minnesota students experience sports concussions annually (Dugan et al 2014). The results of this UROP project contribute directly to informing policy discussion on how current Minnesota concussion legislation and policy might be improved to better address brain health, and lay a foundation for more extensive research on youth sports concussions in the state.

References

- Chrisman, S. P., Schiff, M. A., Chung, S. K., Herring, S. A., & Rivara, F. P. (2014). Implementation of Concussion Legislation and Extent of Concussion Education for Athletes, Parents, and Coaches in Washington State. *The American Journal of Sports Medicine*, 42(5), 1190-1196.
- Cook, A., King, H., & Polikandriotis, J. A. (2014). Where Do We Go from Here? An Inside Look into the Development of Georgia's Youth Concussion Law. *The Journal of Law, Medicine & Ethics*, 42(3), 284-289.
- Dugan, S., Seymour, L., Roesler, J., Glover, L., & Kinde, M. (2014). This is Your Brain on Sports: Measuring Concussions in High School Athletes in the Twin Cities Metropolitan Area. *Minnesota Medicine*, 43-46.
- Gómez, J. E., & Hergenroeder, A. C. (2013). New Guidelines for Management of Concussion in Sport: Special Concern for Youth. *Journal of Adolescent Health*, 53(3), 311-313.
- Marar, Mallika, Natalie M. McIlvain, Sarah K. Fields and R. Dawn Comstock, Epidemiology of Concussions Among United States High School Athletes in 20 Sports, *Am J Sports Med* 2012 40: 747
- Provvidenza, C., Engebretsen, L., Tator, C. Kissick, J., McCrory, P., Sills, A., & Jonston, K. M. (2013). From consensus to action: knowledge transfer, education and influencing policy on sports concussion. *British Journal of Sports Medicine*, 47(5), 1-8.
- Shenouda, C., Hendrickson, P., Davenport, K., Barber, J., & Bell, K. R. (2012). The Effects of Concussion Legislation One Year Later—What Have We Learned: A

Descriptive Pilot Survey of Youth Soccer Player Associates. *Physical Medicine and Rehabilitation*, 4(6), 427-435.

Tomei, K. L., Doe, C., Prestigiacomio, C. J., & Gandhi, C. D. (2012). Comparative analysis of state-level concussion legislation and review of current practices in concussion. *Neurosurgical Focus*, 33(6).

Appendix

Table 1, Number of Participants, by Sport

This table shows the sporting events I attended in chronological order, and the corresponding number of participants. I attended six varsity games at White Bear Lake Area High School – South Campus: two volleyball games on 9/6/16 and 9/20/16, two soccer games on 9/8/16 and 9/22/16, and two football games on 9/16/16 and 10/7/16.

Sport	Number of Participants
Volleyball	16
Soccer	22
Football	16
Volleyball	17
Soccer	22
Football	16
TOTAL	109

Table 2, General Concussion Knowledge

This table shows the results obtained from WBL parents about the average strength of agreement (where 1 is low, and 5 is high) to general statements about concussions. The data show averages from soccer, volleyball, and football parents, as well as the average strength of agreement across the three sports for each statement.

	Average Level of Agreement 1 (low) – 5 (high)			
	Soccer	Volleyball	Football	Overall
A concussion is a type of traumatic brain injury (“TBI”).	4.59	4.63	4.53	4.6
All concussions are serious.	4.93	4.48	4.72	4.7
Most concussions occur without loss of consciousness.	4.59	4.27	4.72	4.5
Concussions are associated with heart attacks and heart abnormalities.	1.68	1.85	1.63	1.7
Recognition and proper response to concussions when they first appear can prevent further injury or even death.	5	4.82	4.81	4.9

Table 3, Knowledge of Concussion Causes

This table shows the results obtained from WBL parents about the average strength of agreement (where 1 is low, and 5 is high) to statements about the causes of concussions. The data show averages from soccer, volleyball, and football parents, as well as the average strength of agreement across the three sports for each statement.

	Average Level of Agreement 1 (low)- 5 (high)			
	Soccer	Volleyball	Football	Overall
Concussions are caused by a bump, blow, or jolt to the head that can change the way your brain normally works.	5	4.82	5	4.9
Concussions can occur from a blow to the body that causes the head to move rapidly back and forth.	4.43	4.67	4.97	4.7
Even a “ding,” “getting your bell rung,” or what seems to be a mild bump or blow to the head can be serious.	5	4.79	4.88	4.9
Concussions can occur in any sport or recreational activity.	3.91	4.88	4.13	4.3
Concussion severity is greater in smaller players.	2.66	2.39	2.69	2.6
A repeat concussion that occurs before the brain recovers from the first can slow the recovery or increase the likelihood of having long-term problems.	5	4.64	4.59	4.8

Table 4, Parent Perspective on Neurological Symptoms of Concussion

This table shows the responses of WBL parents to the question: You be the parent. Your daughter or son reports the signs and symptoms listed below after a bump, blow, or jolt to the head or body. Which are sufficient reasons to keep them out of play the day of the injury? The numbers shown depict the percentage of parents that chose that option.

	1 (Definitely Keep Out of Play)	2 (Definitely Return to Play)	3 (Too Close To Call)
Headaches or “pressure” in head	85%	0%	15%
Nausea or vomiting	98%	0%	2%
Reports feeling feverish	82%	2%	16%
Double or blurry vision	96%	0%	4%
Sensitivity to light	77%	4%	18%
Sensitivity to noise	86%	2%	12%
Numbness in hands and toes	95%	0%	5%
Feeling sluggish, hazy, foggy, or groggy	80%	3%	17%
Concentration or memory problems	85%	0%	15%
Confusion	92%	2%	5%
Does not “feel right” or is “feeling down”	76%	0%	24%
Balance problems or dizziness	99%	0%	1%

Table 5, Coach Perspective on Neurological Symptoms of Concussion

This table shows the responses of WBL parents to the question: You be the coach. Which of the signs and symptoms listed below after a bump, blow or jolt to the head or body are sufficient reasons to keep a player out of play the day of the injury? The numbers shown depict the percentage of parents that chose that option.

	1 (Definitely Keep Out of Play)	2 (Definitely Return to Play)	3 (Too Close To Call)
Appears dazed or stunned	88%	0%	12%
Is confused about assignment or position	83%	1%	16%
Forgets an instruction	53%	3%	44%
Is unsure of game, score, or opponent	84%	3%	13%
Is excessively hungry	46%	14%	40%
Moves clumsily	94%	0%	6%
Answers questions slowly	74%	2%	24%
Complains of being hot or cold	38%	15%	47%
Shows personality, or behavior changes	92%	0%	8%
Can't recall events PRIOR to hit or fall	100%	0%	0%
Can't recall events AFTER hit or fall	100%	0%	0%
Loses consciousness (EVEN BRIEFLY)	100%	0%	0%

Table 6, Minnesota Concussion Law Knowledge

This table shows statements about the 2011 Minnesota Concussion Law and the corresponding percentage of parents that responded correctly to them. The correct answer is bolded following the statement.

Statement	Percentage of parents that responded correctly
Continuing to play with a concussion or symptoms of head injury leaves the young athlete especially vulnerable to greater injury and even death. True	96.88%
A youth athlete who has been removed from play may not return to play until the athlete is evaluated by a licensed health care provider trained in the evaluation and management of concussion. True	78.13%
The youth athlete must receive written clearance to return to play from a licensed health care provider. True	68.75%
The health care provider may be a volunteer. False	68.75%
If no licensed health provider is available, the parent or legal guardian may give written clearance to return to play. False	87.50%
An organization that organizes and charges a fee for a youth athletic activity is required to require the youth athlete and their parent or guardian to sign a concussion information form before participating in the athletic activity. True	87.50%
A youth athlete that is removed from an athletic activity is prohibited from returning to the activity until they no longer exhibit signs, symptoms, or behaviors consistent with a concussion. True	93.75%

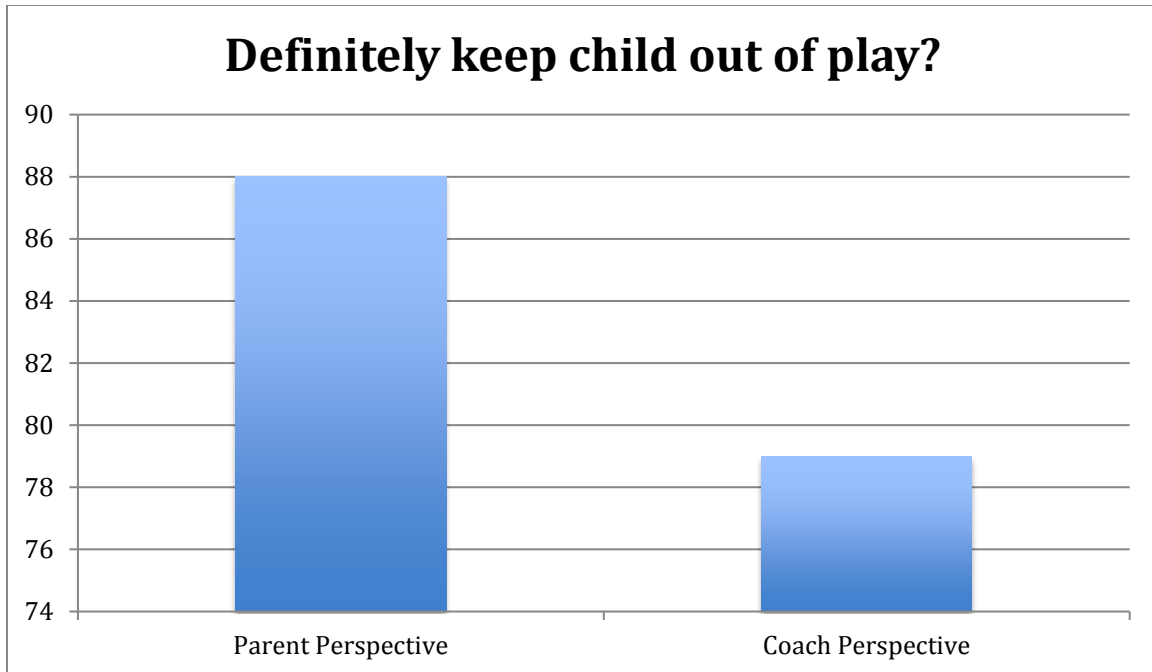


Figure 1. WBL survey respondents were asked to take on the perspective of a parent or the perspective of a coach and report if they would definitely keep a child who had just experienced a bump, jolt, or blow to their head or body out of play in light of neurological symptoms of a concussion. Over 12 neurological symptoms, this chart shows the average percentage of survey respondents who indicated they would “definitely keep them out of play”. See Tables 4 and 5 for the specific neurological symptoms.

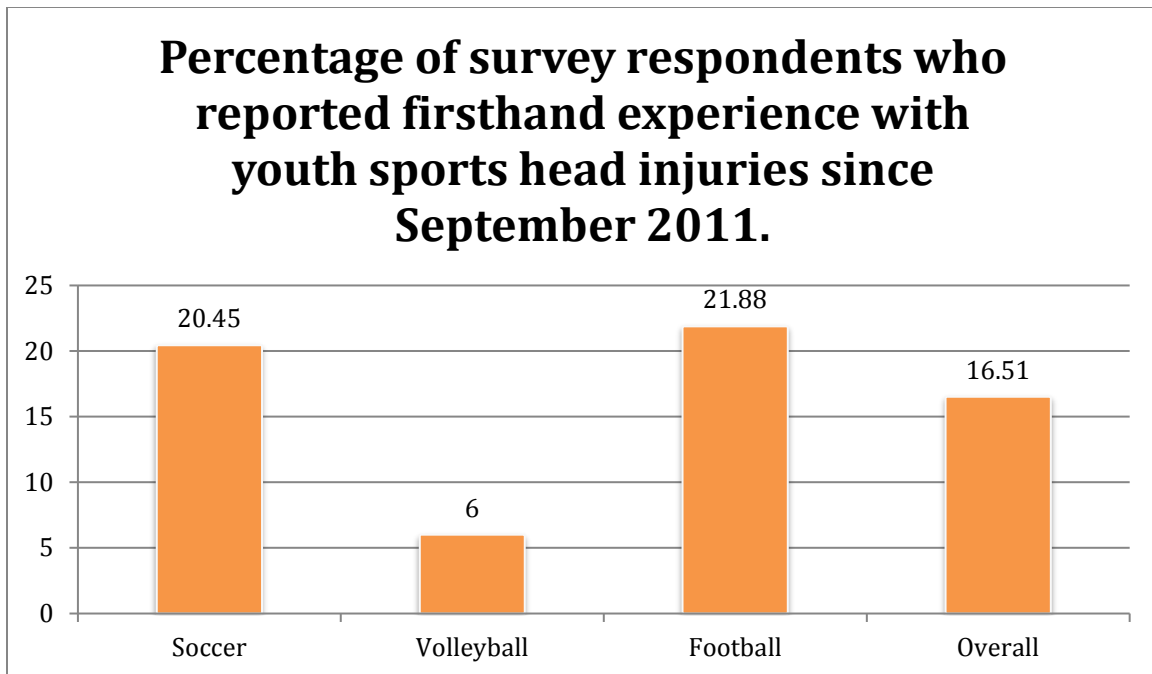


Figure 2. This chart depicts the percentage of WBL survey respondents who reported having firsthand experience with a youth sports head injury since September 2011.