

SPORTS-RELATED CONCUSSIONS: CHANGING THE GAME FOR WOMEN AND SPORTS



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Executive Summary

With the advent of Title IX, more women are playing sports today than ever before. Prior to passage of this landmark legislation, only 1 in 27 girls participated in high school sports, according to the Women's Sports Foundation. Today, that number has risen dramatically to two of every five girls.¹ While public concern about concussions has focused primarily on male football players, recent research shows that female athletes actually suffer from concussions *more frequently* than their male peers in similar sports.^{2 3 4} Additionally, of those athletes who experience concussions, research shows that females suffer more symptoms and take a longer period of time to recover.^{5 6 7}

The reasons behind women and girls' susceptibility to the effects of concussions can be mainly attributed to biological differences, research indicates. Due to the different role that hormones play in the female body, women often experience concussions differently than men.⁸ Nonetheless, female athletes have not received the same attention as males in research and policy initiatives. As a result, female athletes are still not fully aware of their unique needs in order to be able to prevent and recover from concussions.

That is why the *Women's Sports Safety Initiative*, a special project fund of Silicon Valley Community Foundation, is working to raise awareness of the impact of sports-related concussions on female athletes. The Initiative is dedicated to advancing the lives of women and girls by advocating for more research to better understand how biological differences between men and women impact the frequency and severity of concussions; why female athletes are so susceptible to sports-related brain injuries; and how to better protect female athletes from these injuries.

To better grasp Americans' understanding of this issue, the *Women's Sports Safety Initiative* sponsored a nationwide survey by Harris Poll that questioned 2,025 adults about concussions and their impact on men versus women. The survey found that the majority of Americans are not aware that concussions affect males and females differently, and that females actually suffer from a higher rate of concussions than males in similar sports. The survey indicated that majorities are either misinformed or unaware of the facts relating to the impact of concussions on women and girls. A strong majority also believes that more research and guidelines are necessary to ensure the safety of all athletes.

Lawmakers have appropriately responded to the dangers of sports-related concussions by passing "return-to-play" laws in all 50 states. While this response is encouraging, we still need more research on why women suffer more concussions than men in similar sports, and on the full impact of concussions on female athletes. We also need more female-specific guidelines for the diagnosis and treatment of concussions, and more opportunities to educate the public on this issue.

As female athletes push themselves and give their all to their sports, they deserve to have the protection and care needed to keep them safe. Ensuring a safer future for female athletes is our goal; and to do that, additional research should be conducted and new female-specific return-to-play guidelines should be developed.

Medical Column

Most people equate concussions with American football, which is a sport of predominantly men and boys. As a result, most of the research and funding about concussions and mild traumatic brain injuries have been dedicated to male-dominated sports. This has kept female athletes from being a serious part of the conversation, even though women and girls suffer frequent concussions in sports such as soccer, basketball, gymnastics, cheerleading, and others. We've made great strides in understanding the causes and effects of concussions, but there is much more that is unknown about their impact on the female brain.

As a sports medicine specialist for 25 years, including time spent as a team physician at The Ohio State University and University of California-Berkeley, and working with youth sports teams, I have seen countless concussions in a wide range of activities. I have observed that the way male and female athletes are affected by concussions can be very different. We often need to rely on an athlete's report of their own symptoms, but objective and subjective findings often do not correlate. Female athletes are more likely to disclose the possibility of a head injury, and their recovery seems to take longer than the male athletes. Is this because females are physiologically more susceptible, or are they just more aware of their symptoms and more willing to report them? These observations have led me to further question the possible differences between the two sexes in their susceptibility and responses to concussions – questions that the scientific community has yet to fully answer.

This issue also affects me personally. My husband, son, and daughter have all had sports-related concussions. I have experienced the challenges of recovering from a significant mild traumatic brain injury after a biking accident. I know firsthand the physical and neurological impacts, and that is yet another reason why I am so passionate about this issue.

We want all children and adults to remain active and participate in the sports they love, so it's vital that we educate the public to be able to recognize the signs and symptoms of concussions. However, as we raise awareness about this issue, we also need to responsibly educate the public, using the best evidence that is available to us in the scientific community. And we clearly need more research focused on the female athlete and concussions.

I'm honored to join the *Women's Sports Safety Initiative's* Leadership Council in supporting this important cause. Going forward, we need more awareness, more research, and more exposure. We need more females of all races, ethnicities, cultures, ages, and sports, to speak openly about their concussions. Let's begin to address all those unanswered questions about female athletes and their unique susceptibility to and recovery from concussions.



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The Unrecognized Danger

Women are More Susceptible to Concussions than Men in Similar Sports

Concussions are not created equal. Recent research shows that women and girls suffer from a higher rate of sports-related concussions, compared to men in similar sports.^{2,3,4} Female athletes also experience more concussion symptoms, such as dizziness, fatigue, lack of concentration, and lightheadedness, and they take a longer time to recover than their male counterparts.^{3,5,6,7,9} This issue does not only concern women; young girls are affected as well. According to a study published in the American Journal of Sports Medicine, the risk of concussions for high school girls is double the risk for boys in gender-neutral sports.³

Why are women impacted differently by concussions?

Biological differences between men and women contribute to women's increased susceptibility and slower recovery from concussions. Once females reach puberty, research shows that they experience higher rates of concussions, as well as more severe symptoms, and their recovery time is slower.⁷ While estrogen has been found to improve neurological outcomes in males who have suffered brain injuries, it has been found to do the opposite in females suffering from similar conditions.⁸ As a result of these hormonal differences, female athletes face a heightened threat from both the short-and long-term effects of concussions.

A concussion? What's that?

According to the Centers for Disease Control and Prevention, a concussion is a brain injury that usually results from a blow to the head, but can also result from a hit to the body that causes the brain to move rapidly back and forth. This movement can cause damage to the brain cells and may even result in chemical changes in the brain. Many think that a concussion always results in a loss of consciousness; however, this is not always the case. A concussion should always be taken seriously.¹⁰

Survey Results

In order to better grasp American's understanding and knowledge of concussions, Harris Poll surveyed 2,025 adults, including nearly 500 parents of children under the age of 18, on behalf of the *Women's Sports Safety Initiative*. The results were eye-opening.

Key findings include:

Knowledge and Awareness

- Nearly two-thirds (65%) are not aware that concussions affect men and women differently;
- Nearly 8 in 10 (79%) are not aware that males do *not* suffer a higher rate of concussions than females in similar sports; including 2 out of 5 (41%) who mistakenly believe men actually suffer from a higher rate;
- 80 percent did not know that concussions can be more severe based on hormonal differences; and,
- Nearly 9 in 10 (87%) don't know that female athletes take longer than males to recover from concussions.

Education and Resources

- The majority of Americans want to learn more about concussions, with only 29 percent of Americans saying they believe they know all they need to know.
- 42 percent do not know where to turn for reliable information.

Research and Guidelines

- About three out of four U.S. adults (76%) believe more money should be dedicated to research on the impact of concussions on women.
- A vast majority (89%) agree that more guidelines should be put into place to ensure athletes' safety when returning to play after suffering a concussion.

Parents' Views

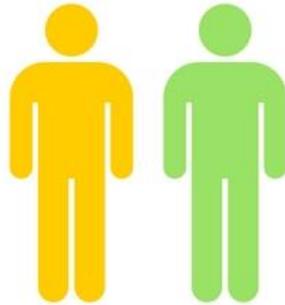
- Three in four parents of kids under 18 (75%) worry about concussions when their children play sports.
- 9 in 10 (90%) advocate for more guidelines to ensure athletes' safety when returning to play after suffering a concussion.
- Nearly 4 in 5 (78%) believe more money should be dedicated to research on the impact of concussions on women.

Women and Sports-Related Concussions: What You Need to Know



Female athletes suffer from a higher rate of sports concussions than men in similar sports.^{1,2,3}

Women often experience more concussion symptoms and take longer to recover from concussions.^{4,5,6}



Hormonal differences between males and females may cause women to experience more concussion symptoms.⁷



Girls in high school have double the risk of concussions than boys in similar sports.²



Sports with the Highest Concussion Rates for Women

Ice Hockey
Soccer

Basketball
Lacrosse⁸

Sources:

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- 6 Covassin, T., Schatz, P., and Swanik, B. Sex differences in neuropsychological function and post-concussion symptoms of concussed collegiate athletes. *Neurosurgery*, 2007; 61: 345-351
- 7 Emerson, C.S., Headrick, J.P., and Vink, R. Estrogen improves biochemical and neurologic outcome following traumatic brain injury in male rats, but not females. *Brain Res*, 1993; 608: 95-100
- 8 American Physical Therapy Association. (2015, October 7). Study Looks at Concussion Rates Among NCAA Sports. Retrieved July 12, 2016, from <http://www.apta.org/PTinMotion/News/2015/10/7/ConcussionNCAA/>



Changing the Game for Women and Sports

Special Fund Project of Silicon Valley Community Foundation
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In Case of a Concussion: What Do You Do?

It is imperative to take the necessary precautions when an athlete appears to have sustained a possible concussion. Experts recommend a number of steps be taken by coaches and parents to ensure the safety of athletes. Below are the actions recommended by the Centers for Disease Control and Prevention in addressing a potential concussion:

- ✓ Remove the athlete from play and keep him/her out of play until cleared by a healthcare provider.
- ✓ Record information about the injury sustained by the athlete, including:
 - Cause of the injury and force of the blow to the head or body
 - Any loss of consciousness
 - Any memory loss right after the injury
 - Any seizures following the injury
 - The number of previous concussions the athlete has sustained, if any
- ✓ Seek out medical care.
- ✓ Request written concussion care instructions from the athlete's healthcare provider that include information on whether or not he/she can return to play.¹¹

Sports with the Highest Concussion Rates for Women

Certain sports and activities have higher rates of concussions than others. The National Collegiate Athletic Association (NCAA) Injury Surveillance Program found that between the 2009-2010 and 2013-2014 academic years, the highest rates for sports-related concussions for women were found in:

Ice Hockey | Soccer | Basketball | Lacrosse | Field Hockey | Volleyball¹²

Effects of Concussions:

According to the Centers for Disease Control and Prevention, there are a number of long-and short-term effects related to concussions. They include:

Short-Term Effects

Headaches
Loss of consciousness
Ringing in the ears
Dizziness/confusion
Nausea/vomiting
Loss of memory¹³

Long-Term Effects

Diminished concentration
Anger or aggression
Sensitivity to light and sound
Difficulties with sleep
Personality changes¹³

State and Federal Concussion Laws

Multiple attempts have been made to enact federal concussion legislation; however, to date, no laws have been passed.

On the state level, progress has been made. Washington became the first state to formally adopt youth sports concussion legislation with the Zackery Lystedt Law in May, 2009. The law requires medical clearance of youth athletes suspected of sustaining a concussion before sending them back into the game, practice, or training. California State Assemblywoman Mary Hayashi also passed ground-breaking return-to-play legislation that added training on concussions to the first-aid certification requirements of high school coaches.

Since 2007, all 50 states and the District of Columbia have passed legislation to address sports-related concussions. According to the National Conference of State Legislatures, most of the laws share three components:

- Provision of education or training on concussion recognition and appropriate responses
- Removing a youth athlete from play or practice in the event of a suspected concussion
- Returning a youth athlete to practice or competition only after evaluation and clearance by a designated health care provider¹⁴



Call to Action from Mary Hayashi

As a former California state assemblywoman, I have worked to bring the issue of sports-related concussions to the attention of our legislative leaders all over the country. But so far, our efforts have only scratched the surface. That's why I helped to create the *Women's Sports Safety Initiative* as an avenue for advocating on behalf of concussion safety for female athletes. The *Initiative* is working to ensure female athletes are protected from concussions and are provided the most appropriate and effective forms of treatment. But we cannot do it alone.

While all 50 states have passed legislation to address sports-related concussions, only 21 require coaches to have formal training on how to identify and respond to a player sustaining a concussion. This training is imperative to the safety of our athletes, and it is something that I believe is necessary for each state to implement in school athletic programs. That is why I authored AB 1451, which adds concussion training to the first-aid certification required of every high school coach in California. As we continue to gain knowledge of concussions, we need the legislature of each state to add this criterion to their current athletic guidelines.

Additionally, our athletes, physicians, athletic trainers, and coaches need more guidelines outlining best practices for the diagnosis, treatment, and management of concussions for female athletes. And we need additional resources for new female-centered concussion research to better understand why women concuss at a higher rate than men, and how to protect female athletes from these injuries.

It will also be important to develop a better data-collection system to identify concussion trends in female and male athletes. The Centers for Disease Control and Prevention (CDC) is leading the way in this effort by establishing the National Concussion Surveillance System. This system will accurately determine the number of concussions sustained each year among both children and adults, and will track how these injuries occur. This data will then be used to prioritize and target specific programs and activities. Data-collection efforts like the CDC's are vital to continuing to grow our knowledge of this issue in order to enact real change, and we need to support them.

Together we can ensure the safety of all athletes from sports-related concussions!

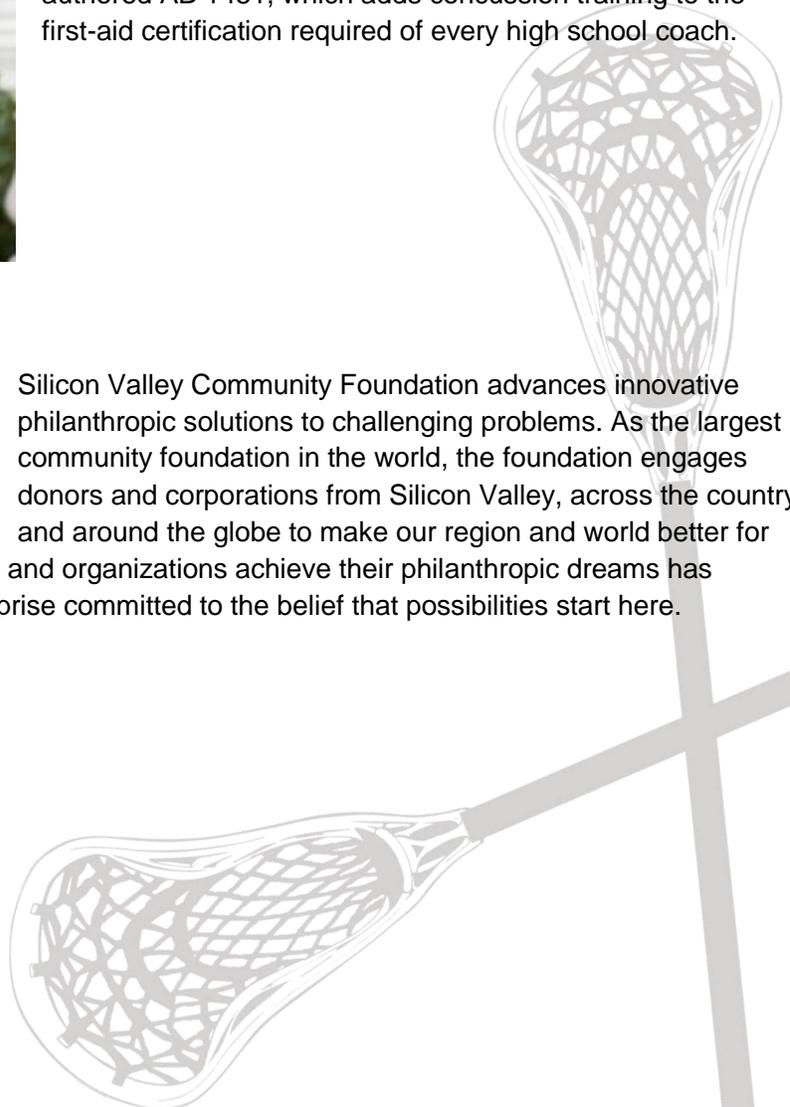
Project Director Mary Hayashi



Mary Hayashi is the project director of the *Women's Sports Safety Initiative*. As a national healthcare leader, non-profit director, and a former California state assembly member, Mary Hayashi has championed meaningful reforms for various healthcare issues, including concussion safety. In 2011, she authored AB 25, a bill that established the toughest return-to-play laws for student athletes. Co-sponsored by the National Football League, AB 25 requires a school district to immediately remove an athlete from a school-sponsored athletic activity if he or she is suspected of sustaining a concussion or head injury. In 2012, she also authored AB 1451, which adds concussion training to the first-aid certification required of every high school coach.



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