

SPORTS

Blindsided

Mounting research shows concussion rates are a lot higher in female than male athletes—even in ‘safer’ sports

IF ALL YOU ever heard about concussions was what turned up in the sports news or highlight reels, you'd be justified in thinking that they mostly only happen to elite male athletes, especially NHL players. A couple of weeks ago, Nathan Horton of the Boston Bruins was rocked by a hit so hard it knocked him out of the Stanley Cup finals. In May, Derek Boogaard of the New York Rangers, who'd been battling concussion symptoms since before Christmas, accidentally overdosed on alcohol and painkillers. In March, scientists announced that the late Bob Probert, a famous brawler, had brain degeneration. Days later, Max Pacioretty of the Montreal Canadiens had a head-on collision with a thick metal stanchion. And, of course, superstar Sidney Crosby of the Pittsburgh Penguins is still recovering from back-to-back blows he received in January.

Despite such evidence to suggest that men are the main victims of concussion, an unsettling body of scientific research reveals that the rates of concussion among female athletes are significantly higher than for male athletes. "What we know right now is that

females are about two to three times more likely to have a concussion than males," says Dave Ellemberg, a professor at the Université de Montréal, who has a grant from the Canadian Institutes of Health Research to study the effect of gender on concussion outcomes. There are also early indications that females might take longer to recover, and that their symptoms might be different from, or worse than, those experienced by males.

The problem is widespread: high rates of concussion in females are occurring at both the youth and adult levels, and across the sports spectrum. Recent studies have found that in gender-comparable sports such as soccer and basketball, which have the same rules and equipment for both sexes, females are far more likely to receive a concussion per number of "athlete exposures" (one player participating in one game or practice). Dawn Comstock, a principle investigator at Nationwide Children's Hospital in Columbus, Ohio, runs the national sports surveillance study, which collects detailed injury data from 200 high schools across the U.S. on a weekly basis.

Between 2005-2010, female high school soccer players received on average three concussions per 10,000 exposures compared to 1.98 among boys. In basketball, girls sustained 2.01 concussions versus just one among boys per 10,000 exposures.

More surprising is the fact that females also have considerably higher rates of concussion in ice hockey—even though the sport is supposedly "safer" for them because bodychecking is prohibited in girls' and women's leagues. One recent study compared all injuries sustained by men and women playing National Collegiate Athletic Association ice hockey between 2000 and 2007. While concussion was the most common injury reported by both sexes, the average rate for males was .72 per 1,000 exposures, compared to .82 for females. "That is a huge difference," says Dr. Edward J. Harvey of the McGill University Health Centre in Montreal and co-author of the 2010 study, "because the men are trying to kill each other and the women aren't supposed to be hitting each other."

In fact, many experts wonder whether the ban on bodychecking may actually be contributing to the high concussion rate among females. Put simply, "Guys are trained to hit; girls aren't trained to receive a hit," says Harvey. "It's obviously not a zero-contact league. It's a light-contact league. And people do run into each other by mistake." A lack of education on how to make and take contact properly can leave female players defenceless on the ice—and oblivious to the danger around

them. Dr. Charles Tator, senior scientist at the Toronto Western Research Institute, adds: "Women can't be lulled into thinking that just because they are not allowed to bodycheck that they're not going to get concussions."

Hayley Wickenheiser, the greatest female hockey player—she has four Olympic medals and the distinction of being the first woman to ever score in a men's professional league—isn't surprised that females get more concussions. "In women's hockey, a lot of players skate with their heads down because they can. On the men's side, when I'm playing I keep my head up all the time because I know I'm one hit away from a potential career-ending injury," says Wickenheiser, who plays for the University of Calgary Dinos while completing her kinesiology degree. "On the women's side, there's no hitting so no one expects it. When it happens, often players are in a vulnerable position. So I think it actually increases the danger for concussions because players aren't bracing for them."

When athletes know a hit is coming, they instinctively tighten their neck muscles to offset the impact, explains Aynsley Smith, a native of Winnipeg who is now research director of the Sports Medicine Center at the Mayo Clinic in Rochester, Minn. "Picture yourself on the ice and then all of a sudden you don't see it and you take a 100- or 50-lb. blow. Your head is going to spin like crazy." Adding to that effect is the fact that female neck muscles aren't usually as developed as those of males. "Certain researchers have said that the neck acts like a shock absorber [during] collisions," says Comstock. A strong neck might mean less acceleration of the head, and therefore less brain injury.

Celebrated speed skater Kristina Groves, a four-time Olympic medallist, experienced extreme neck movement when she received a concussion last November, from which she is still recuperating. During a race in Berlin, she hit a patch of chippy ice and fell on her hip. As her body slid across the ice, and slammed into hard mats, Groves sustained severe whiplash. "I didn't really hit my head that hard, but I snapped my neck around," she says. Her symptoms, which include a pulsing sensation behind her eyes and forehead, have been confusing: "A lot of what you feel in your head can come from your neck, so it's been a constant back-and-forth thinking, is this my neck or my head?"

While Groves takes comfort in the fact that she was able to accomplish so much in her career before the concussion, being sidelined so suddenly has been tough. "There were days when all of sudden I would start bawl-

ing and being like, 'What the hell is wrong with me? Do I need to push it to get back to skating?'" Groves eventually chose to take the rest of the season off. "Once I actually decided that, it was a huge relief because I could just be like, 'It doesn't matter, let yourself heal.' I let go of that pressure."

Admitting to pain, say some experts, is more common for females, and that might explain why concussion rates are higher—they are more likely to report symptoms and get diagnosed. "In our society, it's more acceptable for a young woman to acknowledge that she's in pain or that she's been hit or hurt," says Smith. But the opposite might be true, too: that girls face just as much pressure. "The truth is, athletes are athletes. You have to really work hard to get them

THE BAN ON CHECKING MIGHT ACTUALLY PARTLY EXPLAIN HIGH CONCUSSION RATES IN FEMALE HOCKEY



Making contact: Mariia Posa falls on Wickenheiser at the Olympics

to admit any symptoms, and that counts as much for female athletes as it does for male athletes," says Ellemberg. "They want to win, they're competitive. They've been playing sports since a young age, and it's their life and passion." Adds Diane Wiese-Bjornstal, a researcher and professor at the University of Minnesota: "Over the last 10 to 20 years, women have spent all this time trying to prove ourselves worthy, that we can compete in the male domain. I get females all the time who say they hide injuries."

The worst hit Wickenheiser ever took occurred while playing with the Swedish men's team in 2008. For two weeks, she quietly endured dizziness, headaches and nausea, telling no one but her family. "Not my coaches, not my teammates. It was a unique situation: I'm the only woman playing professional men's hockey in the entire world. I have a contract, I have my family there, my son's in school. If it all ended, what are we going to do? I need to keep playing," she recalls think-

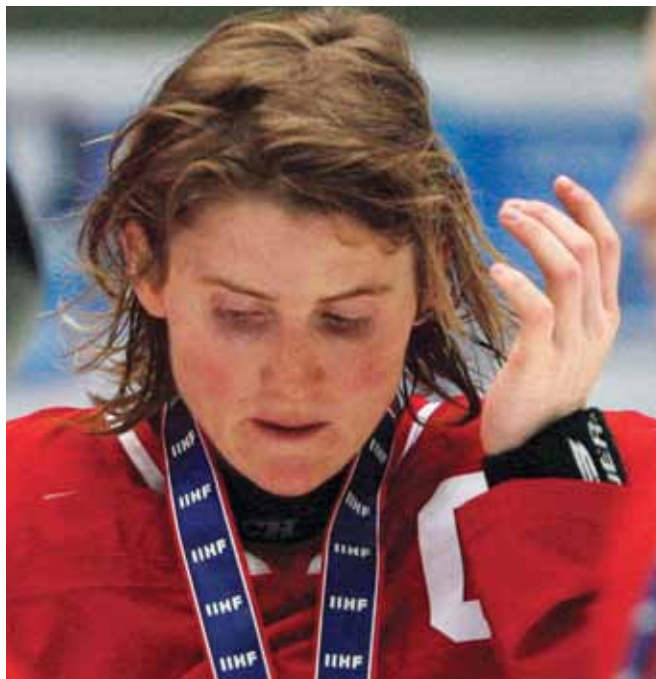
ing. "You just have to be a pro and put it aside. It almost sounds barbaric to say that."

Some symptoms might be easier to ignore than others. A 2009 study co-authored by Dr. Alexis Colvin, a professor of sports medicine at Mount Sinai Hospital in New York, found that among soccer players ages 8 to 24, females reported more symptoms than males, and did worse on neurocognitive testing. Natalie Botzang, a recent graduate of the University of Waterloo, sustained a concussion last May while playing soccer, and has felt nausea, headaches, sensitivity to light and noise, and had trouble communicating. She's received support from her community, but for Botzang, 22, concussion was never framed as an injury that differed by gender.

The experts who spoke with *Maclean's* emphasized that whatever research does exist about how uniquely females and males experience or recover from concussions is still preliminary and inconsistent. Comstock, for instance, has found no difference in the number of symptoms reported by each gender; data about whether or not females take longer to return to play is also spotty. So their message to parents of daughters and to female athletes themselves is to keep playing sports. But they want

to see more neck strengthening exercises and better skills training to teach females, for example, how to ride out a hit on the board. And Tator, founder of ThinkFirst, encourages the public to download a free "Smart Hockey" educational video on its website, and arrange a team viewing.

As for whether bodychecking should be allowed in female hockey, no one told *Maclean's* that that's a good idea. In fact, some advocated taking it out of boys' hockey, too, leaving it to older or pro players. Wickenheiser, who stresses the importance of playing "heads up hockey," says that proper bodychecking is a valuable skill to separate the puck from a player. But she doesn't want to see it brought in either—there's plenty of body contact today. "If you watch a Canada-U.S. game, you see a ton of great hits along the boards and lots of physicality." In that sense, Wickenheiser says female hockey "is fine the way it is." But in another sense, it could be better. **CATHY GULLI**



'Heads up': Hayley Wickenheiser (far left) and Kristina Groves both experienced concussions. Wickenheiser kept quiet about hers. Groves didn't.