

The Risk of Injury Associated with Body Checking Among Pediatric Ice Hockey Players

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The risk of injury with body checking in youth ice hockey has been a topic of hot debate, but has been backed by poor evidence. We conducted a two-year study; the first year compared Pee Wee Alberta (body checking) to Quebec (no body checking) to see if body checking produced more injuries. The second year compared Bantam in Alberta (experienced body checkers) to Quebec (new to body checking) to see if prior experience had a protective effect. Here is what we found:

1. Body checking in Pee Wee resulted in more injuries overall, and more concussions.
 - The rate of injury was 3.3 times higher in games in Alberta
 - The rate of concussion was 3.9 times higher in games in Alberta
 - Considering injuries resulting in more than a week of time loss, the risk was 3.3 times higher in games in Alberta
 - Considering concussions resulting in more than 10 days time loss, the risk was 3.6 times higher in games in Alberta
 - There was no difference in injury rates between Alberta and Quebec in practices
2. If body checking were eliminated in Alberta Pee Wee, it is estimated that out of the 8826 players registered,
 - we could prevent 1124 game-related injuries per year
 - and we could prevent 427 game-related concussions per year
3. In Bantam, the risk of injury was the same in Alberta and Quebec,
 - both injuries and concussions had almost exactly the same injury rate
 - more severe injuries resulting in more than 7 days time loss and concussions resulting in more than 10 days time loss were slightly higher in Quebec, but this was not statistically significant.
 - Therefore, body checking experience in Pee Wee was not protective of injury

Based on the results of this study, there is significant evidence that Hockey Canada should reconsider the policy allowing body checking in Pee Wee at all levels of play. The injury risk in Pee Wee would be reduced significantly and the injury risk in Bantam would not change if body checking were delayed until Bantam.

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Background:

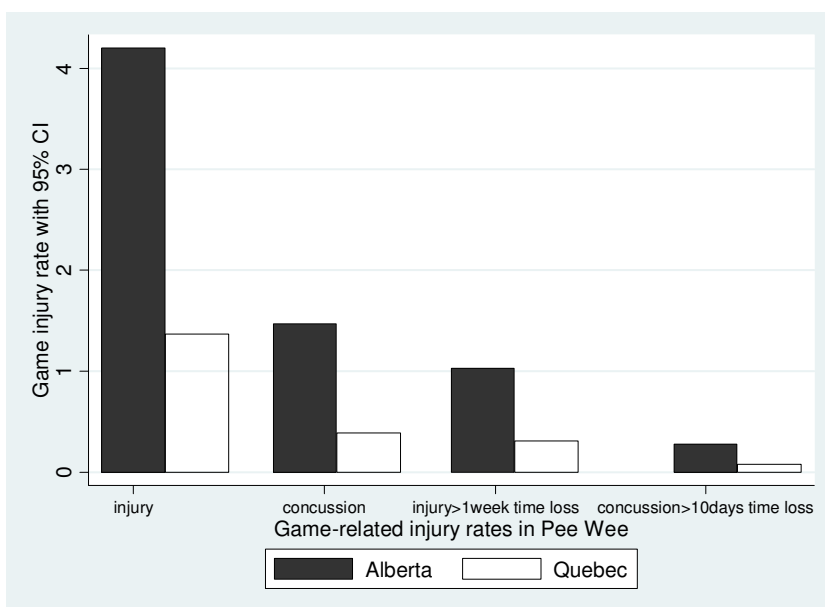
Youth ice hockey has a high participation rate and high injury rates. In Alberta, ice hockey injuries account for over 10% of sport injuries in youth. The age that body checking is introduced in youth ice hockey has been very controversial over the years. From previous studies in Alberta, approximately 18% of all injuries for players aged 9-16 (Atom-Midget) are concussions, and the risk of concussion appears to be higher in leagues that allow body checking. In addition, the risk of all injury (overall) is estimated to be at least two times greater in leagues that allow body checking compared to leagues that do not. However, these data come from studies with significant methodological limitations. As such, an injury surveillance system was developed and validated for youth ice hockey in 2004/05. This system includes team therapists and sport medicine physicians for injury assessment and improves the assessment of risk factors for injury.

Pee Wee Study:

The objective of the 1st year of this national study was to determine if the risk of injury and concussion, differs for Pee Wee hockey players (ages 11-12) who are in a league that permits body checking (Alberta) compared to those who are in a league that does not permit body checking (Quebec).

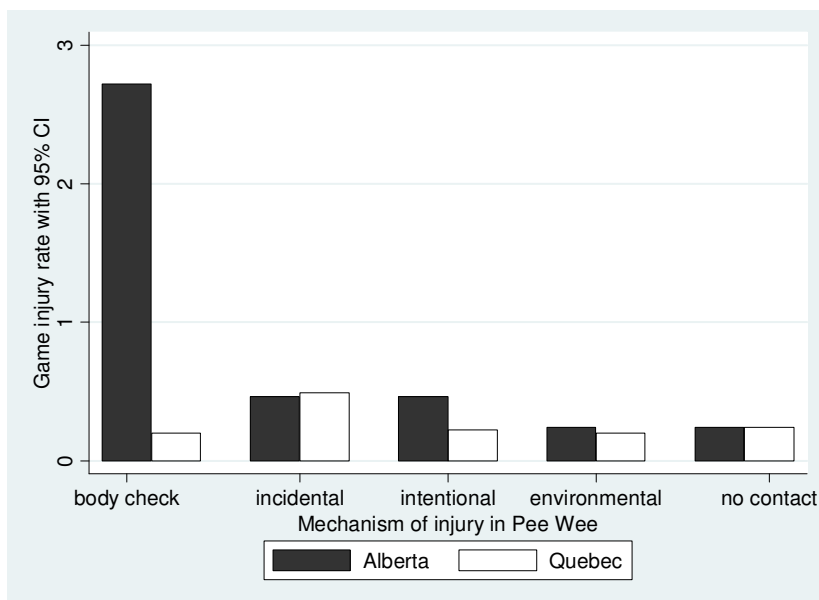
Seventy-four teams from Alberta (1108 players) and 76 teams from Quebec (1046 players), in the upper 60% of the league by level of play, completed the study in the 2007-2008 season. Based on game-related injuries, there was a 3.3-fold increased risk of injury in Alberta compared with Quebec. Players in Alberta were also at 3.9 times increased risk of concussion, 3.3 times increased risk of having an injury that resulted in more than a week of time loss from hockey, and 3.6 times increased risk of having a concussion that resulted in more than 10 days of time loss from hockey. There were no differences between provinces for practice-related injuries.

Figure 1: Game-related injury rate (# injuries/ 1000 player hours) comparisons by province (Pee Wee)



In Alberta, the most common mechanism of injury was body checking, while in Quebec it was incidental contact (Figure 2).

Figure 2: Mechanism of injury comparisons by province (Pee Wee)



Game injury rates for Alberta and Quebec Pee Wee (# injuries / 1000 player hours and # injuries / 100 players) for all injury definitions are summarized in Tables 1 and 2. Absolute Risk Reduction is subsequently translated to estimate the number of injuries that could be prevented in Alberta Pee Wee hockey if body checking was not permitted.

Table 1: Pee Wee Game Injury Rates (# injuries/1000 game hours) (95% CI) by Province

	Injury	Concussion	Injury (> 1 week time loss)	Concussion (> 10 days time loss)
Alberta Pee Wee	4.2 (3.49 – 5.07)	1.47 (1.08 – 1.99)	1.03 (0.73 – 1.46)	0.28 (0.15 – 0.53)
Quebec Pee Wee	1.37 (1.04 – 1.80)	0.39 (0.23 – 0.67)	0.31 (0.19 – 0.53)	0.08 (0.03 – 0.20)
Absolute Risk Reduction	2.84 (2.18 – 3.49)	1.08 (0.70 – 1.46)	0.72 (0.40 – 1.04)	0.20 (0.04 – 0.37)

Table 2: Pee Wee Game Injury Rates (# injuries/100 players) (95% CI) by Province

	Injury	Concussion	Injury (> 1 week time loss)	Concussion (> 10 days time loss)
Alberta Pee Wee	18.86 (15.59 – 22.83)	6.59 (4.82 – 9.00)	4.64 (3.30 – 6.51)	1.27 (0.68 – 2.34)
Quebec Pee Wee	6.69 (5.08 – 8.81)	1.91 (1.11 – 3.30)	1.53 (0.90 – 2.60)	0.38 (0.15 – 1.00)
Absolute Risk Reduction	12.17 (9.17 – 15.17)	4.67 (2.95 – 6.40)	3.11 (1.63 – 4.58)	0.88 (0.12 – 1.64)

The absolute risk reduction is used to estimate how many injuries could be prevented in Alberta Pee Wee hockey if body checking was not permitted.

Based on 8826 Pee Wee players in Alberta (i.e. the 2008-09 enrolment in Alberta) each playing on average 45 game hours per season, and the risk of game injury would be reduced by 4.2 injuries per 1000 player hours; we estimate the prevention of 1124 game injuries if body checking was removed from Pee Wee game play. Similarly, we would prevent 427 game concussions, 285 more severe game injuries (> 1 week time loss) and 79 more severe game concussions (> 10 days time loss).

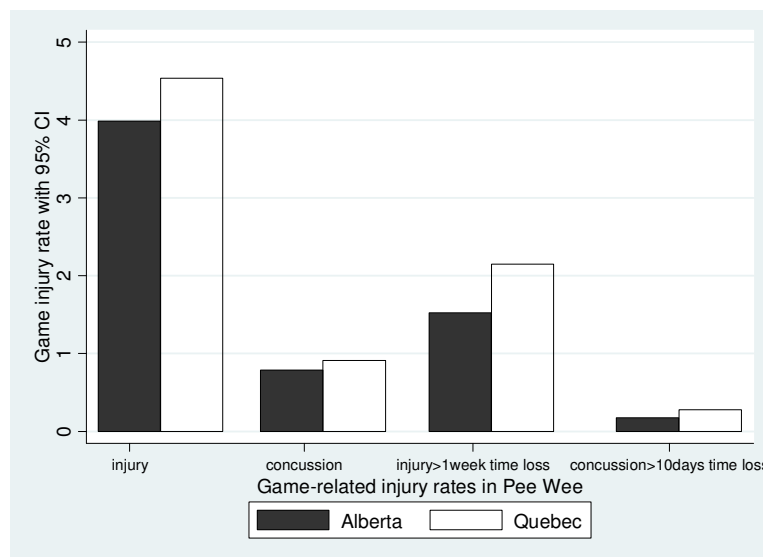
From this study, we can conclude that there is a significantly increased risk of injury, concussion, and more severe injury and concussion (as measured by time loss from participation) in a Pee Wee league where body checking is permitted when compared to a league where it is not permitted.

Bantam Study:

The objective of the 2nd year of this national cohort study (2008-2009 season) was to investigate whether the risk of injury and concussion in the Bantam age group (ages 13-14) differed between players who begin body checking in Pee Wee (Alberta), and players who begin body-checking in Bantam (Quebec).

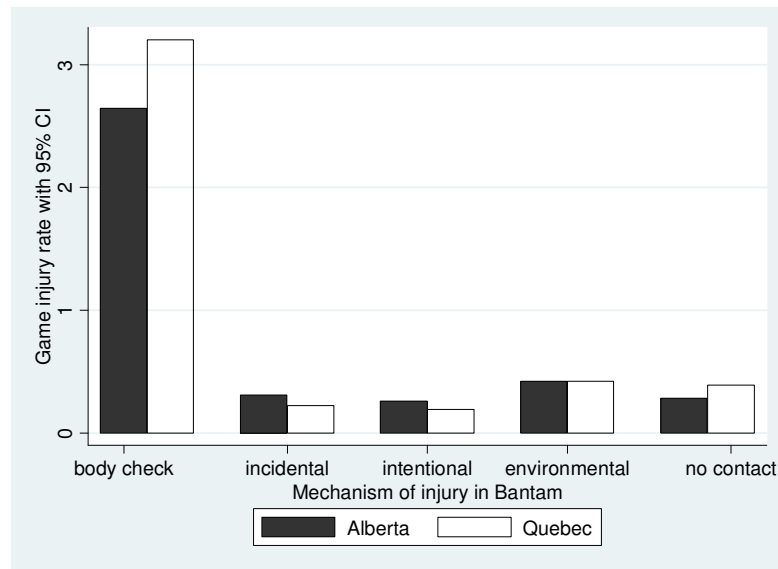
Sixty-eight teams from Alberta (995 players) and 62 teams from Quebec (976 players), from the upper 30% of the league by level of play (body checking permitted in both provinces at this level of play), completed the study in the 2008-2009 season. The game and practice-related injury and concussion rates did not differ significantly between Alberta and Quebec. For rates of injury resulting in more than one week time loss, there was a 30% reduced risk of injury in game-play in Alberta compared to Quebec, but this was not statistically significant. For concussions resulting in more than 10 days time loss, there was a 36% reduced risk of injury in game-play in Alberta compared to Quebec, however this finding was also not statistically significant. (Figure 3)

Figure 3: Game-related injury rate (# injuries/ 1000 player hours) comparisons by province (Bantam)



In Alberta and Quebec, the most common mechanism of injury was body checking (Figure 4).

Figure 4. Mechanism of injury comparisons by province (Bantam)



Game injury rates for Alberta and Quebec Bantam (# injuries / 1000 player hours and # injuries / 100 players) for all injury definitions are summarized in Tables 3 and 4. The absolute risk reduction is used to estimate how many injuries could be prevented in Alberta Bantam hockey if body checking was not permitted in Pee Wee.

Table 3: Bantam Game Injury Rates (# injuries/1000 player hours) (95% CI) by Province

	Injury	Concussion	Injury (> 1 week time loss)	Concussion (> 10 days time loss)
Alberta Bantam	3.99 (3.38, 4.71)	0.79 (0.55, 1.13)	1.50 (1.19, 1.90)	0.18 (0.095, 0.35)
Quebec Bantam	4.54 (3.63, 5.68)	0.91 (0.60, 1.37)	2.16 (1.66, 2.81)	0.30 (0.18, 0.52)
Absolute Risk Reduction	-0.55 (-1.34, 0.24)	-0.12 (-0.47, 0.24)	-0.65 (-1.18, -0.13)	-0.12 (-0.31, 0.07)

Table 4: Bantam Game Injury Rates (# injuries/100 players with 95% CI) by Province

	Injury	Concussion	Injury (> 1 week time loss)	Concussion (> 10 days time loss)
Alberta Bantam	24.32 (20.26, 29.19)	4.83 (3.37, 6.91)	9.15 (7.23, 11.59)	1.11 (0.58, 2.13)
Quebec Bantam	21.52 (17.34, 26.69)	4.31 (2.91, 6.38)	10.25 (7.98, 13.16)	1.44 (0.83, 2.48)
Absolute Risk Reduction	2.81 (-1.42, 7.03)	0.52 (-1.37, 2.41)	-1.04 (-3.80, 1.73)	0.32 (-1.32, 0.68)

Based on absolute risk reduction estimates for Bantam, there is no evidence to suggest that the risk of injury, concussion or severe concussion would change in Bantam if body checking were not permitted in Pee Wee in Alberta. There is some evidence to suggest a 33% reduction in severe injury risk in Alberta where players are exposed to body checking in Alberta. However, there would be a significant net reduction in injuries and concussions over the Pee Wee and Bantam years if body checking were delayed until Bantam. Based on the combined data for similar levels of play in Pee Wee and Bantam, the Net Absolute Risk Reduction is used to estimate how many injuries could be prevented in Alberta Pee Wee and Bantam hockey combined, if body checking was not permitted (Table 5).

Table 5: Net Absolute Risk Reduction in the combined data (Pee Wee upper and Bantam)

Game outcomes	injury	concussion	severe injury	severe concussion
Net ARR /1000 hours	2.67 (0.80, 4.54)	1.28 (0.34, 2.22)	0.34 (-0.62, 1.30)	0.04 (-0.27, 0.35)

Overall Conclusions

Our 2 year cohort study provides significant evidence for a 3-fold increased risk of concussion, all injury, more severe concussion and more severe injury in Pee Wee ice hockey players in a league where body checking is permitted compared to a Pee Wee league where body checking is not permitted. In addition, we can conclude that two years of body checking experience was not protective of injury or concussion in Bantam ice hockey players. The estimated net effect of removing body checking from game play in Pee Wee ice hockey is significant across Pee Wee and Bantam age groups. Based on these findings we recommend reconsideration of body checking policy to delay body checking in youth ice hockey to Bantam.

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