Influence of viewing professional ice hockey on youth hockey injuries

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Abstract

Introduction: Most televised National Hockey League (NHL) games include violent body checks, illegal hits and fights. We postulated that minor league players imitated these behaviours and that not seeing these games would reduce the rate of injuries among younger hockey players.

Methods: Using a quasi-experimental design, we compared 7 years of televised NHL matches (2002–2009) with the year of the NHL lock-out (2004/2005). Data from the Canadian Hospitals Injury Reporting and Prevention Program (CHIRPP) were used to identify the injuries and to ascertain whether they were due to intentional contact and illegal acts including fights.

Results: We found no significant differences in the proportions of all injuries and those involving intentional contact, violations or illegal acts among male minor league hockey players during the year when professional players were locked out and the years before and after the lock-out.

Conclusion: We concluded that not seeing televised NHL violence may not reduce injuries, although a possible effect may have been obscured because there was a striking increase in attendance at equally violent minor league games during the lock-out.

Keywords: *adolescent, males, television viewing, violence, sports injuries, hockey*

Introduction

''Sure you try what they do. You see them do all sorts of things and get away with it.'' So said a 12-year-old hockey player being interviewed on Canadian television following the blind-side hit that concussed National Hockey League (NHL) star, Sidney Crosby, removing him from play for nearly eleven months. Recent deaths of NHL enforcers—players whose main role is to fight—have fuelled the debate regarding ice hockey violence.

The influence of the media on the behaviour of viewers has been the subject of controversy since the 1950s.[1–3] In particular, disagreement remains about whether viewing violence on TV has a negative effect on children. In 1975, Rothenberg was convinced by 146 studies ''that violence viewing produces increased aggressive behaviour in the young.''[4] More recent reports, however, including systematic reviews and meta-analyses, have reached varying conclusions ranging from no effect[5] to clearly harmful.[6–11] Nevertheless, the American Psychological Association[12] and the American Academy of Pediatrics[13] assert that the bulk of the evidence points to negative effects.

Although most televised violence seen by children is presented in cartoons or action dramas, it is also evident in many sports broadcasts. Ice hockey, in particular, has a reputation for combining skilful play with aggression. It has the highest rate of sport injuries for boys[14] and is second only to football as a cause of catastrophic spinal injuries.[15] The amount of violence typically found on hockey broadcasts is striking: about 40% of NHL games include at least one fight[16] and about 16% of all severe injuries (e.g. those that force a player to leave the game) are caused by behaviours resulting in a penalty or suspension.[17] Minor professional hockey leagues, viewed by many as the most violent in hockey, generally have three to four fights per game.[18] Checking from behind—an action usually associated with severe injuries—only became illegal in 2000,[19] and there is still controversy about what to do about deliberate hits aimed at the head (''head shots'').[20] The macho aspect of professional hockey delayed the introduction of helmets until 1979[21] and continues to delay compulsory visor use.[22] In minor hockey, both have been obligatory for many years.

The behaviour of children and youth playing in minor leagues seems to be influenced by their watching televised NHL games.[23–27] A survey showed that 90% reported having learned a ''behaviour, technique or skill'' from watching professional hockey players. In addition, 56% stated they had copied illegal tactics of professional players at least once during the current hockey season.[28] Another survey indicated that high school hockey players who chose aggressive NHL players as role models were more likely to assault others during games.[29] More recently, a

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report commissioned by the ministry of sports in British Columbia noted that 27% of the 144 young hockey players surveyed imitated illegal hits they had seen after watching NHL players.[30]

Accordingly, we concluded there was a reasonable basis for postulating that *not* watching professional hockey on TV would improve the behaviour of younger players such that there would be fewer injuries. To examine this hypothesis, we took advantage of a natural experiment: during the winter of 2004/2005, owners locked out NHL players during a contract dispute. As a result, except for replays of old NHL games in April 2005 and junior league championship games at the end of May, there was no hockey on Canadian television. We investigated whether the absence of televised professional hockey during this season was associated with a lower rate of injuries among minor league players.

Methods

Our study was restricted to boys playing organized hockey in formal minor leagues in Canada throughout seven successive seasons beginning in 2002/2003. Minor leagues are categorized as peewees, bantams, or midgets according to the age of the players.[31]

We considered only those injuries that occurred during the regular NHL season. The Canadian Hospitals Injury Reporting and Prevention Program (CHIRPP)[32,33] provided details concerning the injuries. CHIRPP is an injury surveillance system situated in 14 emergency departments in seven provinces. It gathers information from parents of patients (or older patients) regarding the circumstances of the injury and includes medical details such as the nature of the injury, the body part and the treatment.

We used several definitions to describe the cause or mechanism of the injury. Initially, we compared all injuries to ''contact-related injuries,'' which include all types of contact, intentional or not. Then, we analysed two specific types of contacts. The first, ''injuries due to illegal contact,'' refers to those cases caused by an illegal hit (or act), as defined by Hockey Canada:[31] elbowing (extending elbow in a manner to cause injury), cross-checking (using the shaft of the stick to forcefully check an opponent), checking from behind, boarding (checking a defenceless opponent so as to cause him to impact the boards violently), checking to the head, kneeing (leading with the knee to make contact with the opponent), slashing (any forceful or powerful chops with the stick on an opponent's body), tripping (placing the stick, knee, foot, arm, hand or elbow in way that causes the opponent to trip or fall), roughing, or any acts of violence such as fights, altercations and deliberate punches. The second category, ''injuries due to fights,'' includes all injuries resulting from fights, altercations and deliberate punches.

To calculate rates, we obtained from Hockey Canada, for each year of study, the numbers of boys aged 11 to 17 years registered in each of the minor hockey leagues and expressed the proportion as numbers of injuries per 1000 registered male players in this age group in all the cities with pediatric CHIRPP centres. Confidence intervals for individual rates and individual proportions were calculated using the Poisson test.

Results

From September to April in the years 2002 to 2009, CHIRPP reported 14 717 hockey injuries for 11- to 17-year-old boys. Of the injured, 24% were peewees (11- to 12-year-olds), 39% were bantam (13- to 14-year-olds) and 37% were midgets (15- to 17-year-olds). During most years, at each level, about 70% of the injuries were contact related. For all age levels combined, the rates per 1000 registered players varied from 19.0 to 24.9 for any injury and from 13.7 to 18.4 for those judged to be contact related (Table 1). The data do not reveal, however, any pattern or trend over time nor any evidence that the proportion of injuries changed markedly when the lock-out year is compared with the preceding or following years. The same is true when these data are examined for each league or age group.

Although not statistically significant, Table 2 shows a consistent pattern indicating slightly more injuries arising from acts that were judged to be dangerous, that is, intentional or illegal, during the lock-out year.

Figure 1 shows attendance records at minor professional league games before, during and after the lock-out. We reasoned that, deprived of NHL games on TV, avid fans would compensate by attending these games, some of which were televised. The figure clearly shows that there was a peak in attendance at these games during the lock-out; what the figure does not reveal is that many contend that spectators attend these games in part because of their violence.[34,35] Players and coaches of these teams accept that the ''goon'' (who play hockey with an emphasis on intimidation and violence) is part of the games' appeal.[36,37]

Discussion

Professional hockey is violent because it relies on aggressive play. In *Violence and Sport*, Smith[28] defines aggression as ''any behaviour designed to injure another person, psychologically or physically.'' It is physical violence that typifies much of professional hockey. Robidoux and Trudel[38] observe that ''body-checking is an example of the regulated use of physical force to gain an advantage … it clearly leads to an increase in injuries.'' Several previous studies suggest that observing the behaviour of professionals during televised hockey matches influences young hockey players.[25,28–30,39,40] Contrary to what we expected, however, we found no consistent difference between rates of injuries of all kinds when youngsters were *not* watching NHL games on TV versus seasons when they were. Nonetheless, the belief that young players imitate viewing violence on TV remains plausible and prompted us to search for an explanation.

One explanation is that the behaviours related to youth hockey injuries are so deeply ingrained that they are not likely to change after only one year during which they were not reinforced by viewing the actions of professional players. A second possible explanation is that, by way of compensation, during the lock-out junior players attended more minor professional

TABLE 1
Approximate rates[a] of all hockey injuries and contact-related injuries by league (age group) and season per 1000 minor league players (11–17 years), all CHIRPP centres, Canada

Hockey season	Registered players,	All injuries			Contact-related injuries		
	n	n	Rates/1000 (95% CI)		n	Rates/1000 (95% CI)	
PEEWEES (11–12 years)							
2002/2003	32561	596	18.3	(16.9–19.8)	440	13.5	(12.3–14.8)
2003/2004	34541	508	14.7	(13.5–16.0)	356	10.3	(9.3–11.4)
2004/2005	**32339**	**492**	**15.2**	**(13.9–16.6)**	**362**	**11.2**	**(10.1–12.4)**
2005/2006	35492	449	12.7	(11.5–13.9)	322	9.1	(8.1–10.1)
2006/2007	33526	482	14.4	(13.1–15.7)	356	10.6	(9.6–11.8)
2007/2008	32235	525	16.3	(14.9–17.7)	392	12.2	(11.0–13.4)
2008/2009	34354	523	15.2	(14.0–16.6)	378	11.0	(9.9–12.2)
BANTAMS (13–14 years)							
2002/2003	30116	939	31.2	(29.2–33.2)	682	22.6	(21.0–24.4)
2003/2004	30448	861	28.3	(26.4–30.2)	624	20.5	(18.9–22.2)
2004/2005	**30848**	**833**	**27.0**	**(25.2–28.9)**	**604**	**19.6**	**(18.1–21.2)**
2005/2006	33332	761	22.8	(21.3–24.5)	558	16.7	(15.4–18.2)
2006/2007	31249	731	23.4	(21.7–25.1)	535	17.1	(15.7–18.6)
2007/2008	30049	754	25.1	(23.4–26.9)	558	18.6	(17.1–20.2)
2008/2009	32978	854	25.9	(24.2–27.7)	619	18.8	(17.3–20.3)
MIDGETS (15–17 years)							
2002/2003	28023	721	25.7	(23.9–27.7)	544	19.4	(17.8–21.1)
2003/2004	28152	837	29.7	(27.8–31.8)	614	21.8	(20.1–23.6)
2004/2005	**28597**	**738**	**25.8**	**(24.0–27.7)**	**562**	**19.7**	**(18.1–21.3)**
2005/2006	32615	715	21.9	(20.4–23.6)	510	15.6	(14.3–17.0)
2006/2007	32070	813	25.4	(23.7–27.1)	577	18.0	(16.6–19.5)
2007/2008	29963	777	25.9	(24.2–27.8)	570	19.0	(17.5–20.6)
2008/2009	34970	808	23.1	(21.6–24.7)	601	17.2	(15.9–18.6)
ALL PLAYERS (11–17 years)							
2002/2003	90700	2256	24.9	(23.9–25.9)	1666	18.4	(17.5–19.3)
2003/2004	93141	2206	23.7	(22.7–24.7)	1594	17.1	(16.3–18.0)
2004/2005	**91784**	**2063**	**22.5**	**(21.6–23.5)**	**1528**	**16.6**	**(15.9–17.5)**
2005/2006	101438	1925	19.0	(18.2–19.9)	1390	13.7	(13.0–14.5)
2006/2007	96844	2026	20.9	(20.1–21.9)	1468	15.2	(14.4–16.0)
2007/2008	92248	2056	22.3	(21.4–23.3)	1520	16.5	(15.7–17.4)
2008/2009	102302	2185	21.4	(20.5–22.3)	1598	15.6	(14.9–16.4)

Sources: Canadian Hospitals Injury Reporting and Prevention Program[32]; Hockey Canada (http://www.hockeycanada.ca/index.php/ci_id/23952/la_id/1.htm).

Abbreviations: CHIRPP, Canadian Hospitals Injury Reporting and Prevention Program; NHL, National Hockey League.

Notes: 2004/2005 (bolded) was the year when owners locked out NHL players during a contract dispute. As a result, except for replays of old NHL games in April 2005 and junior league championship games at the end of May, there was no hockey on Canadian television.

[a] Injuries treated in children's hospital emergency departments do not necessarily parallel the denominator data of registered players. Thus, the rates we used are not "true" rates in that the numerators and denominators are from different populations.

league games. Paradoxically perhaps, these are widely regarded as even more violent than NHL games,[34–37] and it is noteworthy, as Figure 1 shows, that there was a striking increase in attendance at these games during the lock-out.[41,42] Thus, exposure to violence may have remained much the same for the entire period of the study.

TABLE 2
Proportions of injuries due to illegal acts and fights during organized hockey, by minor hockey league and year, 2002/2003 to 2008/2009

Hockey season	All injuries,	Injuries due to illegal acts[a]		Injuries due to fights[b]	
	n	%	(95% CI)	%	(95% CI)
PEEWEES (11–12 years)					
2002/2003	596	22.5	(18.1–26.9)	0.5	(0.0–1.3)
2003/2004	508	16.7	(12.5– 21.0)	0.2	(0.0–0.8)
2004/2005	**492**	**27.4**	**(22.3–32.7)**	**1.2**	**(0.0–2.5)**
2005/2006	449	25.4	(20.1–30.7)	0.4	(0.0–1.3)
2006/2007	482	21.8	(17.0–26.7)	0.2	(0.0–0.8)
2007/2008	525	26.5	(21.6–31.5)	0.6	(0.0–1.5)
2008/2009	523	22.9	(18.3–27.7)	0.2	(0.4–0.7)
BANTAMS (13–14 years)					
2002/2003	939	17.1	(14.0–20.4)	0.2	(0.0–0.7)
2003/2004	861	13.8	(10.8–16.9)	0.6	(0.0–1.3)
2004/2005	**833**	**18.7**	**(15.3–22.3)**	**1.0**	**(0.1–1.9)**
2005/2006	761	18.3	(14.7–21.9)	0.4	(0.0–1.0)
2006/2007	731	18.5	(14.8–22.2)	0.8	(0.0–1.7)
2007/2008	754	16.4	(13.0–20.0)	0.9	(0.1–1.9)
2008/2009	854	17.6	(14.3–21.0)	0.5	(0.0–1.1)
MDGETS (15–17 years)					
2002/2003	721	17.2	(13.6–20.9)	1.9	(0.7–3.3)
2003/2004	837	19.5	(16.0–23.1)	1.9	(0.7–3.2)
2004/2005	**738**	**23.2**	**(19.2–27.2)**	**2.7**	**(1.2–4.3)**
2005/2006	715	19.3	(15.5–23.2)	1.3	(0.2–2.4)
2006/2007	813	17.2	(13.9–20.7)	1.6	(0.5–2.8)
2007/2008	777	19.9	(16.3–23.7)	2.1	(0.8–3.4)
2008/2009	808	19.3	(15.8–22.9)	1.6	(0.5–2.8)
ALL PLAYERS (11–17 years)					
2002/2003	2256	18.6	(16.5–20.7)	0.8	(0.4–1.4)
2003/2004	2206	16.6	(14.6–18.7)	1.0	(0.5–1.6)
2004/2005	**2063**	**22.4**	**(20.1–24.8)**	**1.6**	**(1.0–2.4)**
2005/2006	1925	20.3	(18.0–22.7)	0.7	(0.3–1.3)
2006/2007	2026	18.8	(16.6–21.0)	1.0	(0.5–1.6)
2007/2008	2056	20.3	(18.1–22.7)	1.3	(0.7–1.9)
2008/2009	2185	19.5	(17.4–21.7)	0.8	(0.4–1.4)

Source: Canadian Hospitals Injury Reporting and Prevention Program[32]; Hockey Canada (http://www.hockeycanada.ca/index.php/ci_id/23952/la_id/1.htm)

Abbreviation: NHL, National Hockey League.

Notes: 2004/2005 (bolded) was the year when owners locked out NHL players during a contract dispute. As a result, except for replays of old NHL games in April 2005 and junior league championship games at the end of May, there was no hockey on Canadian television.

[a] Illegal acts: hooking, tripping, holding, cross-checking, checking from the back, slashing, elbowing, boarding, checking to the head, kneeing, slashing, roughing.

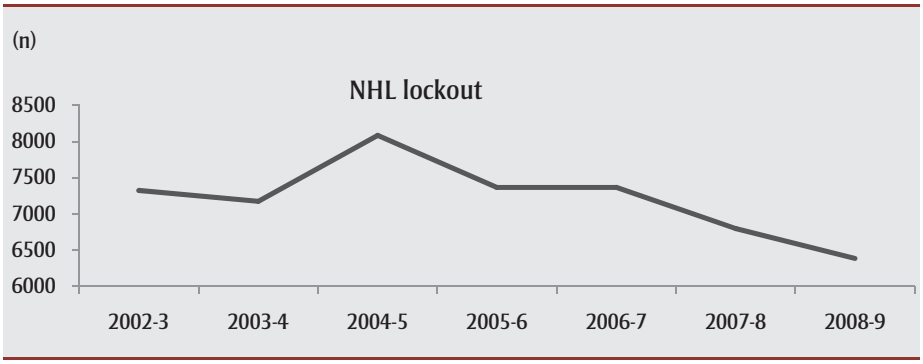
[b] Fights and altercations.

Limitations

We acknowledge several limitations. First, CHIRPP data only include a portion of all injuries across Canada, which cannot be regarded as a genuine sample of these injuries. The injuries treated in children's hospital emergency departments do not necessarily parallel the denominator data of registered players. Thus, we accept that the rates we used are not true rates in that the numerators and denominators are from somewhat different populations. However, it is the relative comparisons that we were examining and there is no reason to believe that the relationship changed over the study period.

A second limitation is that there is often insufficient detail in CHIRPP reports to be certain whether an injury was caused by

FIGURE 1
Attendance records from two minor professional hockey leagues (North American Hockey League and the American Hockey League) between the 2002/2003 and 2008/2009 hockey seasons



Sources: www.theahl.com, www. lnah.com.

Abbreviation: NHL, National Hockey League.

an aggressive or illegal act, and there are missing data. However, all records are coded centrally by trained coders and the information regarding the nature of injury and level of treatment is generally consistent over time. Again, unless there is reason to assume a change in these variables over time, our comparisons are justified.

Third, we did not attempt to verify that all our subjects actually watched televised NHL games between 2002 and 2008. However, the Canadian Broadcasting Corporation (CBC) recently announced *Hockey Night in Canada* as its highest rated show, estimating that 78% of Canadians aged 25 to 54 years watch NHL games.[43] If we apply the same proportion to our target group of 11- to 17-year-old male adolescents living in Canada and note that NHL hockey games were not only broadcast by the CBC, we can comfortably assume that there are at least one million boys of that age watching the NHL regularly. Moreover, given the extent to which ice hockey is part of Canadian culture, it would be surprising if most games involving home teams were not also watched. In addition, we believe it reasonable to assume that, except for the lock-out season where there was nothing to watch, the proportion of young spectators remained the same over the study years.

Finally, although we cannot be certain that young hockey players were part of the increase in attendance in minor professional leagues during the lock-out, it seems reasonable to assume that they were. Although attendance went up significantly, even if this included children and adolescents it would not come close to the number of children and adolescents who watch televised hockey.

Although not statistically significant based on Jonckheere trend test ($p = .099$), it is worth noting that the data in Table 1 suggest a small decline in these injuries over time. If true, this development may represent the success of various preventive initiatives or a decreased propensity to go to emergency departments when an injury occurs.

Conclusion

In spite of a reasonable hypothesis, we failed to demonstrate that not viewing the violence that typifies so much of professional hockey has a beneficial effect on the behaviour of young players. Specifically, we found no significant differences in the rates of injuries during one year when professional players were locked out and there were no televised hockey broadcasts. However, the effect may have been partly obscured by compensatory viewing of even more violent junior league games.

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