

**Analyzing Injury in Canadian Youth Ice Hockey through a Mixed Method
Observational Design: Moving Beyond the Mechanisms of Injury to the Socio-Cultural
Complexities of Implementing Injury Prevention Strategies**

Stephen Adams

Thesis submitted to the
Faculty of Graduate and Postdoctoral Studies
in partial fulfillment of the requirements
For the Doctorate in Philosophy degree in Human Kinetics

School of Human Kinetics
Faculty of Health Sciences
University of Ottawa

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Thesis Committee Members

Supervisor: Dr. Michael A. Robidoux

Member: Dr. Jean Harvey

Member: Dr. Eric MacIntosh

Internal Evaluator: Dr. Norman O'Reilly

External Evaluator: Dr. Kevin Young

Acknowledgements

I would like to thank Dr. Michael A. Robidoux for his guidance, wisdom, and patience. His valuable insights and challenging approach helped me improve as a young academic. I would also like to thank my committee members, Dr. Jean Harvey and Dr. Eric MacIntosh for pushing me to my academic limits and beyond. Charles Boyer, Mitchell Green, Matthew Davey, and Dr. Michael Spivock were instrumental during data collection and analysis. I could not have completed this thesis without their assistance. Thank you guys. Thank you to both Chiaki Inoue and Steph Mackay as well. Your mentorship and encouragement during challenging times helped me to overcome the bumps along the road. I would also like to thank the 20 volunteer research assistants, the AHMH, and ODMHA. I dedicate this paper to my brother Carlos and my parents Fraser and Kathy Adams for all their love and support. Thank you.

Thesis Abstract

Ice hockey is a sport known for its speed and skill. However, its intensely physical nature is associated with the potential risk of injury, which has become a major public controversy in Canada (Cusimano, Sharma, Lawrence, et al., 2013; Emery et al., 2010). Epidemiological research has adequately documented the frequency and severity of injury (King & LeBlanc, 2006; Yard & Comstock, 2006). Yet, because of methodological limitations and the lack of systematic and mandatory injury prevention strategies implemented nationwide, injuries remain high (Cusimano, Nastis, & Zuccaro, 2013; Emery et al, 2010). An alternative methodology, combined with broadening injury definitions can provide a more detailed assessment of the risks of, and circumstances, around injury.

A methodology, based primarily on observational techniques, was utilized to examine injury in body checking hockey when it is first introduced to youth players. Injury was defined as ‘any physical trauma that has occurred as a result of participation in an organized competition’ including four categories of injury severity. In a comparison of Ontario Peewee (ages 11-12) with Québec Bantam (ages 13-14) boys hockey, no significant differences were found in overall injury (χ^2 : 0.22; p:0.64), however, there were significant differences in frequency of body checking related injury; 76% versus 59% (χ^2 :4.76; p:0.03). The odds of being injured due to body checking are 2.158 times higher in Peewee (β_{ex} 2.158; 95%CI: 1.07-4.34; p:0.03) indicating no increased risk of injury when body checking is introduced later while delaying introduction reduces the frequency of body checking related injury.

Ongoing public debate in Canada concerning safety in youth hockey is understood through the theoretical lens of discourse (Foucault, 1972, 1990). The dominant discourse in

Canada around hockey is based in a traditional, physically dominant model, where intense physical contact is not only inevitable but desirable. The reverse discourse prioritizes the safety of participants over the potential of lessening the intense physicality of the Canadian style of play. These competing discourses create tension and ambivalence amongst safety advocates and conservative hockey practitioners and enthusiasts. The emotionality of hockey stakeholders often overwhelms logic regarding safety decisions, ultimately impacting progressive injury prevention initiatives.

Part I: Research Context

Chapter One

Introduction

Ice hockey¹ is a game celebrated for its intensely physical nature and the challenges it poses for participants of all levels and physical capabilities. Along with these challenges comes the potential risk of injury, which at present has become a topic of major public and academic debate in Canada (Cusimano, Sharma, Lawrence, et al., 2013; Emery, Kang, Shrier, et al., 2010; Juhn, 2004; Robidoux & Trudel, 2006). As injury in contact sport has gained increased public attention since the early 21st century (Caine, Maffulli, & Caine, 2008; Cook, Cusimano, Tator, & Chipman, 2003; Cusimano, Taback, McFaull, et al., 2011), the academic community has responded by examining its frequency and severity (King & LeBlanc, 2006; Yard & Comstock, 2006). In fact, between 1990 and 2003, there was an estimated 172,128 injuries in the sport of hockey (Yard & Comstock, 2006). In 2002/2003, there were 3000 injuries reported to emergency departments in Ontario (Canada) alone; all of the injured hockey players were under the age of 16 (King & LeBlanc, 2006).

Presently, the role of body checking in Canadian minor hockey has particularly come under public scrutiny (Coakley & Donnelly, 2009; Harder, 2013; Robidoux & Trudel, 2006; Tetley, 2012). Body checking is defined by Hockey Canada (2003) as:

An individual defensive tactic designed to legally separate the puck carrier from the puck. This tactic is the result of a defensive player applying physical extension of the body toward the puck carrier moving in an opposite or parallel direction...and is not solely determined by the movement of the puck carrier.

Nearly every study points to body checking as the primary mechanism of injury (Emery, Hagel, Decloe, et al., 2010; Emery & Meeuwisse, 2006; Hagel, Marko, Dryden, et al., 2006;

¹ To be referred to as hockey from this point forward.

Macpherson, Rothman, & Howard, 2006; Warsh, Constantin, Howard, et al., 2009), yet efforts to remove body checking have been resisted by minor hockey administrations. Instead, Hockey Canada, hockey practitioners, and other hockey stakeholders have been in an ongoing debate about when to introduce body checking (Juhn, 2004; Juhn, Brolinso, Duffey, et al., 2002; Marchie & Cusimano, 2003; Robidoux & Trudel, 2006; Tetley, 2012).

In the 1970s, most minor hockey branches decided to delay the introduction until Peewee² (ages 12-13). In 2002, Hockey Canada made a controversial rule change and allowed interested branches to introduce body checking at the Atom level (ages 9-10). This was in response to those parents and administrators who argue that it is safer to introduce body checking when participants are younger, smaller and there is potentially less size/weight disparity (Harder, 2013; Riemer, Dorsch, Hoeber, & Karreman, 2006; Rutherford, 2008). It is also argued that by introducing body checking earlier, players will be better prepared for contact at more elite levels where body checking is more intense and arguably more dangerous (CBC News, 2013; Johnson, 2013). Hockey Québec was the first provincial branch to have taken the opposite approach in that body checking is delayed until Bantam (ages 13-14) to prevent the unnecessary risk of injury as long as possible. This approach is not without criticism, however, as some argue this hinders the development for Québec born players, ill-preparing them for national and international competition, while simultaneously putting youth at greater risk of injury once body checking is introduced. Nevertheless, Hockey Alberta, Hockey Nova Scotia, and most recently Hockey Canada, have all followed Québec's lead by delaying body checking until Bantam for safety reasons in 2013 (Hockey Canada AGM, 2013; The Canadian Press, 2013).

² At present, ages 11-12.

Despite repeated claims about body checking increasing the risk of injury it is unlikely that it will be completely removed from the sport for a host of historical, cultural and political reasons (Robidoux & Trudel, 2006). Instead the debate about the most appropriate age/level to introduce body checking rages on. Therefore, if body checking is to remain, it is not enough to simply understand injury rates, but to begin to understand how and why injuries are occurring, and why this debate continues to be the politically and culturally volatile one it is. Unfortunately, while previous research has done well to highlight the rate of injury in youth hockey, the methods used to document injury tell us very little about how youth are getting injured, the differences in injury when introducing body checking in Pee wee versus Bantam, and what these differences tell us about making an informed decision about body checking initiation. Additionally, with the removal of body checking from youth hockey doubtful, a greater understanding of the impact of the historical, cultural, and political factors on the construction of hockey's meanings and practices³—particularly with regards to issues of health and safety—is also needed. Hockey Canada's mission is to “lead, develop, and promote positive hockey experiences” in a safe playing environment (Hockey Canada, n.d.a), however, given the high incidence of injuries, is the health and safety of youth being compromised?

Statement of the Problem

Epidemiological based research has brought increased awareness to the issue of injury in youth minor hockey by documenting their frequency and severity (King & LeBlanc, 2006; Yard & Comstock, 2006). However, because of methodological limitations, effective injury prevention strategies that are systematic, mandatory, and implemented nationwide remain mostly absent (Cusimano, Nastis, & Zuccaro, 2013) as injuries remain

³ From this point forward practice refers to patterned behaviour unless otherwise indicated.

high (Emery et al, 2010). Given that the purpose of injury reporting is to gain valuable information about athletic injuries (Meeuwisse & Love, 1997; Rice, 2000), understanding *how* and *why* injury is happening *in situ* is an important step towards developing and implementing injury prevention strategies that can assist in managing the risks associated with minor hockey participation. However, this requires research that moves beyond the injury enumeration of conventional retrospective and prospective injury reporting as well as broadening injury definitions currently being used. If advancements are going to be made in understanding and preventing injury, an alternative approach that provides a more comprehensive injury reporting system is needed. Arguably, observational research designs are ideal for this task.

The aim of this research project is to provide a comparative contextual analysis of injury in two competitive Hockey Canada sanctioned minor hockey leagues with different policies regarding the introduction of body checking. The observational approach used in this study was needed in order to provide vital information about injuries *in situ* to assist hockey administrators make informed decisions concerning the health and safety of its participants. The second primary focus of this research was to offer critical readings of injury and body checking in Canadian minor hockey. Since removing body checking altogether from youth hockey is unlikely to happen in Canada because of a multitude of historical, cultural and political factors (Robidoux & Trudel, 2006), understanding the dominant and reverse discourses (Foucault, 1972, 1990) that frame injury prevention debates, particularly with regards to body checking, is essential if best practice initiatives are to be successfully implemented. Thus, research investigating discourse in minor hockey is significant from a theoretical perspective. Examining how cultural conservative and safety

discourses construct and shape hockey practices will shed light on Hockey Canada's position on issues of participant health and safety, body checking, and the impact these discourses have on policy implementation and change. This knowledge may be useful to injury prevention and socio-cultural researchers seeking to understand hockey's meanings and practices and to minor hockey administrators trying to enact policy change.

Accordingly, the specific research questions are as follows:

- 1) What are the situational factors and contextual details of injury in youth minor body checking hockey?
 - a. What type of injury predominates?
 - b. What were the leading causes?
- 2) What are the differences in injury between Peewee and Bantam Leagues?
- 3) At what age/level is the most appropriate for body checking initiation?
- 4) What are the parental perspectives on health and safety issues in minor hockey?
- 5) What is the impact of competing cultural conservative-safety discourses on the establishment of legitimate Canadian minor hockey meanings and practices, and the implementation of the rules and regulations that govern them? Specifically, what is the impact of these competing discourses in conjunction with the deep seeded emotional connection hockey stakeholders have with the game on the implementation of progressive injury prevention initiatives?

Ultimately, the goal of this study is to provide detailed information for minor hockey organizations to help inform the development of preventative measures aimed at reducing the prevalence and severity of injuries in youth body checking hockey.

Chapter Two

Literature Review

Current Injury Reporting Practices

To date hockey injury studies have been based on either retrospective secondary or prospective voluntary injury reporting. While the former uses secondary data collected by hospital emergency departments where the player visits a hospital and/or is recommended to visit emergency departments from team personnel or parents (e.g., Covassin, Swanik, & Sachs, 2003; King & LeBlanc, 2006; Yard & Comstock, 2006), the latter involves a group of researchers establishing an affiliation with a team(s) or an association(s), within or across leagues, that is monitored for one or more seasons where recorded injuries are voluntarily reported by players to team personnel. Here, injuries are documented by certified athletic trainers or physicians and reported directly to researchers (Dick, Agel, & Marshall, 2007; Meeuwisse, 1991; Stuart & Smith, 2000). The benefits and drawbacks of both approaches are discussed below.

The appeal of retrospective secondary reporting is that it is cost effective and typically contains large sample sizes. For example the Canadian Hospitals Injury Reporting and Prevention Program (CHIRPP) database collects information regarding what the person was doing at the time of injury, the mechanism or cause, where the injury happened (time and place), the contributing factors, and some demographic information of the patient, namely their age, and sex (Cusimano, Taback, McFaull, et al., 2011, Mackenzie & Pless, 1999; Meeuwisse & Love, 1997; Public Health Agency of Canada, 2009). In the United States, the National Electronic Injury Surveillance System (NEISS) functions in an analogous manner. Accessing these databases provides researchers with a large data set

where extensive statistical analysis can be conducted to examine the overall rate of injury requiring some form of hospital treatment. Despite containing limited details on the mechanism(s) of injury, anatomical location, or a physician diagnosis, this type of research has been useful for quantifying the frequency and types of injury that occur in hockey. As a result, studies using medical based reports have found that the frequency of injuries in youth hockey is alarmingly high (Caine, Maffulli, & Caine, 2008; King & LeBlanc, 2006; Yard & Comstock, 2006).

Conversely, prospective voluntary reporting has several advantages; it has stable operational terms and definitions, straightforward data collection methods, and can document injury more accurately because researchers are part of the reporting process. A well-designed prospective reporting system can provide important detailed information relating to mechanisms, risk factors, and characteristics of injury, (Darling et al., 2011; Emery et al., 2010; Smith, Stuart, Wiese-Bjornstal & Gunnon, 1997) whereas retrospective reporting cannot (Meeuwisse, 1991; Reid & Losek, 1999). Researchers using prospective designs have been able to better define mechanisms of injury (Smith et al., 1997), determine the on-ice locations of injury occurrences (Agel, Dompier, Dick, & Marshall, 2007), and determine whether or not they involved rule transgressions (Brust, Leonard, Pheley, & Roberts, 1992; Emery & Meeuwisse, 2006). For instance, player to player contact, specifically body checking, has been found to have a high correlation with hockey injuries (Agel et al., 2007; Marchie & Cusimano, 2003; Smith, et al., 1997; Willer, Kroetsch, Darling, Hutson, & Leddy, 2005; Yard & Comstock, 2006).

Unfortunately, using medical databases such as CHIRPP or NEISS have several limitations. To begin with, an injury must be severe enough to warrant medical attention

whereby a player must willfully visit a medical institution. Moreover, documented cases are restricted to acute self-reported injuries requiring emergency room visitations and only the most severe injuries are included in the data set (Emery et al., 2010; Hostetler, Xiang, & Smith, 2004; Yard & Comstock, 2006). Consequently, minor injuries are underrepresented—in particular injuries that are difficult to discern such as concussions (Williamson & Goodman, 2006)—while injuries that do not receive medical attention are not reported at all. Hospital reports generally contain limited descriptive information concerning the injury incident such as the nature of the activity (i.e. structured vs. unstructured), injury mechanism, the principal situational factors, protective equipment, and other contextual details (Yard & Comstock, 2006). Consequently, in a study using the NEISS, Yard and Comstock (2006) indicate that only 1.1% of all estimated injuries had enough detailed information to determine the mechanism of injury while only 6.9% of all estimated injuries had a corresponding anatomical location or physician diagnosis. Moreover, in reference to the NEISS database, Delaney (2004) indicates that "information about individual cases is descriptive, and injury estimates are not meant to imply that injuries were caused by a specific activity or product" (p. 81). Since the database does not record specific variables like body checking, these variables need to be teased out from the incomplete descriptions provided in the injury incident narratives (Hostetler, Xiang, & Smith, 2004). Without witnessing or reviewing video footage of the injury incident, secondary accounts are liable to recall bias (Emery, Meeuwisse, & McAllister, 2006) and the precision of the descriptive information can be questioned. Lastly, in general, researchers will divide the number of injured athletes by the number of total athletes registered in the particular activity of interest to obtain incidence rates (usually per 10 000

athletes or 10 000 participants) (Delaney, 2004; Delaney & Al-Kashmiri, 2005). Since medical data is not population based, accurate exposure estimates are difficult, if not impossible to calculate.

While prospective studies are moving beyond the limitations of retrospective designs, they too are limited. Specifically, players must voluntarily disclose an injury to team staff—who typically have an assortment of responsibilities during a game and may not actually witness the injury incident—before an injury can be documented and a report can be submitted to the research team (Emery et al., 2010; see also Emery & Meeuwisse, 2006; Emery, Meeuwisse, & Hartmann, 2005). This approach is problematic in a culture that encourages players to normalize pain, conceal injury, and keep playing as part of hockey participation experiences (Vaz, 1982; Yard & Comstock, 2006). This is especially evident in Canada and the United States where players play a rougher, more violent style compared to the more finesse game played by Europeans (Grossman & Hines, 1996). This arguably leads to the underreporting of minor injuries in North American hockey (Juhn et al., 2002; King & LeBlanc, 2006; Vaz, 1982; Yard & Comstock, 2006). Thus, relying on players to voluntarily disclose injury can be unreliable. If accurate injury frequency data is to be obtained involuntary reporting practices are needed: practices that can only be implemented through observational research. Moreover, disparities between studies are difficult to scrutinize since injuries are reported from team officials and are only later validated indirectly by physicians and/or researchers. Since few prospective studies involved firsthand accounts (i.e. direct observation of injury by researchers), they provide limited detailed descriptions about the injuries themselves and how they occurred. As a result, this information is difficult to assess without direct observation and comprehensive video recording of on-ice activity. In

short, despite the wealth of information procured through both retrospective secondary and prospective voluntary injury reporting, current research has mostly failed to advance knowledge of the nature, cause, and socio-cultural context of injury.

Defining Injury

From the existing literature, there are two approaches on how to define injury. In the first approach, many strictly quantitative studies draw from medical databases which documents injuries that require some form of medical treatment (Brown, Mascia, Kinnear, Lacroix, Feldman, Mulder, 2008; Hostetler, Xiang & Smith, 2004; Mölsä, Kujala & Myllynen, 2003; Smith, Stuart, Wiese-Bjornstal, & Gunnon, 1997; Tator, Provvidenza, Lapczak, Carson, & Raymond, 2004; Yard & Comstock, 2006). Using this approach does not account for misdiagnosed injuries, injuries not warranting medical attention, or injuries where medical treatment is not sought. Other proponents of the first approach argue that researchers must use a standardized, quantifiable, definition based on ‘time-loss’ from full sport participation (Orchard & Hoskins, 2007). A number of researchers carrying out prospective injury reporting practices use a similar definition to the one used in the National Collegiate Athletic Association Injury Surveillance System developed by Dick, Agel, and Marshall (2007):

- (1) occurred as a result of participation in an organized intercollegiate practice or competition and
- (2) required medical attention by a team certified athletic trainer or physician and
- (3) resulted in restriction of the student-athlete’s participation or performance for 1 or more calendar days beyond the day of injury. (p. 174).

Agel et al. (2007) effectively quantified injuries in hockey using this threefold definition. However, there are limitations to these traditional 'time-loss' definitions in that they are too narrow, having overly restrictive inclusion criteria; and in attempting to equate 'time-loss' with severity of injury, it causes difficulties because it is typically the players themselves who determine if they are fit to return to play.

Studies that define injury in terms of 'time-loss'—that is "the time between the original injury and return to participation at a level that would allow competition participation" (Dick, Agel, & Marshall, 2007, p. 175)—typically have strict inclusion thresholds where only injuries that restrict participation from training or competition for one or more days (24 hours) beyond the initial injury are documented and analyzed (Dick, Agel, & Marshall, 2007). This results in overlooking minor injuries or instances where an athlete returns to the same session (either a practice or game) in which they were injured (Biasca, Lorentzon, & Montag, 2000; Rice, 2000), along with a tendency to under-report the actual incidence of injury (Hodgson, Gissane, Gabbett, & King, 2007). In other words, injury implies cessation of participation in the current session *and* a complete nonparticipation in a subsequent session(s). With regards to attempting to equate 'time-loss' with injury severity, other factors such as pain tolerance, type of session to be missed, importance of the session, personality characteristics, parental influence, and motivation can impact the amount of time missed due to injury. The degree in which these factors are taken into account when an athlete decides to return to play will vary by individual. Additionally, Lindenfeld, Noyes, and Marshall (1988) point out that "using time as the only determinant for the result of an injury assumes that when the player has returned to participation the injury is fully healed" (p. S-78). This assumption is problematic as hockey players are notorious for returning

prematurely from injury and/or playing through pain and injury (Vaz, 1982; Yard & Comstock, 2006). Nevertheless, injury based on 'time-loss' is generally reliable and easily comparable between studies.

The second approach argues that injury definitions should be broader and more encompassing (Fuller, Molloy, Bagate, Bahr, et al., 2007). Initially, qualitative research approached injury from the standpoint of the normalization and acceptance of injured bodies through the adoption of the sport ethic (Charlesworth & Young, 2004; Donnelly, 2004; Howe, 2001; Hughes & Coakley, 1991; Johns, 2004; Nixon, 2004; Roderick, Waddington & Parker, 2000; Sabo, 2004; Young, 2004). However, the acceptance of pain and injury by following the sport ethic still furnishes a vague definition of what injury really is. In fact, until the first decade of the 21st century (Fuller et al., 2007), the documentation of how the sport ethic is adopted and perpetuated is more developed than the definition of injury itself. As Malcom (2006) states: "sociological research focusing on the sport ethic and reactions to injuries rarely defines what constitutes an injury" (p. 503). It is clear that there are difficulties adopting a pre-made standardized definition of injury. Still, by recognizing the limitations of 'time-loss' definitions used by traditional voluntary retrospective and prospective reporting practices, it becomes evident that a broader injury definition is required. By accounting for injuries that are known to be notoriously under-reported, namely minor or slight injuries (any physical complaint whether requiring medical attention, hospital visitation, 'time-loss' or not) and concussions, a more comprehensive understanding of the risk of injury in sport can be attained (Fuller et al., 2007). Therefore it is critical to move beyond definitions which either require athletes to seek medical attention (Dick, Agel, & Marshall, 2007; Stuart, Smith, Nieva, & Rock, 1995), miss the remainder of the session in

which they are injured (Brust et al., 1992; Emery et al., 2010; Emery & Meeuwisse, 2006), and/or miss subsequent participation time (Brust et al., 1992; Dick, Agel, & Marshall, 2007; Stuart et al., 1995). Dumas and Laforest (2009) move in the right direction by defining injury in their study on skateboarding as: “any accident that stopped the skaters from practicing, whether requiring first aid or not” (p. 23; see also Laforest & Dumas, 2003). This study provides a useful starting point, but at present, efforts to move beyond ‘time-loss’ have been inconsistent and sporadic while consensus on a broader injury definition in hockey has yet to be established. Unfortunately, there are surprisingly few studies that scrutinize this definitional framework let alone investigate injuries beyond ‘time-loss’ (Bernard, Trudel, Marcotte, & Boileau, 1993; Dumas & Laforest, 2009; Fuller et al., 2007; Twellaar, Verstappen, & Huson, 1996).

Quantifying Injury in Minor Hockey: How Injuries Occur

The chance of a player sustaining an injury depends on a multitude of extrinsic and intrinsic variables (Schiff, Caine, & O’Halloran, 2010) including playing position, practice versus game exposures, level of play, and the personal characteristics and predispositions of the player in question (Caine, Maffulli, Caine, 2008; Emery & Meeuwisse, 2006; Smith, Stuart, Wiese-Bjornstal, et al., 1997; Willer, Kroetsch, Darling, et al., 2005). The potential of injury depends on physical, behavioural, biomechanical, and equipment factors (Juhn, 2004; Juhn et al., 2002; Kissick, 2007; Sim, Simonet, Melton, & Lehn, 1987; Sim & Chao, 1978). More specifically, there are several mechanisms of injury that have been reported by scholars using quantitative approaches including ‘contact with the puck, stick, or ‘boards’ and ‘body checking’. The following sections will discuss the mechanisms of injury.

Contact with the puck, stick, or boards. No matter what physical condition a player is in, the impact of either a puck or stick at full speed can lead to serious injury. In a study of youth hockey by Stuart, Smith, Nieva, and Rock (1995), the authors explained that a puck moving at full speed has an impact force of 1, 251 pounds and a stick moving rotationally approaches speeds of 200 km/h. Of the total injuries documented by Agel et al. (2007), 6.4% resulted from contact with stick and 7.0% resulted in contact with puck. The injuries sustained by either stick or puck contact occur with less frequency than other mechanisms of injury; however, the velocities that sticks and pucks reach are dangerously high and can cause significant injury.

Contact with the boards is a significant mechanism of injury as well. Some of the most severe injuries occur because of contact with the boards. Indeed, Tator, Provvidenza, Lapczak, Carson, and Raymond (2004) indicate that between 1943 and 1999, 65.8% of all spinal cord injuries resulted from impact with the boards and hits from behind (although the number of major spinal cord injuries in Canadian hockey is decreasing) while Boyer⁴ (2010) found that in body checking hockey, the leading “mechanism of injury was the combination of player and board contact” (p. 54) which represented 38.8% of all injuries. Also, studies have shown that the smaller the ice surface, the greater the chance of injury (Watson, Nystrom, & Buckolz, 1997; Wennberg, 2005) because there is a greater chance of collisions between the boards and other players.

Body checking. Researchers have been able to prove that most injury in hockey occurs from body checking (Agel, Dompier, Dick, et al., 2007; Marchie & Cusimano, 2003). In fact, the most prevalent cause of injuries in youth hockey is explained in Smith, Stuart,

⁴ From the unpublished thesis of Charles Boyer who worked extensively during the first year (2009-10) of the larger research initiative.

Wiese-Bjornstal, and Gunnon's (1997) study where "collisions with other players (33.3%), the boards (39.6%), and the ice (11.1%) were the mechanisms attributed to 74.1% of high school injuries" (p. 505). Body contact has been at the focus of medical based reports and Agel et al. (2007) stated that 50% of injuries are caused by player-to-player contact.

Similarly, Marchie and Cusimano (2003) stated that body checking "the most common cause of trauma in hockey, accounts for 86% of all injuries among players 9–15 years old" (p. 124). Research has also demonstrated that players are more likely to be injured receiving a body check than by delivering one (Emery, McKay, Campbell, & Peters, 2009; Emery & Meeuwisse, 2006; Smith et al., 1997). This finding may imply that the players delivering a body check have not had sufficient training in how to properly deliver a check and what situation requires one while those receiving checks may not have sufficient experience in how to take checks and consequently are checked in vulnerable positions on the ice such as the around the boards (Agel et al., 2007; Smith et al., 1997; USA Hockey, 2011a; Stuart, 2011). The evidence indicates that the majority of injuries in youth hockey are attributed to some form of body contact and has prompted comparative studies investigating the differences between body checking and non-body checking leagues.

Accordingly, direct comparison between body checking and non-body checking leagues have shown that body checking puts players at a higher risk of injury (Emery, Kang, Shrier, et al., 2010; Hagel, Marko, Dryden, et al., 2006; Macpherson, Rothman & Howard, 2006; Régnier, Boileau, Marcotte, et al., 1989). Still, few studies have actually compared contact and non-contact leagues that play at the same competitive level. A study by Hagel, Marko, Dryden, et al. (2006) compared 28 Peewee teams in Ontario that implemented body checking and 21 non-body checking Peewee teams from Québec. Their results show a

drastic increase in injuries from the Ontario body checking leagues and call for the age of initiation to body checking be raised to that of Quebec's (13-14 years of age at the Bantam level instead of Peewee) (Hagel, Marko, Dryden, et al., 2006). However, the authors admit that the primary limitations to their studies were that they relied on hospital reports and were not able to get detailed injury information and other necessary qualitative data. Using the Canadian Hospital Injury Reporting and Prevention Program (CHIRPP), Macpherson, Rothman, and Howard (2006) obtained similar results when comparing injury data from Ontario and Québec. The authors report that of the total injuries documented, 63% occurred in Ontario (where checking was allowed at younger ages) and 37% in Québec (where body checking is delayed). As a result, the researchers concluded that players were more susceptible to injury when body checking is introduced at earlier ages.

There has been scholarly interest in differing body checking policies of Québec and Ontario and the impact of these policies on the incidence and severity of injury. An initial national survey on spinal injuries concluded that of all the spinal injuries sustained between 1976 and 1983 in Canada, 61.9% occurred in the province of Ontario while only 7.1% occurred in the province of Québec (Tator & Edmonds, 1984). However, Tator and Edmonds (1984) indicate that "the reasons for these differences are unknown, but this feature merits intense study of whether there are differences in play or organization between provinces" (p. 878). In a study only involving teams in Québec, Régnier et al. (1989) concluded that players of the Peewee body checking AA teams would have one fracture per 8.2 games; Peewee body checking CC teams would have one fracture per 22.5 games; and Peewee non-body checking CC teams would have one fracture per 263 games, indicating that there are more severe injuries in hockey played at the higher levels.

Further research investigating the rates of injury in different age groups by Emery and Meeuwisse (2006) found that there is not a significantly increased risk of body checking related injuries at the Pee wee level compared with Bantam in Alberta leagues. While there is some evidence that suggests that prior body checking experience slightly lowers injury rates in older age groups (Emery, Kang, Shrier, et al., 2011; Kukawadia, Warsh, Mihalik, & Pickett, 2010), the statistical significance is limited. It is noteworthy that Emery Kang, Shrier, et al (2011) speculate that these results could be "attributable to a 'survivor' effect and not to the protection conferred from bodychecking experience" (p.1255). That is to say, players who were injured in Alberta Pee wee body checking hockey leagues may have dropped-out and not registered to play in the Bantam leagues the researchers examined. As a matter of fact, the majority of studies indicate that there are no protective effects when introducing body checking at earlier ages levels (Emery, Kang, Shrier, et al., 2010; Hagel, Marko, Dryden, et al., 2006; Marchie & Cusimano, 2003; King & LeBlanc, 2006; Macpherson, Rothman, & Howard, 2006). These findings, combined with research indicating that as players progress in age level and competitive divisions they sustain more injury (Brust et al., 1992; Emery & Meeuwisse, 2006; King & LeBlanc, 2006; Marchie & Cusimano, 2003; Mölsä, Kujala, Myllynen, Torstila, & Airaksinen, 2003; Stuart, Smith, Nieva, et al., 1995; Willer et al., 2005), suggests that introducing body checking at earlier ages does not protect players from future injury as they progress through minor hockey and only prolongs their exposure to the risk of injury. Unfortunately, the introduction of body checking coincides with an increase in both the frequency and severity of injury.

Since the most common injury mechanism is body checking (Emery, Hagel, Decloe, et al., 2010; Emery & Meeuwisse, 2006; Hagel, Marko, Dryden, et al., 2006; Macpherson,

Rothman, & Howard, 2006; Warsh, Constantin, Howard, et al., 2009) and research data seems to clearly indicate that injuries are higher in body checking leagues compared to non-body checking leagues (Régnier, Boileau, Marcotte, et al., 1989; Emery, Kang, Shrier, et al., 2010; Macpherson, Rothman, & Howard, 2006; Warsh, Constantin, Howard, et al., 2009; Willer et al., 2005), there is a need to revise how and when governing bodies introduce body checking to youth players. This places checking research at the forefront and gives merit to studies that focus more intensely on comparing leagues with different ages of body checking initiation. This will enable researchers and policy makers to better understand the impact of the age of body checking initiation, how injuries are occurring and what, if anything can be done to decrease their frequency and severity.

The Rate of Injury

As previously noted, epidemiological studies, using medical based reports, have found that the frequency of injuries in youth hockey is alarmingly high (e.g., King & LeBlanc, 2006; Yard, Comstock, 2006). In fact, recent numbers show that there is a high frequency of injuries happening at young ages, suggesting that youth are particularly at risk (Emery & Meeuwisse, 2006). For example, in a systematic review of the injury research literature, of the 14 different youth (under the age of 15) sports and activities, hockey had the highest injury per hourly rate (Spinks & McClure, 2007). However, as previously noted, one limitation to the method of quantifying injuries through injury reports (using the criteria of 'time-loss') is that they often underreport specific types of injury (such as concussions) and others which do not require 'time-loss' (e.g., contusions). Consequently, the present study calculated game injury rates for the full duration of the season using a broader definition of injury.

Injury Type

Epidemiological research has been beneficial in reporting injury type and the corresponding anatomical location. Agel, Dompier, Dick and Marshall (2007) studied collegiate hockey for 16 years and classified five types of injuries occurring in games along with the percentage of injury occurrence within each classification. The authors reported the injury data: head/neck (15.4%), upper extremity (34.4%), trunk/back (14.3%), lower extremity (34.3%), and other/system (1.6%). Additionally, Smith, Stuart, Wiese-Bjornstal and Gunnon (1997) report similar results with high school hockey players (27 incidence of injury) despite classifying them differently using injury location; musculoskeletal or specific body parts and type of injury. The specific body locations documented for injuries were head (11.1%), chin (3.7%), shoulder (11.1%), arm/elbow (11.1%), wrist (3.7%), fingers (7.4%), chest/rib (7.4%), spine (7.4%), hip (11.1%), thigh/groin (11.1%), and knee (14.8%) (Smith et al., 1997). The types of injury Smith et al. (1997) documented were contusions (37%), sprains (22.2%), strains (14.8%), lacerations (11.1%), fractures (7.4%), dislocations (3.7%) and concussions (3.7%). Furthermore, Emery et al. (2010) indicate that recent studies show concussions are the most common specific injuries, “accounting for 15% of all injuries in 9-16-year-old players” (p. 2265). This data facilitated the formulation of an injury reporting protocol that was utilized for the *in situ* documentation of injury used for both the larger research initiative as well as the present study.

When and Where Injuries Occur

Agel, Dompier, Dick, and Marshall (2007) explain that most injuries to collegiate hockey players occur in the second (35.5%) and third periods (35.5%) of games (cf. Brust et al., 1992; Flik, Lyman, & Marx, 2005; Pinto, Kuhn, Greenfield, & Hawkins, 1999).

Additionally, Agel et al. (2007) indicate that the four most common areas where injuries occur are ‘between blueline and face-off circle’ (28%), in the ‘corner’ (23.5%), ‘neutral zone’ (21.4%), and ‘in front of goal’ (16%), though the authors do not indicate whether players were in the offensive or defensive zones at the time of injury. Lastly, Flik et al. (2005) found that almost 40% of all collegiate injuries occurred along the boards while an unpublished Master’s thesis by Boyer (2010) found that 63.5% of all injuries in minor Pee wee hockey occurred in areas associated with the boards, indicating that the areas surrounding the boards are particularly dangerous. This is particularly compelling in light of the recent evidence showing that most physical contact occurs along the boards in the offensive and defensive zones in both Pee wee body checking hockey in Alberta and Pee wee non-body checking hockey in Québec (Malenfant, Goulet, Nadeau, Hamel, & Emery, 2012).

Situational Factors and Contextual Details

Player size. In youth hockey, between the ages of 11-15, a high determinant of injury is the large anthropometric (height and weight) discrepancies of the athletes. In their study, Emery, Kang, Shrier, et al., (2010) contend “smaller player size was also a risk factor for all injuries. This may be owing to the contact mechanisms of injury reported in both cohorts and the size differential between players participating in these leagues” (p. 2270). Stuart et al. (1995) concluded that large physical differences between players at the Bantam level (ages 14-15 at the time of their study) are significant mechanisms of injury (see also American Academy of Pediatrics, 2000; Brust, Leonard, Pheley, et al., 1992). This means that players are at a high risk of injury during a critical phase of growth and development (Bernard, Trudel, Marcotte, & Boileau, 1993).

Conversely, Régnier et al. (1989) found “major morphological differences ... between players of the same age group (12 to 13 years)” (p. 92) at the Pee wee level. Roy, Bernard, Roy, Marcotte (1989) believe that size discrepancies in Pee wee hockey are too great to allow for body checking. In their study, the authors found major height, weight, and grip strength (which is a good indicator of a player’s overall strength) discrepancies between 8 of the smallest and 8 of the largest Pee wee players in body checking leagues in Quebec. In addition, Willer, Kroetsh, Darling, Hutson and Leddy (2005) documented spikes in injury rates at the 8-10 age group and 12-14 age group and concluded that the first spike was due to the introduction of body checking and the second spike was due to “a consequence of adolescence, that is, increased testosterone levels and concomitant aggressiveness” (p. 1662). Such increased testosterone levels in growth at this pubertal stage of development can lead to injury by the pure nature of increased levels of aggressiveness, and can create size differentials that ultimately lead to more injuries. In fact, Roy et al., (1989) contend that “height increases before weight and muscle strength at puberty” (p. 121) where “muscle strength allows the body to withstand a much greater impact than the bones and ligaments alone, thus preventing a fracture” (p.121). Moreover, Roy et al., (1989) point out that chronological age doesn’t necessarily correspond to physiologic age and that “large differences in the physiologic age of players and, consequently, in their anthropometric and biomechanical differences” (p.126) can increase the number of serious injuries (such as fractures) in Pee wee leagues that allow body checking. It’s important to note that the Canadian Hockey Association changed its age categories in 2001 starting in the 2002-03 season (CBC Sports, 2001). More specifically, the eligible ages for Pee wee players was lowered from 12-13 years old to 11-12 while Bantam saw a change from 14-15 to 13-14.

However, despite this change, large anthropometric differences in players at both the Peewee and Bantam level remain (American Academy of Pediatrics, 2000; Brust, Leonard, Pheley, et al., 1992; Emery, Kang, Shrier, et al., 2010; Emery & Meeuwisse, 2006; Stuart et al., 1995). Lastly, regardless of the size discrepancies found between players at both the Peewee and Bantam levels, it should be noted that Juhn et al. (2002) contend that there is not any credible or conclusive evidence that hockey injuries are the direct result of a larger player checking a smaller player. Accordingly, observational studies using both quantitative and qualitative data provide critical details about the body checking initiation debate that singular methodological paradigms cannot.

Illegal play. Numerous injuries in hockey occur because of aggressive collisions and the illegal acts of participants (Smith, Stuart, Colbenson, & Kronebusch, 2000). Aggressive and illegal plays which are especially hazardous are checking from behind, fighting, and violent stick use (Juhn et al., 2002). Legal body checking also seems to be linked to dirty play as Régnier et al. (1989) explained, “when body checking is allowed, a general increase in penalties seem to follow, particularly those of an aggressive or hostile nature, which are more likely to injure the opponent” (p. 97). According to Gilbert and Trudel (2000), 62.4% of all penalties are classified as minor aggressive (i.e. roughing, high-sticking, slashing, cross checking, elbowing, checking-from-behind, charging, and boarding), where the number of penalties assessed increased per period. Information on rule infractions is useful when used in conjunction with injury reports because the two are connected, as injury often occurs from body checking and illegal acts (Kissick, 2007). However, Boyer (2010) observed that areas on the ice that were highly injurious are associated with a lower frequency of penalties called. This suggests that rules and regulations may not be protecting

players from injury as players are injured more often on legal plays than illegal ones. In fact, Sutherland, (1976) found that “of the game injuries in high school hockey, 29.09% were associated with penalties” (p.266). Recent youth hockey injury studies have also substantiated the findings noted by Sutherland (1976), indentifying that a high number of injuries are occurring on legal hockey plays (Emery & Meeuwisse, 2006; Pinto et al., 1999; Reid & Losek, 1999; Stuart et al., 1995; cf. Brust et al., 1992).

Violence and aggression. The use of intimidation, which is associated with aggressiveness, can lead to injury as it can be considered a form of dirty play, where body checking could be a signifier of malicious intentions (e.g., aggressive body checking vs. assertive and body checking). Additionally, parents, peers, coaches, and referees play a role in transmitting certain values that perpetuate an environment that is conducive to violence, aggressive play, and rule violation (Bernard & Trudel, 2004). Previous research indicates that there is a link between aggression, violence, and injury in boys minor hockey (Colburn, 1986; Marchie & Cusimano, 2003; Smith, 1974). Moreover, the literature concerning body checking indicates that it does not provide an outlet for the reduction of aggression. In fact, the opposite is true; body checking leads to increased levels of aggression and illegitimate acts (Kissick, 2007). As injury often occurs from body checking and illegal acts (e.g., stick fouls), hockey’s culture may contribute to its own predicament as “illegitimate tactics and violence are considered technical skills for achieving team success and are taught accordingly. The difference between legal and illegal acts is blurred at a very early age even in non-competitive levels of hockey” (Kissick, 2007, p. 3). These rule violations and illegitimate tactics are present at all levels of hockey (Kissick, 2007) as violence and hyper-aggression are legitimized by players and coaches (Weinstein, Smith, & Wiesenthal, 1995).

In fact, levels of violence, more than playing or skating proficiency lead to greater perceptions of hockey competence by teammates and coaches alike (Weinstein et al., 1995).

However, violence and aggression doesn't come naturally to sport participants. Even though Kissick (2007) reported that the legitimization of aggression, violence, and rule violation occurs at a very early age, this type of behaviour must still be learned and socialized (Colburn, 1986; Smith, 1974; Vaz, 1978, 1982). Messner (1990) describes how athletes he has interviewed recall their early experiences with football violence (hitting) as a trying time. This is because most athletes are bothered by the fact they have to hit and hurt other people. They have to learn to utilize aggression and violence to achieve a goal and to see it as inevitable, necessary, and a desirable 'part of the game'. As Messner (1990) points out "the weight of evidence supports the contention that most males are not comfortable committing acts of violence: violent behavior is learned behavior, and some men learn it better than others" (p. 205). Only once sporting participants, especially males, are socialized into participating in violence and aggression as part of its rule-bound structure are they viewed as "[...] legitimate, natural, and even 'safe' in a psychological sense" (Messner, 1990, p. 208-209).

Recently, professional leagues have seen a rash of incidents which has left players with severe injuries such as concussions. This has led to the perception that minor hockey is played in the same reckless manner. However, studies have concluded that significant amount of injuries occurred on plays which were deemed legal by on-ice officials (Emery & Meeuwisse, 2006; Pinto et al., 1999; Reid & Losek, 1999; Stuart et al., 1995; Sutherland, 1976; cf. Brust et al., 1992). Thus, we may need to rethink both the role of aggression and

violence at the Pee wee and Bantam levels and the manner in which the game is being played, including how the formal rules of hockey are being interpreted and enforced.

While traditional injury reporting practices provide extensive amounts of data regarding injury frequency and severity (King & LeBlanc, 2006; Yard & Comstock, 2006), they are limited because of (a) their reliance on second hand injury data from medical databases; (b) requiring players to willfully disclose injury; and (c) utilizing narrow definitions of injury. To overcome these limitations, this project outlined and utilized a mixed methods approach based primarily on observational techniques. The methods used to recruit, assess, and analyze injury in body checking hockey when it is first introduced to youth players is outlined in the next chapter.

Chapter Three

Methodology and Research Design

The Larger Research Initiative

This study is part of a larger 3 year project involving the investigation of injury in competitive boys and girls minor hockey in the provinces of Ontario and Québec. The project used a mixed methods approach with an observational component to examine the situational factors and contextual details of injury. However, the nature of observational designs demands the utilization of vast human resources and considerable time requirements. This makes it unlikely that a single researcher can collect all incidences of injury from multiple locations, often times simultaneously. This is particularly true when the study involves a comparative component. Accordingly, the project as a whole consisted of a team of researchers who were involved in the collection and analysis of data over a three year period. This approach to data collection has been used successfully in the past when observational methods were implemented (Dumas & Laforest, 2009; Laforest & Dumas, 2003).

The first phase or year one of the project involved the comparison of two boys and one girls' Peewee team (ages 11-12) from the Ottawa-Gatineau region. The primary point of comparison was examining differences in injury between body checking (Ontario boys) and non-body checking (Québec boys and Ontario girls) hockey. The second phase (year two) consisted of observing and assessing injury and the culture and environment of competitive girls' hockey in Ontario. Lastly, the third phase (year three) investigated the situational factors and contextual details of boys body checking hockey at the age/level of body checking initiation by comparing a Peewee team from Ontario and a Bantam (ages 13-14)

team from Québec. A table summarizing the data collection phases of the larger research initiative is provided at the end of this subsection (see *Table 1*). The research presented in this thesis stems from phase one and three of the larger research initiative, specifically the boys body checking hockey data (Ontario Peewee and Québec Bantam), where I was involved in all stages of data collection and analysis. In both years I took a leading role in acquiring ethics approval, team recruitment, videotaping game-play, writing field notes, filling in observation grids, and conducting interviews with parents, coaches, and trainers. I was also actively involved in creating injury databases and performing extensive descriptive analysis.

Table 1. Data Collection Phases

Summary of Larger Research Initiative's Data collection Phases

Phase	Year	Purpose	Teams
1: Body checking vs. Non-Body checking	2009-10	Does body checking hockey have higher injury rates?	Boys Minor Peewee AA (Ontario, ODMHA); Boys Peewee BB (Québec, AHMH); Girls Peewee BB (Ontario, ³ OGHA)
2: Non-body checking	2009-10 & 2010-11	Injury rates; analysis of girls hockey culture and environment	Girls Peewee BB (Ontario, OGHA)
3: Body checking	2011-12	Does Peewee have higher injury rates than Bantam?	Boys Peewee AA (Ontario, ODMHA); Boys Bantam BB (Québec, AHMH)

³Ottawa Girls Hockey League (OGHA), part of the Ottawa District Women's Hockey Association

The Project

Research indicates that body checking is the primary mechanism of injury in youth hockey (Emery, Hagel, Decloe, & Carly, 2010; Hagel, et al., 2006; Macpherson, Rothman, & Howard, 2006; Warsh, Constantin, Howard, & Macpherson, 2009) and as players advance in age levels they sustain more injury (Brust, Leonard, Pheley, et al., 1992; Emery & Meeuwisse, 2006; King & LeBlanc, 2006; Stuart, Smith, Nieva, et al., 1995; Willer, Kroetsch, Darling, Hutson, & Leddy, 2005). However, questions remain about when is the optimal age to introduce body checking.

Injury prevention researchers advocate the use of prospective cohort designs (Fuller, Molloy, Bagate, et al., 2007), particularly with an observational component (Stuart, Smith, Nieva, et al., 1995; Twellaar, Verstappen, & Huson, 1996), to complement larger quantitative studies by providing detailed injury information. However, few studies make use of observational methods while using a more holistic injury definition to document important instances where a player is temporarily incapacitated and clearly in discomfort (Bernard, Trudel, Marcotte, et al. 1993; Dumas, & Laforest, 2009), but are able to continue to participate in the current practice or game. Furthermore, while epidemiological and medical approaches are able to effectively quantify injury (King & LeBlanc, 2006; Yard & Comstock, 2006), they require more qualitative details. In addition to on ice behaviours, injury in hockey must be understood in its larger socio-cultural context. This project consists of two studies and employs a mixed methods approach to respond to the multidisciplinary questions being asked. Accordingly, the first study compared injury in competitive boys' body checking hockey from both Ontario Peewee body checking teams from phase 1 (2009-10) and phase 3 (2011-12) with the Québec Bantam body checking team from phase 3

(2011-12). The second study examined the impact of competing discourses on hockey meanings, practices, and governance. Additionally, local parental perspectives on youth health and safety were also examined. The University of Ottawa Research Ethics Board approved all phases of the research initiative including this project (*Appendix A*). Study I and II are discussed in the following sections.

Study I

The first study consisted of documenting all aspects of game-play where a team of researchers and volunteer research assistants attended league games, observed the action, and spoke with people to assist in understanding what was documented. The researchers also videotaped all observed league games, filled out observation grids, and collected *Post-Game Injury Assessments* from team trainers to: a) record all on-ice behaviour that leads to injury or potential injury; and b) enumerate injuries as they occur *in situ*. More specifically, the objective of the first study was to compare leagues that introduce body checking at different age levels by observing and analyzing league play by observing three different teams playing in two separate leagues to understand differences in injury as a result of delaying body checking or introducing it earlier.

Preseason. The training and coaching staff were contacted prior to the start of the regular season in order to ascertain the medical status of each player. A preseason medical screening questionnaire or diagnosis was not administered (i.e. no physical baseline was established) by certified medical personnel to the players. However, no preseason injury, hockey related or otherwise, was indicated by the participating teams' trainers or coaches. Moreover, Smith, Stuart, & Wiese-Bjornstal & Gunnon (1997) contend that "neither

previous injuries, present injuries, musculoskeletal abnormalities, nor medical problems significantly predicted season injuries” (p.505; cf. Emery et al., 2010).

Season: research team tasks. Following three separate youth hockey teams playing in the Ottawa-Gatineau regions, a team of researchers observed and videotaped all facets of the on-ice play accompanied by extensive field notation and the completion of observation grids. Only games were attended and observed because the scholarly literature has shown that hockey players are injured significantly more often during games than during practices (Emery & Hagel, 2010; Flik et al., 2005; Pinto et al., 1999; Smith et al., 1997; Stuart, Smith, & Nieva, 1995; Stuart & Smith, 1995; Stuart, 2011; Willer et al., 2005). In order to carry out the extensive observational component for this research, a three person research team comprised of graduate and undergraduate students from the University of Ottawa was assembled. Previous observational studies have successfully used, and trained research teams (Bernard, Trudel, Marcotte, et al., 1993; Brust, Leonard, Pheley, et al., 1992; Dumas & Laforest, 2009; Laforest & Dumas, 2003). Research assistant training for this study consisted of emailing observation grids a head of time to familiarize themselves with them. Prior to the start of their first game, RAs were shown how to fill out the observation grids and record field notes via a demonstration by a lead researcher. Next the researchers demonstrated how the camera worked and what the expectations were (e.g. stop recording in between whistles unless something of particular interest was occur such as a skirmish in front of the net). The vast majority of field notes and observation grids were recorded by the lead researchers; however, as the season progressed and RAs were more familiar with research protocols, they filled out more observation grids and field notes. The injury

reporting procedure, data collection methods, participants, injury definition, and data analysis are outlined in the following sections.

Injury identification and reporting. After discussions with the two Hockey Associations, parents, and team personnel, injury reporting was done through the team trainer who is responsible for monitoring player injury. For this reason, injury reporting consisted of players self-reporting any injury sustained during games to the team trainer and/or the trainer approaching any player who was involved in either an injurious or potentially injurious situation. This was followed by the researchers carrying out a short debrief with the coach and trainer immediately after the game to understand what transpired and to confirm if an injury did or did not occur. The researchers also approached coaches and trainers after games when a player was identified by a member(s) of the research team as being in physical discomfort, missed playing time, or involved in a potentially injurious situation or to ask questions pertaining to any situation observed during the game. In this way, the study moves beyond voluntary injury reporting by including an involuntary injury identification or 'involuntary reporting' component.

Observation grids. The observation grids were informed by previous research to help monitor injury during the action (*Appendix B*). All members of the research team were trained by the lead researchers on how to document injury using this method. The grids included both injury mechanisms and a modified version of Adversary Interactions and Nonconformity with the Rules (AINR) to assess whether the play consisted of an instrumental transgression or an instrumental non-transgression of the formal rules of hockey tied to game play (Brunelle, Goulet, & Arguin, 2005). The injury mechanisms included on the observation grids are: contact with another player (Agel et al., 2007;

Marchie & Cusimano, 2003), contact with stick or puck (Agel et al., 2007; Stuart et al., 1995), contact with ice (Smith et al., 1997), and contact with boards (Boden & Jarvis, 2008; Juhn et al., 2002). The observation grids were filled out by researchers when a player was involved in an incident consistent with the injury definition (see *injury defined* section).

Post-game injury assessment. When players were identified as missing at least one period of game-play (a minimum of 15 minutes), trainers were asked to fill out a *Post-Game Injury Assessment* (PGIA)—informed by Dick et al. (2007), Gilbert and Trudel (2000), and Smith et al. (1997)—at the conclusion of the game in which the injury occurred so that more detailed information was available. The PGIA is similar to the Injury Surveillance Sheet (ISS) developed by Dick et al. (2007) for the NCAA Injury Surveillance System. The PGIA is simplified and included this study's unique assessment criteria where it was only filled out if a player missed a minimum of one period of play or 15 minutes of play. The PGIA consists of the classification of injury by 'musculoskeletal or specific body part injured' and 'less specific' body part injured along with a physician diagnosis to categorize injuries (Smith et al., 1997). The associated anatomical location that characterized specific body parts included the knee, thigh or groin, shoulder, hip, arm/elbow, head, spine, chest/rib, fingers, chin, and wrist while less specific injury types/diagnosis included contusion, sprain, strain, laceration, fracture, dislocation, and concussion (Smith et al., 1997). Additionally, the PGIA included a breakdown of well-defined areas of a rink developed by Gilbert and Trudel (2000) to map out where the injury occurred as well as categories found on the observation grids (e.g. situational factors, transgressions, penalty called, period, etc.) (*Appendix C*). The assessment took about 5 to 10 minutes and was intentionally short to avoid being overly inconvenient for children and parents wanting to leave promptly after games. The intention

was to simply gain a quick and accurate assessment of the nature, cause, and severity of the injury.

Video recording system and analysis. To complement field observations, a video recording system was set-up prior to the start of play. To capture the majority of the ice surface, one or two cameras were positioned at the opposite ends of the rink or in another location that provided the most coverage, thereby minimizing blind spots. The video footage was then downloaded into *Final Cut Pro Editing Software*[®] where all injuries were subjected to a frame-by-frame analysis (e.g. slow motion, zooming in, multiple viewings) to establish their nature and cause. Since researchers Parkkari, Kujala, and Kannus (2001) point out that "careful video analysis of the mechanisms of sports injuries would likely reveal new ways to decrease the number of injuries" (p. 993), the ability to use video to analyze each injury incident is vital for a comprehensive reporting system. Moreover, video has been successfully used in recent studies to analyze physical contact and concussions (Hutchison, Comper, Meeuwisse, & Echemendia, 2013; Malenfant et al., 2012). Each game-tape was reviewed by researchers to ensure that all injuries were documented and to ensure the accuracy of each injurious event. By reviewing the video with multiple observers, bias from initial injury reports could be eliminated while also verifying and substantiating what has been documented. Every second week during the study, the research group would meet to go over game footage, compare field notes, discuss any methodological issues, and any aspect of the project requiring clarification or emphasis. Data collection ended at the conclusion of the hockey season for all three teams.

Participants. In order to meet the aims of this study, we needed data from two competitive body checking leagues that introduce body checking at different age levels.

Additionally, teams needed to be located in close proximity to the researchers' institution for the feasibility of having researchers attend all games. Since the researchers were situated in the Ottawa-Gatineau region, it was possible for a direct comparison of teams from two provinces with different body checking policies. In Ontario, body checking is introduced at the Pee wee level (ages 11-12) whereas, in Québec, body checking is delayed until Bantam (ages 13-14). These demographics were also chosen since male participation rates have a tendency to decline after the Pee wee level (Hockey Canada, 2006; MacGregor, 2012; Mirtle, 2012; Winton Sarvis, 2013). Accordingly, over the course of the 2009-10 season, 25 Minor Pee wee AA games were observed (732 athletic exposures and 1200 playing minutes). In the 2011-2012 hockey season 62 games were observed; 33 games⁵ from Minor Pee wee AA (1116 athletic exposures and 1728 playing minutes) and 29 games from Bantam BB (825 AE and 1392 playing minutes). All teams consisted of 12-17 skating players, between the ages of 11 to 14; no injury data was collected for goalies. All games were 48 minutes in length. Since important questions are still being raised by hockey practitioners and academics concerning when the best time to introduce body checking to youth participants, this group provided an excellent opportunity to compare injury data between teams with similar competitive levels but in leagues with different ages of body checking initiation.

Team recruitment. Recruitment was managed under the guidance of Hockey Canada, l' Association de Hockey Mineur de Hull (A.H.M.H.) and the Ottawa District Minor Hockey Association (O.D.M.H.A.) in the Gatineau and Ottawa regions respectively. The hockey associations were first contacted explaining what the study involved and about their potential involvement in the study. The associations then contacted and directed the

⁵ Three (3) games were not directly observed, however both injury data and athletic exposures were available bringing the total number of games with injury data in Minor Pee wee AA (2011-12) to 36.

researchers to teams and coaches who were interested in participating in the study. The researchers then provided team managers and coaches of teams that were identified as possible participants with detailed letters outlining the study and requesting their participation (*Appendix D*). Communication was both through email and telephone. For the teams that expressed interest in the study, a meeting was held with team officials, parents, and players following a practice of their convenience. At that time it was explained what was involved in the study, what participation would consist of, the benefits of the study, potential risks, and the proposed outcomes. Each organization that was approached participated in the study; therefore, there was no selection bias. Informed consent was then obtained following this initial meeting.

Obtaining consent. Informed consent was sought following the initial team meeting that was held between the researchers and the interested team personnel and parents. Two levels of consent were sought: 1) from the associations indicating that they were aware and in support of the study (*Appendix E*) and; 2) from the parents, coaches, and trainers involved in the study. Informed consent forms were provided to team officials and parents while the players were given 'youth assent forms' (*Appendix E*).

Injury defined. In this study injury is defined as 'any physical trauma that has occurred as a result of participation in an organized competition whereby a player: (1) is in discomfort; (2) missed playing time but returned to the current game; (3) missed playing time and did not return to the current game; (4) missed subsequent game(s)'. The classifications of 'discomfort' and 'missed time' were built around previous observational studies (Bernard, Trudel, Marcotte, et al., 1993; Dumas & Laforest, 2009; Laforest & Dumas, 2003; Meeuwisse, Sellmer, & Hagel, 2003; see also Boyer, 2010). With regards to

the first two components of our injury definition, a player is in discomfort when a player is clearly in distress but finishes their shift and does not miss any playing time regardless if medical attention from a team certified athletic trainer or physician was given or not. For a player to be categorized as missing playing time the player in question must immediately leave the ice thereby interrupting the player's shift or the play is stopped because of injury (not including instances where the play was blown dead by stoppages of play other than the presence of an injured player) or a subsequent shift(s) is missed. Lastly, the total number of games a player missed was calculated from discussions with trainers and coaches and confirmed with game sheets and video review. This definition was able to accurately and reliably account for more minor injuries and instances where a player is temporarily incapacitated and clearly in discomfort (Bernard et al., 1993; Dumas & Laforest, 2009) by combining the characteristics of traditional 'time-loss' definitions with the broader scope of an 'all encompassing' framework.

Data analysis. The rate of injury was compared by way of Athletic Exposures (AE), which is defined as one player participating in one practice or competition where they are exposed to the possibility of injury (Dick, Agel, & Marshall, 2007) regardless of the amount of playing time. The number of injuries for each team was divided by the number of AE for that particular team which is informed by previous studies (Agel, Dompier, Dick, et al., 2007; Powell & Barber-Foss, 1999). Each individual injury was considered as an independent event and non-hockey related injuries were excluded from the analysis. With the assistance of research team member Dr. Michael Spivok, descriptive cross tabulation analyses were performed followed by binary logistic regressions to compare the odds of injury between Peewee and Bantam leagues and identify whether mechanisms of injury

influenced these odds. Injury per athletic exposure was modeled as the dependant variable (as a dichotomous outcome of Yes/No) with league, mechanism of injury and the presence of other situational factors as independent predictors. All statistical analyses were performed using *Statistical Package for Social Sciences, version 20.0* (IBM Armonk, NY). Due to a limited number of incidents that required the team trainer to complete a *PGIA* during the second year of examining boys' hockey, they were not used in the analysis for this study⁶.

Study II

The second study consisted of utilizing secondary sources (scholarly literature and news media) to understand the resistance to efforts at reducing the risk of injury and to making the sport safer for youth. These secondary sources were supplemented by both informal and formal qualitative interviews with local hockey stakeholders to understand their perspectives on injury, hockey culture, and the current direction of Hockey Canada concerning health and safety initiatives. These stakeholders included the parents, trainers, and coaches of the teams observed throughout the study. Rather than using the interviews as part of a detailed analysis of parental discourse, the interviews served as a means to assess how parents are responding to wider public discourse concerning preserving 'Canadian' hockey culture and tradition versus prioritizing player safety and how parents are negotiating this. The objective of the second study then was to understand the tension, emotionality, and ambivalence surrounding the body checking debate through the theoretical lens of discourse (Foucault, 1972, 1990) and their impact on minor hockey meanings, practices, and governance.

⁶ Eleven *PGIA* were filled out in Ontario Peewee in 2009-10 while only seven were filled out in 2011-12 for both Ontario Peewee and Québec Bantam leagues.

Issue focused semi-structured interviews. The development of novel definitional frameworks is aided by the use of qualitative data and interviews are an effective way of unearthing what people think, how they behave, and how they view their surroundings. In-depth interviews give participants the opportunity to "explain their answers or give examples or describe their experiences" (Rubin & Rubin, 2005, p. 2-3). Additionally, qualitative interviews can overcome the poor response rates typically associated with survey research, provide greater depth, and insure that respondents answer all the questions (Austin, 1981; Barriball & While, 1994). Accordingly, this study used issue focused semi-structured interviews (Weiss, 1994) to overcome the limitations of unstructured and structured approaches. With unstructured interviews researchers are only able to gain a general idea about a particular social phenomenon (Rubin & Rubin, 1995, 2005) while the rigid configuration of structured interviews generally restricts the range of responses available to interviewees. Additionally, structured interviews restrict the flexibility of the interviewer to make adjustments (Fontana & Fey, 2005).

Recruitment. The head coaches of the teams involved in phase 3 of the project were contacted about the opportunity to interview parents and members of the coaching staff. It was determined that the best way to approach parents and team personnel was to send an initial recruitment email followed by an in-person meeting prior to a practice or game. Accordingly, participants were recruited by the lead researchers via email followed by a meeting with the parents, trainers, and coaching staff. Prior to a game the researchers reiterated the purpose of the project and how the interviews would complement the observational component of the study followed by distributing the researcher's contact information. A follow up email for those who didn't attend was sent out to ensure all parents

and coaches were made aware of this part of the study. Email and telephone correspondence were used to set up interviews with those individuals who showed interest in participating. The interviews were conducted in both English and French depending on the preference of the interviewee. The dates, times, and locations for interviews were mutually agreed upon and were often during practice hours or prior to games. Some were conducted in meeting rooms or other locations within arenas and others were conducted in coffee shops. Using an interview guide, interviews were carried out by the lead researchers either in tandem with other members of the research team or solo (*Appendix F*). All interviews were anonymous and voluntary, voice recorded, and transcribed verbatim by the lead researchers.

Participants and data analysis. There were a total of 10 parental interviews from the Ontario Minor Peewee AA (2011-12) and 6 interviews from the Québec Bantam BB team (2011-12). All interviewees were affiliated with the organizations in some manner whether they were a member of the team personnel or parents whose child played on the team. Analysis, in accordance with Weiss (1994), consisted of an issue focused approach. The aim of issue focused analysis is to understand "what could be learned about specific issues—or events or processes—from any and all respondents. Some respondents might contribute more to the analysis, others less" (Weiss, 1994, p. 154). Accordingly, only the issues relating specifically to: 1) definitions of injury; 2) body checking; 3) hockey culture; 4) hyper-competitiveness and professionalization; 5) Hockey Canada; and 6) other issues of health and safety; were transcribed.

Informal interviews. Over the course of the first phase (2009-10) of the project, informal interviews were conducted with parents associated with a Minor Peewee AA team playing body checking hockey in Ontario and a non-body checking Peewee BB team in

Québec. The discussions were recorded via field notation. A total of 13 parents from Ontario participated in informal interviews while 6 parents from Québec agreed to participate in these informal discussions (*Appendix F*). Analysis was also issued focused and in accordance with Weiss (1994).

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Part II: Articles

Article One

Running head: INJURY REPORTING IN YOUTH HOCKEY

Injury Reporting in Youth Hockey: Moving Towards Injury Prevention

Stephen Adams

University of Ottawa

Charles Boyer

Children's Hospital of Eastern Ontario

Matthew E. Davey and Mitchell Green

University of Ottawa

Michael Spivock

Canadian Forces Morale and Welfare Services

Michael A. Robidoux

University of Ottawa

Author Note

Stephen Adams, Matthew E. Davey, Mitchell Green, and Michael A. Robidoux, School of Human Kinetics, Research Centre for Sport in Canadian Society, University of Ottawa; Charles Boyer, Healthy Active Living and Obesity Research Group, Children's Hospital of Eastern Ontario; Michael Spivock, Directorate of Fitness, Canadian Forces Morale and Welfare Services.

This research was partially funded by the Research Centre for Sport in Canadian Society.

Abstract

Despite the wealth of information procured through both retrospective secondary and prospective voluntary injury reporting in ice hockey, inconsistencies of injury reporting and limitations of operational definitions limits our understanding of injury. Assessing the contextual details and situational factors surrounding injury requires moving beyond traditional injury reporting along with broadening injury definitions currently being used. The objective of this paper is to outline a methodology that can be used to document how and why injury is occurring in youth hockey to move towards more effective injury prevention. The authors advocate the application of observational designs which define injury as ‘any physical trauma that has occurred as a result of participation in an organized competition’ including four categories of injury severity.

Keywords: Injury Prevention, Injury Reporting, Observation, Ice Hockey

Injury Reporting in Youth Hockey: Moving Towards Injury Prevention

Injury in contact sport is gaining increased public attention (Caine, Maffulli, & Caine, 2008; Cook, Cusimano, Tator, & Chipman, 2003; Cusimano et al., 2011) and in response there has been a great deal of research documenting the frequency and severity of injury (King & LeBlanc, 2006; Yard & Comstock, 2006). Epidemiological research has brought awareness to the issue of injury in ice hockeyⁱ, however, because of methodological limitations, effective injury prevention strategies that are systematic, mandatory, and implemented nationwide remain mostly absent (Cusimano, Nastis, & Zuccaro, 2013) as injuries remain high (Emery et al, 2010). The aim of injury reporting is to gain valuable information about athletic injuries and to develop and implement intervention strategies that can aid in managing the risks associated with athletic participation (Meeuwisse & Love, 1997; Rice, 2000). If advancements are going to be made in understanding and preventing injury, researchers must move beyond basic injury enumeration and begin critically examining *how* and *why* injuries are occurring *in situ*. This paper will discuss the limitations of traditional reporting practices and offer an alternative injury reporting system that provides a more comprehensive understanding of injury frequency and the contextual factors surrounding them. Utilizing this methodological approach not only exposes the limitations of traditional injury reporting practices but forces researchers to rethink the very definition of injury. The objective of this paper is to outline a definition and method that can be used to document how and why injury is occurring in youth minor hockey to move beyond injury reporting and move towards more effective injury prevention.

ⁱ To be referred to as hockey from this point forward.

Current Injury Reporting Practices

To date hockey injury studies have been based on retrospective secondary reporting. This method of researching injury uses secondary data collected by hospital emergency departments. The injury information in emergency department databases relies on self-reported injuries, where the player willfully visits a hospital and/or is recommended to visit emergency departments from coaches, team trainers, or parents as a result of injury. In this case, injuries must be severe enough to warrant a trip to the hospital, while offering little in the way of how the injuries occurred. For example the Canadian Hospitals Injury Reporting and Prevention Program (CHIRPP) database collects information regarding what the person was doing at the time of injury, the mechanism or cause, where the injury happened (time and place), the contributing factors, and some demographic information of the patient, namely their age, and sex (Cusimano et al., 2011, Mackenzie & Pless, 1999; Meeuwisse & Love, 1997; Public Health Agency of Canada, 2009). In the United States, the National Electronic Injury Surveillance System (NEISS) functions in an analogous manner. Accessing these databases provides researchers with a large data set where extensive statistical analysis can be conducted to examine the overall rate of injury requiring some form of hospital treatment. As a result, studies using medical based reports have found that the frequency of injuries in youth hockey is alarmingly high. In fact, studies in youth hockey between 1990 and 2003, show that, "ice hockey accounted for an estimated 172 128 injuries" (Yard & Comstock, 2006, p. 444) in the United States alone. Moreover, emergency departments in Ontario, Canada estimate that they treated "more than 3000 children 16 years of age and younger" (King & LeBlanc, 2006, p. 163) in 2002/2003. Concussions in particular have become problematic as Covassin, Swanik, and Sachs (2003) noted that "20%

of all elite ice hockey players will sustain at least one concussion during their entire hockey career" (p. 14).

The appeal of retrospective injury reporting is its cost effectiveness and ability to work with large sample sizes, however, using medical databases such as CHIRPP or NEISS have several limitations. To begin with, documented cases are restricted to acute self-reported injuries requiring emergency room visitations and only the most severe injuries are included in the data set (Emery et al., 2010; Hostetler, Xiang, & Smith, 2004; Yard & Comstock, 2006). Since only the most severe injuries are documented minor injuries are underrepresented while injuries that do not receive medical attention are not reported at all, in particular concussions (Williamson & Goodman, 2006). Hospital reports generally contain limited descriptive information concerning the injury incident such as the nature of the activity (i.e. structured vs. unstructured), injury mechanism, the principal situational factors, protective equipment, and other contextual details (Yard & Comstock, 2006). Consequently, in a study using the NEISS, Yard and Comstock (2006) indicate that only 1.1% of all estimated injuries had enough detailed information to determine the mechanism of injury while only 6.9% of all estimated injuries had a corresponding anatomical location or physician diagnosis. Moreover, in reference to the NEISS database, Delaney (2004) indicates that "information about individual cases is descriptive, and injury estimates are not meant to imply that injuries were caused by a specific activity or product" (p. 81). Consequently, since the database does not record specific variables like body checking, these variables need to be teased out from the incomplete descriptions provided in the injury incident narratives (Hostetler et al., 2004). Without researchers witnessing injuries, taking detailed field notes, or reviewing video footage of injury incidents, secondary accounts are

liable to recall bias (Emery, Meeuwisse, & McAllister, 2006) and the precision of the descriptive information can be questioned. Lastly, in general, researchers will divide the number of injured athletes by the number of total athletes registered in the particular activity of interest to obtain incidence rates (usually per 10 000 athletes or 10 000 participants) (Delaney, 2004; Delaney & Al-Kashmiri, 2005). Since medical data is not population based, injury rates are difficult, if not impossible to calculate. In other words, it is nearly impossible to provide accurate exposure estimates.

Another standard form of injury reporting is prospective voluntary reporting whereby researchers establish an affiliation with teams or associations, who in turn, report injuries every two weeks directly to researchers via certified athletic trainers or physicians (Dick, Agel, & Marshall, 2007; Meeuwisse, 1991; Stuart & Smith, 2000). Typically, a team(s) within or across leagues is followed for one or more seasons where recorded injuries are voluntarily reported by players to team personnel. It is then the responsibility of the partnering hockey teams' trainers to document and submit the injury report to the research team (Emery et al., 2010). An example of this type of research has the following injury forms filled out by coaches and athletic therapists (Emery & Meeuwisse, 2006; Emery, Meeuwisse, & Hartmann, 2005):

- A Preseason Medical Form;
- Therapist Assessment Form (for injury diagnosis);
- Injury Report Form (recording 'time loss' as number of days a participant was unable to play regardless of the number of sessions booked in that time frame);
- Weekly Exposure Sheet (number of sessions missed); and
- Physician Treatment Plan

The advantages of prospective reporting designs is that they have stable operational terms and definitions, straightforward data collection methods, and can document injury more accurately because researchers are part of the reporting process. Further, a well-designed prospective reporting system can provide important detailed information relating to mechanisms, risk factors, and characteristics of injury, (Darling et al., 2011; Emery et al., 2010; Smith, Stuart, Wiese-Bjornstal, & Gunnon, 1997) whereas retrospective reporting cannot (Meeuwisse, 1991; Reid & Losek, 1999). For example, researchers using prospective designs have been able to better define mechanisms of injury (Smith et al., 1997), determine the on-ice locations of injury occurrences (Agel, Dompier, Dick, & Marshal, 2007), and whether or not they involved rule transgressions (Brust, Leonard, Pheley, & Roberts, 1992; Emery & Meeuwisse, 2006).

While current prospective studies are moving beyond the limitations of retrospective designs, they too are limited. Specifically, players must willfully disclose an injury. This raises problems in a culture that encourages players to normalize pain, conceal injury, and keep playing as part of hockey participation experiences (Vaz, 1982; Williamson & Goodman, 2006; Yard & Comstock, 2006). This is especially evident in Canada and the United States where players play a rougher, more violent style compared to a more European style of play which places less emphasis on physical contact (Grossman & Hines, 1996). This arguably leads to the underreporting of minor injuries in North American hockey (Juhn et al., 2002; King & LeBlanc, 2006; Vaz, 1982; Yard & Comstock, 2006). Thus, relying on players to voluntarily disclose injury can be unreliable. If accurate injury frequency data is to be obtained involuntary reporting practices are needed; practices that can only be implemented through direct observational research. Moreover, disparities—in

terms of methods and operational definitions—between studies are difficult to scrutinize since injuries are reported from team officials and are only later validated indirectly by physicians and/or researchers. Since few studies involved firsthand accounts, they provide little in the way of description about the injuries themselves. As a result, this information is difficult to assess. Thus direct observation and comprehensive video recording of on-ice activity enables researchers to circumvent these limitations. In short, despite the wealth of information procured through both retrospective secondary and prospective voluntary injury reporting, inconsistencies of injury reporting and the limitations of operational definitions limit our understanding of injury.

Defining Injury

From the existing literature, there are two approaches on how to define injury. The first draws from medical databases which documents injuries that require some form of medical attention/treatment (Brown et al., 2008; Hostetler et al., 2004; Tator, Provvidenza, Lapczak, Carson, & Raymond, 2004; Yard & Comstock, 2006). Using this approach does not account for misdiagnosed injuries, injuries not warranting medical attention, or injuries where medical treatment is not sought. Other proponents of the first approach argue that researchers should use a standardized quantifiable, injury definition based on ‘time loss’ from full sport participation (Orchard & Hoskins, 2007). However, traditional ‘time loss’ definitions are often too narrow as they have overly restrictive inclusion criteria. Many authors who define injury in terms of ‘time loss’, that is "the time between the original injury and return to participation at a level that would allow competition participation" (Dick et al., 2007, p. 175), document injuries that restrict participation from training or competition for one or more days beyond the initial injury in their analysis (Dick et al.,

2007). In this way, researchers attempt to account for any variability in the interpretation of the aforementioned definition by having a strict inclusion threshold but dismiss minor injuries or instances where an athlete returns to the same session (either a practice or game) in which they were injured (Biasca, Lorentzon, & Montag, 2000; Rice, 2000). In other words, injury implies cessation of participation in the current session *and* a complete nonparticipation in a subsequent session(s) or a minimum of 24 hours where the player would be unable to partake in a session the following day. Moreover, 'time loss' based solely on the number of sessions missed discounts incidents of injury where a player "is unable to participate the next day, but does not have a session scheduled and returns to play at the next scheduled session" (Emery & Meeuwisse, 2006, p. 1968). Consequently, even though injury based on 'time loss' is generally reliable and easily comparable between studies, they have a tendency to underreport the actual incidence of injury (Hodgson, Gissane, Gabbett, & King, 2007). This said, efforts are being made to be more comprehensive by including both the number of days and the number of sessions a player is unable to participate in hockey (Emery et al, 2010; Emery & Meeuwisse, 2006).

Another limitation to defining injury by time loss is attempting to equate 'time loss' with severity of injury since it is typically the players themselves who determine if they are fit to return to play. As a result, other factors such as pain tolerance, type of session to be missed, importance of the session, personality characteristics, parental influence, and motivation come into play. Consequently, the degree in which these factors are taken into account when an athlete decides to return to play will vary by individual. Additionally, Lindenfeld, Noyes, and Marshall (1988) point out that "using time as the only determinant for the result of an injury assumes that when the player has returned to participation the

injury is fully healed" (S-78). This assumption is problematic as hockey players are notorious for returning prematurely from injury and/or playing through pain and injury (Vaz, 1982; Yard & Comstock, 2006).

By recognizing the limitations of 'time loss' definitions, used by traditional voluntary retrospective and prospective reporting practices, it becomes evident that a broader injury definition is required. From this comes a second approach on injury, which suggest that by accounting for all injuries, namely minor or slight injuries (any physical complaint whether requiring medical attention, hospital visitation, 'time loss' or not) and undiagnosed concussions, a more comprehensive understanding of the risk of injury in sport can be attained (Fuller et al., 2007). Working from this approach it is critical for researchers to move beyond definitions which either require a visit to a medical institution or missed participation time in the sessions or days following the initial incident when documenting injuries. At present, efforts to move beyond 'time loss' have been inconsistent and sporadic while consensus on a more holistic injury definition in hockey has yet to be established. Unfortunately, there are surprisingly few studies that scrutinize this definitional framework let alone investigate injuries beyond 'time loss' (Bernard, Trudel, Marcotte, & Boileau, 1993; Dumas & Laforest, 2009; Fuller et al., 2007; Twellaar, Verstappen, & Huson, 1996).

Alternative Methodology and Implications for Injury Prevention

Given the limitations of traditional reporting definitions and practices, an alternative injury reporting system is needed. Injury prevention researchers advocate the use of prospective cohort designs (Fuller et al., 2007), particularly with an observational component (Stuart, Smith, Nieva, & Rock, 1995; Twellaar et al., 1996) to complement larger quantitative studies by providing detailed information surrounding injury incidents. In a sport context, a prospective observational cohort design consists of identifying a group or

population (cohort) of athletes prior to being exposed to injury and following them longitudinally for a season or another specified period. Researchers then observe the outcome where players sustain injury, do not become injured, or are removed from the cohort at risk for reasons other than activity related injury. Even though observational methods examine smaller sample sizes that may not be representative of the entire population, they can provide researchers with accurate detailed descriptions of injury incidences, the situational factors, and the ability to describe characteristics that vary between those who become injured and those who do not (Meeuwisse, 1991; Stuart & Smith, 2000). For example, precisely where on the ice did the injury occur? What factor(s) led to the injury? Injury incidents can be systematically recorded by trained researchers (Bernard et al., 1993; Brust et al., 1992; Dumas & Laforest, 2009) utilizing observation grids (Agel et al., 2007; Juhn et al., 2002; Smith et al., 1997; Stuart et al., 1995), detailed injury assessments (Dick et al., 2007; Smith et al., 1997), supplemented with detailed field notes, and follow-up with parents, coaches, and trainers. Moreover, injury data can be reviewed for accuracy by videotaping practices and games. Since researchers Parkkari, Kujala, and Kannus (2001) point out that "careful video analysis of the mechanisms of sports injuries would likely reveal new ways to decrease the number of injuries" (p. 993), the ability to use video to analyze each injury incident is vital for a comprehensive reporting system. Lastly, despite the considerable time demands and use of vast human resources, smaller controlled observational studies have the sensitivity to calculate accurate athletic exposures (the amount of individual athlete participation in an activity in hours, playing season, or number of participants per game of an entire population at risk) and monitor the effects of policy changes prior to and after a change (Meeuwisse & Love, 1997).

Utilizing a mixed methods approach, our research team carried out an observational research design to study the impact of the new 'Head Contact' rule implemented by Hockey Canada at the start of the 2011-12 season and to better understand the differences in introducing body checking in young or older age divisions as part of a larger research initiative. The study followed three separate youth hockey teams from the Ottawa-Gatineau region during the 2009-10 and 2011-12 seasons. A three person research team observed and videotaped all facets of on-ice game play accompanied by extensive field notation, the completion of observation grids, and following-up with parents, coaches, and trainers. The observation grids (Figure 1 in the Appendix) were informed by previous research and constructed to help monitor injury during the action and all team members were trained by the lead researchers on how to document injury using this method. To complement field observations, a video recording system was set-up prior to the start of play. To capture the majority of the ice surface, one or two video cameras were positioned either at opposite ends of the rink or in another location that provided the most coverage, thereby minimizing blind spots. The video footage was then downloaded into *Final Cut Pro Editing Software*[®] where all injuries were subjected to a frame-by-frame analysis (e.g. slow motion, zooming in, multiple viewings) to establish their nature and cause. Each video was reviewed by the authors to ensure that all injuries were recorded and to ensure the accuracy of each documented event.

Injury reporting was done through the team trainer who was responsible for monitoring player injury. For this reason, injury reporting consisted of players self-reporting any injury sustained during games to a team trainer and/or the trainer approaching any player who was involved in either an injurious or potentially injurious situation. This was

followed by a short debrief between the researchers, coach, and trainer immediately after the game to understand what transpired and to confirm the presence or absence of injury. The authors also approached coaches and trainers after games when a player was identified by a member(s) of the research team as being in physical discomfort, missed playing time, was involved in a potentially injurious situation, or to ask questions pertaining to any situation observed during the game. When players were identified as missing at least one period of game-play (i.e. a minimum of 15 minutes), trainers were asked to fill out a *Post-Game Injury Assessment* (PGIA)—informed by Dick et al. (2007) Gilbert and Trudel (2000), and Smith et al. (1997)—at the conclusion of the game in which the injury occurred so that more detailed information was obtained. Additionally, the PGIA consisted of the classification of injury by 'musculoskeletal or specific body part injured' and 'less specific' body part injured along with a physician diagnosis to categorize injury (Smith et al., 1997). A map of a rink with well-defined areas developed by Gilbert and Trudel (2000) was also incorporated to identify injury location. Lastly, categories found on the observation grids (e.g. situational factors, transgressions, penalty called, period, etc.) are included on the PGIA.

An observational approach to injury reporting required broadening conventional definitions. Accordingly, the authors have adapted a definition from previous studies (Bernard et al., 1993; Dumas & Laforest, 2009; Fuller et al., 2007; Meeuwisse, Sellmer, & Hagel, 2003) and defined injury as any physical trauma that has occurred as a result of participation in an organized competition whereby a player:

- (1) is in discomfort;
- (2) missed playing time but returned to the current game;
- (3) missed playing time and did not return to the current game; and

(4) missed subsequent game(s)

With regards to the first component, a player is in discomfort when a player is clearly in distress but finishes their shift and does not miss any playing time regardless if medical attention by a team certified athletic trainer or physician was given or not. To be categorized as missing playing time, the player in question must immediately leave the ice or a shift is missed because of injury.

Traditional injury reporting definitions typically require players to receive medical attention (Dick et al., 2007; Stuart et al., 1995), miss the remainder of the session in which they are injured (Brust et al., 1992; Emery et al., 2010; Emery & Meeuwisse, 2006), and/or miss subsequent participation time (Brust et al., 1992; Dick et al., 2007; Stuart et al., 1995) to be classified as an injury. What these studies do not account for are more minor injuries that do not necessarily require missed playing time, have debilitating or chronic effects, but do cause some physical trauma that players voluntarily or involuntarily play through. The limited physical trauma endured may not have immediate debilitating or chronic effects in themselves, but it is the wear and tear on the body and minor injuries that can lead to chronic issues down the road if not handled properly. There is also the potential for minor injury to negatively impact playing experiences and participation rates (Butcher, Lindner, & Johns, 2002; Winton Sarvis, 2013; Yard & Comstock, 2006). In utilizing this comprehensive approach to record injury and by working with a broader injury definition, our research team was able to ascertain that 87.7% of injury occurrences would not be documented by traditional injury reporting practices (see Figure 2). "Insert Figure 2 about here".

Documenting more minor injury by observing injurious situations that put participants at risk, allows researchers to discover what can be changed to prevent these

minor injuries before more serious injury occurs. However, for a more complete picture of what constitutes an injury and their subsequent impact on participants, a qualitative approach is needed.

The development of novel definitional frameworks is aided by the use of qualitative data and interviews which are an effective way of unearthing what people think, how they behave, and how they view their surroundings. In-depth interviews give participants the opportunity to "explain their answers or give examples or describe their experiences" (Rubin & Rubin, 2005, p. 2-3). Qualitative interviews can also overcome the poor response rates typically associated with survey research, provide greater depth, and insure that respondents answer all the questions (Austin, 1981; Barriball & While, 1994). Accordingly, this study used issue focused semi-structured interviews (Weiss, 1994) to overcome the limitations of unstructured and structured approaches. With unstructured interviews researchers are only able to gain a general idea about a particular social phenomenon (Rubin & Rubin, 1995, 2005) while the rigid configuration of structured interviews generally restricts the range of responses available to interviewees. Additionally, structured interviews restrict the flexibility of the interviewer to make adjustments (Fontana & Fey, 2005).

The interviews with parents, trainers, and coaches provided the opportunity to gain insight into how minor hockey parents understand and define injury on a more subjective level since they are the ones with youth enrolled in the sport. Specifically, the interviews allowed us to understand the parental and coaches' perspective on injury, body checking, the role of Hockey Canada regarding player safety, and their overall experiences as parents with children playing minor hockey. There were a total of 10 parental interviews from the Ontario Minor Peewee AA (2011-12) and 6 interviews from the Québec Bantam BB team

(2011-12). Analysis, in accordance with Weiss (1994), consisted of an issue focused approach. The aim of an issue focused analysis is to understand "what could be learned about specific issues—or events or processes—from any and all respondents. Some respondents might contribute more to the analysis, others less" (Weiss, 1994, p. 154).

A consideration of a qualitative perspective of injury has important implications for health and safety research. The majority of parents who provided their own injury definitions believed that an injury consists of any sort of physical trauma which causes discomfort or hinders performance⁷. Even if the injury did not warrant missing the remainder of a practice or game, interviewees still included these occurrences in their definitional framework. A male parent explained: "An injury is any trauma that is suffered on the ice.... where by the time he comes back the next game or practice there is still some lingering discomfort that is going to make him not be able to play to his fullest and is going to, you know, [pause] cause him some difficulty I guess" (interview, December 16, 2011). Adding to this were two other parents who argued for the need to move beyond the physical component of injury and begin understanding what the psychological impacts of injury are. A female parent explained that:

It's physical but it's also mental When you see a kid who just doesn't want to go to practice or you see a kid whose esteem is down or you see a kid who doesn't see worthy of the team you know, that that to me is an injury as well. (interview, February 29, 2012)

The mental distress and lowered self esteem suffered by players are viewed not only as a consequence of a physical injury, but also as a form of injury. These definitions lend support for the assertion that broader definitions of injury are needed to fully understand not only the

⁷ See *Appendix G* for raw interview data.

risks associated with minor hockey participation, but how researchers and hockey practitioners understand what an injury essentially is. Whether it is an instance where a player is temporary incapacitated and in discomfort (Bernard et al., 1993; Dumas & Laforest, 2009) or misses a period and returns to the game, minor injury can have an impact on participation experiences and, ultimately, participation rates (Butcher, Lindner, & Johns, 2002; Winton Sarvis, 2013; Yard & Comstock, 2006). The investigation of injury then is not simply a matter of developing more efficient and effective ways to enumerate injury, especially those that may have been previously overlooked or underreported, but also a matter of examining injury beyond biomedical definitions and the physical reporting of injury. Thus, qualitative interviews expose the limitations of how researchers commonly define injury while providing a more comprehensive understanding of its nature.

The knowledge gained from a comprehensive approach to injury reporting provides researchers with a greater understanding of injury and their impact on players' experiences and, ultimately, sport participation rates. If researchers want to gain valuable insight into the risks associated with youth hockey, accounting for more minor injury that does not result in missed playing time, have debilitating or chronic effects, but that do cause some physical trauma, is imperative. Obtaining the qualitative details and circumstances surrounding injury can provide critical information about *how* and *why* injury is occurring for organizations such as Hockey Canada. So while the recent decision by Hockey Canada to delay the introduction of body checking until the Bantam level is an initial step (The Canadian Press, 2013; Hockey Canada AGM, 2013), research indicates that body checking related injury is occurring on legal 'hockey plays' (Emery & Meeuwisse, 2006; Reid & Losek, 1999). This requires not simply delaying when body checking is introduced, but a) graduated approach

and b) systematic and mandatory training for all participants. By using a holistic injury reporting system, a more accurate assessment of injury is possible, which is critical to move beyond injury reporting and move towards more effective injury prevention.

Conclusion

The two dominant forms of injury reporting are retrospective secondary and prospective voluntary designs. These methods are useful in providing data pertaining to incidence, mechanisms, and risk factors. However, they mostly fail to provide details pertaining to the circumstances surrounding injury since they rely on secondhand data. Moreover, prior definitions are often too narrow, requiring a visit to a medical institution or missing a certain amount of time beyond the game in which the initial injury occurred. Accordingly, injury reporting accuracy is questionable and lack details that would help to prevent injuries, thus limiting how we understand what an injury is. Based on two years of research in Canadian minor hockey, observational designs are the ideal method for furthering our understanding of injury. Observational designs in conjunction with qualitative interviews can provide exposure-based injury rates and document minor injury that would not be considered in previous studies, helping to shape a new definition. Accessing the situational factors and the micro-details of injury is essential in determining how and why injury is occurring. Ultimately, this information can be used by administrators in implementing more effective injury prevention initiatives.

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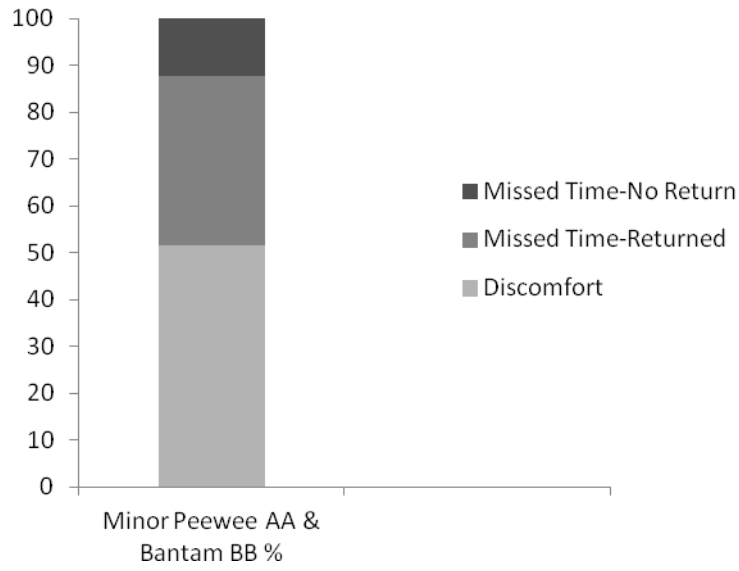
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Figure Captions

Figure 1. Sample of the 'Observation Grid' developed and utilized in the authors' study to document injury as they occur in playing situations.

Figure 2. Distribution of injury severity in Pee wee and Bantam leagues combined (n = 179). Of the total number of injury incidents (181), injury severity for two (2) were undetermined (1.1%). Youth players missed a total of 27 games. Data on injury severity beyond the game in which the initial injury occurred is unavailable for opposing teams.

Figure 2. Distribution of injury severity in Pee wee and Bantam leagues combined (n = 179).



Appendix

Figure 1. Sample of the 'Observation Grid'.

Observation Grid 2011-2012		Game:		Date:	
Team:	Injury is defined as: any physical trauma . . . whereby a player: (1) Is in discomfort; (2) Missed playing time but returned to the current game; (3) Missed playing time and did not return to the current game; (4) Missed subsequent game(s)	Injury severity in terms of time missed: (1) Missed shift; (2) Missed period; (3) Missed game; (4) Missed games: # _____	A) Transgressional* actions leading to injury: (1) Instrumental transgression; (2) Instrumental non-transgression B) Was a penalty called on the play? Y/N -If 'Yes', what penalty?	Enumerating causation/mechanism of injury: (1) Contact with player; (2) Contact with stick; (3) Contact with puck; (4) Contact with ice; (5) Contact with boards (8) Other:	Situational factors of injury:
Upper body injury					
Head					
Lower body injury					

*Transgression: nonconformity with rules

Instrumental: physical actions tied to game play

Article Two

When to Introduce Body Checking? A Comparative Analysis of Injury in Peewee and Bantam ice Hockey

Stephen Adams, PhD Candidate,¹ Charles Boyer, MA,² Mitchell Green, MA Candidate,¹ Matthew E. Davey, MA Candidate,¹ Michael Spivock, PhD,³ Michael A. Robidoux, PhD¹

Affiliations: ¹School of Human Kinetics, Research Centre for Sport in Canadian Society, University of Ottawa, Ontario, Canada; ²Healthy Active Living and Obesity Research Group, Children's Hospital of Eastern Ontario, Ottawa, Canada; ³Directorate of Fitness, Canadian Forces Morale and Welfare Services, Ottawa, Ontario, Canada.

Short Title: A Comparative Analysis of Injury in ice Hockey

Abbreviations: None.

Key Words: Recreation; Child; Injury; Prevention

Funding Source: No formal external funding was secured for this study. However, Dr. Blaine Hoshizaki did provide funding for transportation during data collection.

Financial Disclosure: The authors have no financial relationships relevant to this article to disclose.

Conflict of Interest: The authors have no conflicts of interest to disclose.

What's Known on This Subject

Research indicates that body checking is the primary mechanism of injury in youth ice hockey and as players advance in age levels they sustain more injury. Questions remain about when is the optimal age to introduce body checking.

What This Study Adds

Utilizing an observational design, a comparison of Peewee and Bantam ice hockey was conducted to understand differences in introducing body checking earlier or later to youth hockey players. Results indicate there are no adverse effects of introducing body checking later.

Contributor's Statement:

Stephen Adams: Mr. Adams conceptualized and designed the study, coordinated and supervised data collection with one of the three teams, drafted the initial manuscript, and approves the final manuscript as submitted.

Charles Boyer: Mr. Boyer conceptualized and designed the study, designed the data collection instruments, coordinated and supervised data collection with one of the three teams, reviewed and revised the manuscript, and approves the final manuscript as submitted.

Mitchell Green: Mr. Green coordinated and supervised data collection with one of the one of the three teams, reviewed and revised the manuscript, and approves the final manuscript as submitted.

Matthew E. Davey: Mr Davey coordinated and carried out data collection with one of the teams, reviewed and revised the manuscript, and approves the final manuscript as submitted.

Michael Spivock: Dr. Spivock carried out the statistical analysis, reviewed and revised the manuscript, and approves the final manuscript as submitted.

Michael A. Robidoux: Dr. Robidoux was the research supervisor and was involved with project conceptualization, participated in project and data management, reviewed all stages of the manuscript and approves the final manuscript as submitted.

ABSTRACT

Introduction. Ice hockey is known to be a highly physical, aggressive and violent sport. Virtually every study points to body checking as the primary mechanism of injury. The objective of this study was twofold: to compare leagues that introduce body checking at different age levels by observing three different teams; and to understand differences in injury as a result of delaying body checking or introducing it earlier.

Methods. This study took place during the 2009-10 and 2011-12 hockey seasons focusing on two different boys body checking leagues with comparative competitive levels in the Ottawa-Gatineau region. The rate of injury was compared by way of athletic exposures (AE) and binary logistic regressions were performed to compare the odds of injury and identify whether mechanisms of injury influenced these odds.

Results. No significant difference was found between Peewee and Bantam body checking hockey with regard to injury when weighted by AE: (χ^2 : 0.22; p:0.64). There were significant differences between Peewee and Bantam in frequency of body checking related injury 76% versus 59% (χ^2 :4.76; p:0.03). The odds of being injured due to body checking is 2.158 times higher in Peewee than in Bantam (β_{ex} 2.158; 95% CI: 1.07-4.34; p:0.03).

Conclusion. Hockey injuries at the youth levels are similar in Peewee and Bantam while Peewee players sustained more body checking related injuries. In addition to their decision to delay body checking until the Bantam level, governing bodies should consider (1) a graduated approach and (2) systematic and mandatory body checking training for all participants.

INTRODUCTION

Ice hockeyⁱ is a game celebrated for its intensely physical nature and the challenges it poses for varying athletic capabilities. Along with these challenges comes the potential risk of injury, which at present has become a major public controversy in Canada.¹⁻⁵ Virtually every study points to body checking as the primary mechanism of injury,⁶⁻¹⁰ yet calls to remove body checking have been largely ignored by minor hockey governing bodies. Instead Hockey Canada and hockey practitioners have been in an ongoing debate about when to introduce body checking.^{2,3,5,11-13} In the 1970s, most minor hockey branches decided to delay the introduction until Peeweeⁱⁱ (ages 12-13). In 2002, Hockey Canada made a controversial rule change and allowed interested branches to introduce body checking at the Atom level (ages 9-10) in response to those arguing that it is safer to introduce body checking when youth are younger, smaller and there is potentially less weight/size disparity. Hockey Québec however, was the first provincial branch to have taken the opposite approach in that body checking is delayed until Bantam (ages 13-14) to prevent the unnecessary risk of injury as long as possible. This approach is not without critique, however, as some argue this hinders the development for Québec born players, ill-preparing them for national and international competition, while simultaneously putting youth at greater risk of injury once body checking is introduced. Despite this critique, Hockey Alberta, Hockey Nova Scotia, and most recently Hockey Canada, have all followed Québec's lead by delaying body checking until Bantam for safety reasons.^{14,15} In this study we compare the injury profiles of youth players in competitive Peewee and Bantam hockey

ⁱ To be referred to as hockey from this point forward.

in Ontario and Québec, respectively, in order to provide information about how youth are getting injured when body checking is introduced at different age categories.

Issues of Body Checking in Youth Hockey

The concerns around injury in minor hockey have intensified in recent years and are receiving greater public scrutiny. Between 1990 and 2003, there was an estimated 172,128 injuries in the sport of hockey¹⁶. In 2002/2003, there were 3000 injuries reported to emergency departments in Ontario (Canada) alone¹⁷; all of the injured hockey players were under the age of 16. Researchers have been able to prove that most injury in hockey occurs from body checking,^{11,18} and direct comparison between body checking and non-body checking leagues have shown that body checking puts players at a higher risk of injury.^{1,6,7,19} Furthermore, researchers⁹ found that there is not a significantly increased risk of body checking related injuries in Peewee compared with Bantam. As a matter of fact, the majority of studies indicate that there are no protective effects when introducing body checking at earlier levels.^{7,11,17} In other words, prior body checking experience at earlier age levels does not decrease injury rates at older age levels. These findings, combined with research indicating that as players progress in age level and competitive divisions they sustain more injury,^{9,17,21-23} suggest that introducing body checking at earlier ages only prolongs exposure to the risk of injury. This said, removing body checking altogether is unlikely to happen in Canada because of a host of historical, cultural and political factors.² Unfortunately, while previous research has done well to highlight the high rate of injury in youth hockey, the methods used to document injury tell us very little about how youth are getting injured when introducing body checking in Peewee versus Bantam, and what these differences tell us about making an informed decision about when to introduce body checking.

METHODS

This study compared the injury rates between three different teams playing in their first year of body checking hockey. In order to utilize an observational design and meet the aims of this study, we needed to compare two competitive body checking leagues that introduce body checking at different age levels. Since the researchers were situated in the Ottawa-Gatineau region, it was possible for both the assessment and comparison of league play by following three different teams playing in two provinces with different body checking policies. Ontario introduces body checking at the Peewee level (ages 11-12) whereas, in Québec, body checking is delayed until Bantam (ages 13-14). Accordingly, over the course of the 2009-10 season, 25 Minor Peewee AA games were observed (732 athletic exposures and 1200 playing minutes). In the 2011-2012 hockey season 62 games were observed; 33 gamesⁱⁱ from Minor Peewee AA (1116 athletic exposures and 1728 playing minutes) and 29 games from Bantam BB (825 AE and 1392 playing minutes). All teams consisted of 15 skating players, between the ages of 11 to 14; no injury data was collected for goalies. All games were 48 minutes in length. This enabled us to compare injury data between teams with similar competitive levels but different ages of body checking initiation. Each organization we approached participated in the study; therefore, there was no selection bias. The objective of this study was twofold: to compare leagues that introduce body checking at different age levels by observing three distinct teams; and to understand differences in injury as a result of delaying body checking or introducing it earlier.

ⁱⁱ Three (3) games were not directly observed, however both injury data and athletic exposures were available bringing the total number of games with injury data in Minor Peewee AA (2011-12) to 36.

Research Team

In order to carry out the extensive observational component for this research, a research team comprised of graduate and undergraduate students from the University of Ottawa was assembled. All students were trained on how to document injury through self-designed observation grids. Three researchers attended each game in both leagues to provide detailed notes pertaining to all aspects of injury and videotape game-play. Each game-tape was reviewed by researchers to ensure that all injuries were documented and to ensure the accuracy of each documented event. A single camera was placed in positions that allowed the researchers to capture the majority of the areas on the ice, thereby minimizing blind spots. Video footage was then downloaded into Final Cut Pro Editing Software[®] where all injuries were subjected to frame-by-frame analysis. By reviewing the video with multiple observers, bias from initial injury reports could be eliminated. Data collection ended at the conclusion of the hockey season for all three teams.

Injury Defined

Injury was defined as any physical trauma that has occurred as a result of participation in an organized competition whereby a player: (1) is in discomfort; (2) missed playing time but returned to the current game; (3) missed playing time and did not return to the current game; (4) missed subsequent game(s). The classifications of 'discomfort' and 'missed time' were built around previous observational and prospective cohort studies.²⁴⁻²⁶ Further, to complement voluntary injury reporting, involuntary injury identification or 'involuntary reporting' (with informed consent of team officials and parents) consisted of in-game observations of whenever a player physically showed an experience of physical trauma. As such whether or not the trainer attended to the individual, we would document

the injury based on these physical signs. To capture these observations, an observation grid was developed to properly categorize injury and document factors contributing to injury such as mechanisms of injury,^{11,12,18,21,27-29} and legal/illegal transgressions.³⁰

Analysis

The rate of injury was compared by way of Athletic Exposures (AE), which is defined as one player participating in one practice or competition where they are exposed to the possibility of injury³¹ regardless of the amount of playing time. The number of injuries for each team were divided by the number of AE for that particular team which is informed by previous studies.^{18,32} Following descriptive cross tabulation analyses, binary logistic regressions were performed to compare the odds of injury between Peewee and Bantam leagues and identify whether mechanisms of injury influenced these odds. Injury per athletic exposure was modeled as the dependant variable (as a dichotomous outcome of Yes/No) with league, mechanism of injury and the presence of other situational factors as independent predictors. All statistical analyses were performed using *Statistical Package for Social Sciences, version 20.0* (IBM Armonk, NY).

RESULTS

Peewee versus Bantam: Injury Rates and Mechanisms

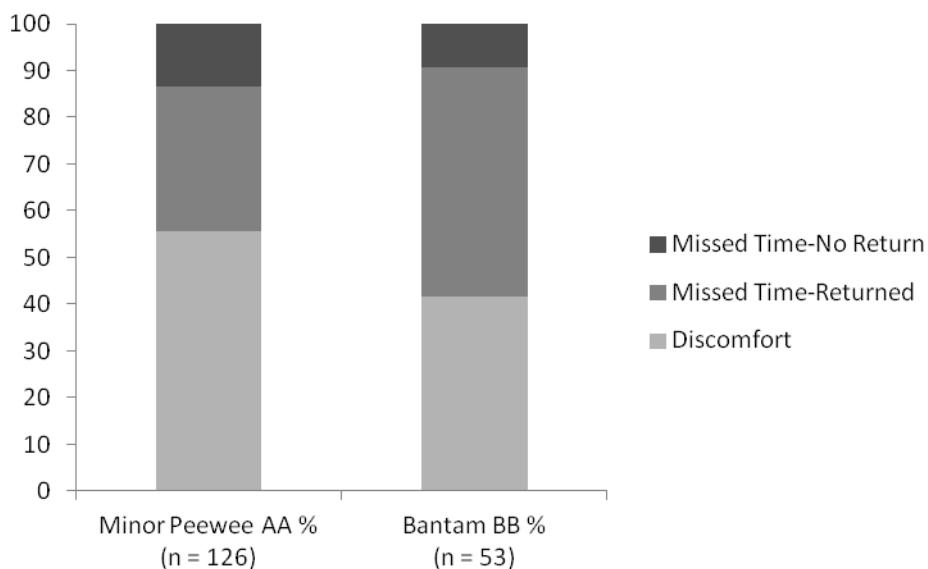
Injury Rates. Of all observed injuries (n=181), 128 (69.3 injuries per 1000 AE) occurred in Minor Peewee AA, 53 (64.2 injuries per 1000 AE) occurred in Bantam BB. Comparing both body checking leagues, there was no significant difference in terms of injuries per game when weighted by AE: (χ^2 : 0.22; p:0.64) (*Table 1*).

Table 1. Situational factors of injury in Pee wee versus Bantam leagues

Situational Factor	Minor Pee wee AA	Bantam BB
Injury (/1000AE)	128 (69.3)	53 (64.2)
Body checking (/1000AE)	*97 (52.5)	*31 (37.6)
Anatomical location		
Head/Neck (%)	23 (18)	13 (25)
Upper body (%)	77 (60)	27 (51)
Lower body (%)	28 (22)	13 (25)
Stick (/1000 AE)	7 (3.8)	6 (7.3)
Deliberate (%)	2 (29)	4 (67)
Inadvertent/Incidental (%)	5 (71)	2 (33)
Puck (/1000 AE)	16 (8.7)	11 (13.3)
Attempt at net (%)	12 (75)	8 (73)
Dump in/Clearing attempt (%)	4 (25)	3 (27)
Period of play		
First (%)	27 (21)	11 (21)
Second (%)	38 (30)	23 (43)
Third (%)	61 (48)	19 (36)
(Missing) (%)	2 (2)	0 (0)
On ice location		
Mid/Open ice (%)	35 (27)	12 (23)
Front of net (%)	13 (10)	9 (17)
Behind net (%)	15 (12)	9 (17)
Corners (%)	11 (9)	3 (6)
Along boards (%)	48 (38)	18 (34)
(Missing) (%)	6 (5)	2 (4)
Penalty called (% of injury)	23 (18)	9 (17)
Other		
Altercation/Battle (/1000 AE)	3 (1.6)	0 (0)
Incidental collision (/1000 AE)	1 (0.5)	3 (3.6)

*Significant difference at $p < 0.05$

In terms of injury severity (*Figure 1*), there were few injuries which required players to leave the current game where they were then unable to return in both Pee wee and Bantam (a non-significant difference of 13% vs. 9% respectively; χ^2 : 0.57; p :0.45).

Figure 1. Distribution of injury severity in Pee wee versus Bantam leagues

Of the total number of injury incidents in Pee wee (128), injury severity for two (2) were undetermined (1.6%). Pee wee players missed a total of 23 games (12.45 per 1000 AE) versus 4 games (4.85 per 1000 AE) in Bantam. Data on injury severity beyond the game in which the initial injury occurred is unavailable for opposing teams.

Mechanisms and Situational Factors of Injury. Of the total number of injuries, Pee wee hockey had a significantly greater percentage involving body checking than in Bantam; 76% versus 59% (χ^2 :4.76; p:0.03). As the leading mechanism of injury, the odds of being injured due to body checking are more than twice as high in Pee wee when compared to Bantam (β_{ex} 2.158; 95%CI: 1.07-4.34; p:0.03) (*Table 2*).

Table 2. Situational factors of body checking related injury in Pee wee versus Bantam leagues.

Situational Factor	Minor Pee wee AA	Bantam BB
Body checking (/1000AE)	*97 (52.5)	*31 (37.6)
Given (%) ^a	12 (12)	5 (16)
Received (%)	85 (88)	26 (84)
Into boards (%)	54 (56)	19 (61)

Anatomical location		
Head/Neck (%)	19 (20)	10 (32)
Upper body (%)	65 (67)	17 (55)
Lower body (%)	13 (13)	4 (13)
Period of play		
First (%)	24 (25)	7 (23)
Second (%)	28 (29)	14 (45)
Third (%)	43 (44)	10 (32)
(Missing) (%)	2 (2)	0 (0)
On ice location		
Mid/Open ice (%)	16 (17)	4 (13)
Front of net (%)	5 (5)	1 (3)
Behind net (%)	15 (16)	9 (29)
Corners (%)	9 (9)	3 (10)
Along boards (%)	49 (51)	14 (45)
(Missing) (%)	3 (3)	0 (0)
Penalty called (% of BC injury)	20 (21)	5 (16)

*Significant difference at $p < 0.05$

^aAll percent (%) are in terms of body checking related injury

Other situational factors including playing position (data on playing position was not available for all opposing teams), anatomical location, mechanism (puck, stick, other),^{11,12,18,21,27-29} legal/illegal transgressions, and on ice location produced no significant differences between Peewee and Bantam. An analysis of injuries per period, contact with the boards, giving or receiving a body check also discerned no significant differences between the two leagues. The differences between Peewee and Bantam in terms of the situational factors of injury related to body checking were also not statistically significant. Average height (150.2cm \pm std 7.4 vs. 167.1cm \pm std 7.2) and weight (43.7kg \pm std 8.1 vs. 55.6kg \pm std 6.8) differences within both Peewee and Bantam teams (respectively) followed over the duration of this study were not statistically significant and were not significant predictors of injury.

DISCUSSION

There is an ongoing debate about what is the ideal age/level to introduce body checking in youth hockey, yet decisions are being made with little scientific evidence suggesting one strategy is safer than another. Through direct observations of injury in youth hockey, results from our current study indicates there is no increased risk of introducing body checking in Bantam rather than Peewee as there are hardly any significant differences between the two leagues. However, Peewee players were more likely to be injured due to body checking than their bantam counterparts. Recent research has shown that introducing body checking at younger ages does not produce a protective effect while potentially placing youth at a prolonged exposure to the risk of injury.^{7,11,17} Even with this overwhelming evidence, hockey organizations in Canada are unwilling to remove body checking from certain competitive youth divisions because of the perceived importance body checking has for developing elite hockey players and maintaining Canadian dominance at the international level.² Prior to Hockey Canada's recent decision to delay body checking until Bantam,^{14,15} the hockey development system in Québec was (and arguably still is) under scrutiny for delaying checking until Bantam and is often looked upon as the weak link among the three Canadian junior leagues (the Western Hockey League, Ontario Hockey League, and Québec Major Junior Hockey League) in terms of producing elite junior and professional caliber players.^{33,34} However, worries over the negative effects of delaying body checking on performance and elite skill development has been somewhat overstated by popular discourse. In reality, Québec born Francophone players are equal to or out-perform their Anglophone junior and professional counterparts.^{33,34} Moreover, USA Hockey also recently changed their body checking policy by delaying it until Bantam through a

Progressive Checking Skill Development Program for both health and skill development reasons.^{35,36}

Despite the overall low frequency of injury and the dearth of ‘missed playing time-no return’ injuries, field observations provides evidence that suggests players in both Pee wee and Bantam play a physical brand of hockey within the rules of the game. Even though body checking accounted for the majority of injury, far more body checking related injury occurred on legal plays as deemed by the on ice officials indicating that players are being injured on routine ‘hockey plays’ rather than on reckless ones. In fact, the authors observed few cases of overly aggressive and violent behaviour and even fewer cases of careless play that directly resulted in a player being injured. Although these types of plays may be observed in higher levels of competition,³⁷ there is little evidence of dangerous play leading to injury at either the Pee wee or Bantam levels. Moreover, even with the size and age differences between the two leagues, both Pee wee and Bantam players are sustaining injury mostly to the upper body, are more frequently injured from receiving body checks rather than delivering them, and players are more likely to be injured as the game progresses. Regarding the latter finding, it's noteworthy that the third period was longer (18 minutes) than either the first or second periods (15 minutes each), potentially impacting this outcome. Lastly, along, and in contact with the boards, are areas where Pee wee and Bantam players are particularly susceptible to injury caused by a body check. These injury differences associated with body checking illustrate that regardless of the age and competitive level in which body checking is introduced, players in their first year of body checking hockey are being injured in similar ways and in similar situations.

Acknowledging that body checking will remain a part of the Canadian minor hockey system makes it imperative to extend beyond standard injury reporting and begin to locate ways to help reduce the risk of injury within the way the sport is currently being played. By prospectively observing and videotaping all game play from body checking leagues, we can now reveal injury prevention pathways which can significantly reduce injury in youth body checking hockey.

LIMITATIONS

Because of our observational research design, we were limited to the amount of games and injury situations recorded, resulting in a small sample size. Secondly, due to ethical considerations, no follow up with coaches and trainers of opposing teams were conducted to ascertain injury severity in terms of missing subsequent games and the number missed. Lastly, referee play calling was not evaluated which may have impacted results pertaining to penalized versus non-penalized injuries. The role officials play in injury is definitely worthy of future exploration.

CONCLUSION

Concerns about safety in youth hockey have been openly expressed in public and academic circles, yet the prevalence of injury remains high at both the elite and grassroots levels of the sport.^{16,17} Through extensive observations, analysis of games *in situ*, and video review, specific details pertaining to injury were revealed. First, and in support of previous research, there is a similar risk of injury in body checking hockey at both the Pee wee and Bantam levels.^{7,11,17} Second, Pee wee hockey had a significantly greater percentage of injuries involving body checking than in Bantam where the odds of sustaining a body checking related injury is more than twice as high in Pee wee. While few injuries were

serious enough to miss the remainder of a game, the majority of injuries occurred on legal play indicating that injury prevention at these levels is not necessarily an issue of aggressive and violent play.

The first and most obvious implication to injury prevention would be to simply remove body checking from youth hockey. The pressures governing bodies face to preserve the core elements of the sport, in particular its highly physical nature, make it unlikely that body checking will be entirely removed anytime soon. With this said, the primary implication to be gained from this is that the sport in some way must modify its body checking policy to assist in reducing the risk of injury. A first step is to reduce the exposure of youth to body checking hockey. Delaying body checking until Bantam^{13,17,35,36} is an initial injury prevention initiative taken by youth hockey organizations^{14,15,36} without necessarily compromising the skill development of players.³³⁻³⁵ However, the majority of injury occur on legal hockey plays thus requiring not simply delaying when body checking is introduced, but a graduated approach as well as systematic and mandatory training for all participants. Future research should focus on the fact that players are still being injured on routine 'legal' hockey plays by utilizing observational designs to gain insight into the situational factors which lead to injury and are not available through traditional injury reporting.

AKNOWLEDGEMENTS

We would like to thank the Ottawa District Minor Hockey Association and l'Association de Hockey Mineur de Hull for their participation in this study. We wish to thank the 20 volunteers from the University of Ottawa who assisted in collecting data over the course of the season. Finally, we wish to thank Dr. Blaine Hoshizaki who provided financial support for the data collection.

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Article Three

Competing Discourses around Safety in Youth Hockey: How Preserving Canadian Hockey Integrity Impedes Progressive Approaches to Injury Prevention

Stephen Adams

University of Ottawa

Charles Boyer

Children's Hospital of Eastern Ontario

Mitchell Green and Matthew E. Davey

University of Ottawa

Michael Spivock

Canadian Forces Morale and Welfare Services

Michael A. Robidoux

University of Ottawa

Author Note

Stephen Adams, Mitchell Green, Matthew E. Davey, and Michael A. Robidoux, School of Human Kinetics, Research Centre for Sport in Canadian Society, University of Ottawa; Charles Boyer, Healthy Active Living and Obesity Research Group, Children's Hospital of Eastern Ontario; Michael Spivock, Directorate of Fitness, Canadian Forces Morale and Welfare Services.

Abstract

Ice hockey is known for its speed, skill, and aggression. The physical component of the sport has been constructed as the essence of Canadian hockey and the foundation of a unique cultural identity. Informed by Foucault's (1972, 1990) concept of discourse, this paper uses secondary sources supplemented by qualitative data from a larger project to examine competing discourse surrounding participant safety which give meaning to, and, inform hockey practices. The dominant discourse prioritizes preserving Canadian hockey integrity while a reverse discourse prioritizes player safety. This reverse discourse has created a true public controversy, particularly concerning body checking, and if anything has intensified the debate rather than diminishing it. Ultimately, these discourses impact the implementation of progressive injury prevention initiatives in minor hockey.

Keywords: discourse, safety, ice hockey, youth

Competing Discourse around Safety in Youth Hockey: How Preserving Canadian Hockey Integrity Impedes Progressive Approaches to Injury Prevention

Ice hockey¹ is known for its speed, skill, aggression, and particularly in North America, its physicality and violence (Allain, 2008; Cantelon, 2006; Grossman & Hines, 1996; Gruneau & Whitson, 1993; Laba, 1992; Novak, 1993; Rutherford, 1990; Sutherland, 1976). Constructed as the essence of Canadian hockey, contemporary notions of hockey's physicality and violence are maintained by hockey traditions and represent a normalized dominant form of Canadian hockey practices (i.e. patterned behaviour). Any alterations to the game that has the potential to diminish a physical and aggressive style of play are seen as a threat against Canada's national culture and identity (Cormack & Cosgrave, 2013; Gruneau & Whitson, 1993; Robidoux & Trudel, 2006). In other words, any modifications to the rules and regulations that may possibly change characteristics that make hockey identifiably Canadian are met with resistance. At present, there are several competing interests surrounding the sport of hockey in Canada, with hockey conservatives and enthusiasts seeking to preserve quintessential elements of the sport, largely focusing on physicality and maintaining/reclaiming hockey supremacy. They argue that a physical brand of hockey must be maintained and that the priority for Hockey Canada (Canada's Minor hockey governing body) should be based on competition, hypercompetitiveness, and elite player development to ensure that "Canadian" hockey integrity is preserved. In contrast, medical and research practitioners as well as informed parents argue that the health and safety of youth players should be prioritized and that hockey governing bodies should be focusing on injury prevention initiatives, grassroots programs, and mass participation.

¹To be referred to as hockey from this point forward.

By drawing on Michel Foucault's concept of discourse (1972, 1990), this paper sets out to critically analyze the ongoing public debate about preserving quintessential elements of the sport versus health and safety initiatives as competing discourse that are potentially compromising progressive approaches. This competing discourse creates tension amongst health and safety advocates as well as conservative hockey practitioners and enthusiasts. It is the emotionality of hockey stakeholders (i.e. their deep seeded emotional connection with the game) that often supersedes logic when making decisions regarding the health and safety of participants. It is the aforementioned competing discourse and their impact on the debate around youth safety in minor hockey that is the subject of this paper.

Theoretical Framework

This paper is informed by Foucault's concept of discourse. According to Foucault (1972), a discourse consists of a set of statements that constitute an object and gives it meaning. The implication is that discourse constructs all forms of social practice where the meaning of an object and what is known about it can only be understood through discourse (Foucault, 1972, 1990). All objects, and therefore all of social reality, cannot exist outside of discourse (Foucault, 1972; White, 1979). Moreover, even though discourse is composed of language (written or spoken text used to designate objects), it cannot merely be reduced to language since it is the relation of statements to one another within an associated discipline or area that defines them and gives them meaning (Foucault, 1972; Sheridan, 1980). A discursive formation then consists of all the statements which constitute an object and differentiates it from other objects (Foucault, 1972). Within a discursive formation there is a multiplicity of discourse present whereby the dominant discourse at any one time

shapes what can be written, said, and known about a particular facet of reality through the exercise of power relations (Cheek, 2004; Foucault, 1972, 1990; White, 1979).

Since discourse is produced, reproduced, and transformed, they emerge in a discontinuous manner and often times by chance rather than as a linear series of logical events. Foucault (1972) asserts that "discourse must be treated as a discontinuous activity, its different manifestations sometimes coming together, but just as easily unaware of, or excluding each other" (Foucault, 1972, p. 229). Therefore, at any one time, there is a multiplicity of discourses present competing for the authority to dictate the legitimacy of specific meanings and practices. As a consequence, not all discourse is valued equally or are afforded equal status and therefore equal authority (Cheek, 2004; Foucault, 1990). At any point in history, a certain discourse is dominant while others are marginalized or excluded. The discourse that is afforded dominant status is the result of power relations and a "whole series of mechanisms operating in different institutions" (Foucault, 1990, p.33). As such, certain knowledge is produced and 'known' while simultaneously constraining what is possible to know of other subjects, objects, and practices (Cheek, 2004; Foucault, 1990). In this way, individuals face multiple, and often competing discourse that create diverse meanings while informing particular cultural practices (Foucault, 1990).

For the purposes of this paper, discourse refers to ways of thinking, knowing, and speaking about social practices or a particular facet of reality and consists of language and meaning (Foucault, 1972, 1990; Cheek, 2004). Language in this case includes all forms of cultural texts (whether written, spoken, or visual). Discourse shapes and determines the availability of practices and the meanings and understandings ascribed to them. In other words, discourse is carried out through regulated practice or patterned behaviour (Johns &

Johns, 2000) where the meanings associated with these practices are produced, reproduced, transformed, and ultimately contested through discourse (Foucault, 1972, 1990; Rail, 2002). Moreover, a reverse discourse does not merely run counter to the dominant one, but has its own authority, and demands that "its legitimacy or 'naturalness' be acknowledged, often in the same vocabulary, using the same categories by which it was. . . disqualified" (Foucault, 1990, p. 101).

Canadian minor hockey is constituted by a multiplicity of discourse that gives meaning to, and, informs practices (Foucault, 1972). Although the ability to identify a particular dominant discourse can be difficult, there are at least two competing discourses that can be identified at work in Canadian minor hockey. The primary focus of the dominant discourse is maintaining Canadian hockey supremacy through a physically dominant and aggressive style of play arguing that elite player development and the integrity of the Canadian game are the priority. Conversely, the reverse discourse is about prioritizing participant safety, arguing that in its current form minor hockey is placing Canadian youth at an unnecessarily high risk for injury and the safety of participants must be the priority. Both discourses are supported by different institutions as they construct, disseminate, and reinforce certain discourse over others (Foucault, 1972, 1990). For example, professional hockey (specifically the National Hockey League) and Hockey Canada are both institutions where hockey discourse is formed and employed but uneven power relations between the two institutions constrains Hockey Canada's ability to autonomously dictate minor hockey practices. Consequently, the cultural conservative discourse is often prioritized by Hockey Canada (Hockey Canada, 2012; Gruneau & Whitson, 1993; Vaz, 1974). The legitimacy of this discourse is contested by medical

practitioners, academics, and parents who are concerned with youth safety and the perceived dangers of the sport of hockey, frequently producing and supporting a reverse discourse (Cusimano et al., 2011; Emery, Hagel, Decloe, et al. 2010; King & LeBlanc, 2006).

Ultimately, these competing discourses are embedded in the ongoing public debate concerning safety in Canadian minor hockey making it difficult for Hockey Canada to live up to its mandate of ensuring “a positive hockey experience for all participants, in a safe, sportsmanlike environment” (Hockey Canada, n.d.).

Method

This article originates as part of a larger research project examining the situational factors and contextual details of injury in Canadian Minor hockey. The larger project involved using an observational design to study three different boys body checking teams and one boys non-body checking team from Ontario and Québec over a two year period. Specifically, from the period of 2009-10 and 2011-12 a total of 99 games were observed at the Pee wee (70) and Bantam (29) levels. To gain an understanding of parental perspectives on the current state of the game, this paper uses secondary sources (scholarly literature and news media) to examine discourse pertaining to preserving Canadian hockey integrity and health and safety in Canadian minor hockey. This literature is supplemented 16 formal interviews with both male and female hockey parents, and a number of informal discussions stemming from the larger project. The formal interviews were transcribed verbatim and the analysis consisted of an issue focused approach. The primary aim of an issue focused analysis is "with what could be learned about specific issues—or events or processes—from any and all respondents" (Weiss, 1994, p. 154). In other words, rather than using the interviews as part of a detailed analysis of parental discourse, the interviews served as a

means of examining how parents are responding to—and negotiating—broader public discourse concerning preserving 'Canadian' hockey culture and tradition versus prioritizing player safety.

This paper puts hockey in Canada in its historical context and then critically examines the dominant and reverse discourse which prioritizes a competitive, physically dominant game and youth safety, respectively. Local hockey parents are caught in between these extremes creating ambivalence regarding what constitutes legitimate Canadian hockey practices and the direction Hockey Canada should take concerning best practice initiatives. The ongoing public debate surrounding the introduction of body checking to youth players illustrates how emotionality often supplants logic and how these competing discourses create tension and ambivalence amongst hockey practitioners and enthusiasts. Accordingly, an examination of the workings of competing dominant and reverse discourse provides a better understanding of the complexities of changing and implementing minor hockey policy.

Historical Context: Development of Hockey in Canada

In the past, the once exclusively Canadian sport of hockey has become an international game recognized and played throughout the world (Allain, 2008; Maguire, 1996; Moore, 2002; Earle, 2002). The increased popularity of the game on both sides of the Atlantic has led to differences in points of emphasis and has produced a variety of styles of play and player development philosophies. Grossman and Hines (1996) argue that this is in part due to cultural differences and media representations: “The fact that the game has evolved quite differently on the two continents may be a result of cultural differences as well as in the way in which hockey is publicized” (p.589). Still, what part of hockey makes it

distinctly Canadian? Robidoux and Trudel (2006) contend that Canadians have “construed the physical component of the game as the essence of Canadian hockey. Since the game’s modern origins, Canadians have taken pride and celebrated qualities of toughness, aggression, and stoicism, the fodder for establishing a uniquely Canadian sport heritage” (p. 116). The aggressive style of play that symbolizes hockey in North America is in stark contrast to the European game built more on skill and finesse (Allain, 2008; Grossman & Hines, 1996; Maguire, 1996). The early international Canadian success based on aggression and physicality contributed to the Canadian mythology of hockey dominance which took off after World War I. According to Whitson and Gruneau (2006):

Canadian men’s amateur teams began to travel to Europe, they proved to be virtually unbeatable. The widespread circulation of stories about Canadian success in international competitions-on radio and in the newspapers and magazine articles-cemented the notions that hockey was Canada’s game and that the passion, skill, and physicality of ‘our’ hockey players made them the best in the world. (p. 3)

However, in the 1970s “the awesome power of the Russian teams shattered the illusion the [sic] Canada could any longer claim superiority at its own national game” (Rutherford, 1990, p. 254). Canada’s dominance in hockey has waned even more in recent years due to the growing popularity of the sport in Europe, the influx of European players plying their trade in the National Hockey League (NHL) and the increased success of European countries in international tournaments. Yet, the belief in toughness, intimidation, physicality, and ‘character’ (competitive intensity) still remain at the core of the ‘Canadian’ style of play (Allain, 2008; Sutherland, 1976; Whitson & Gruneau, 2006; Rutherford, 1990). Some contend that hockey was embraced by Canadians precisely because of its excessive violence, aggression, power, and physical dominance. In addition to providing an opportunity for Canadians to display attributes that were unacceptable in daily life, hockey offered a distinct

and alternative form of sport from the traditional British sports model (Earle, 2002; Gruneau & Whitson, 1993; Robidoux, 2002).

The manner in which hockey is played is of great cultural importance, as the game embraced the rugged and aggressive behaviour that is meant to mirror traits needed by Canadian settlers to navigate and survive the harsh, unforgiving northern climate (Kidd & MacFarlane, 1972; Laba, 1992; Robidoux, 2002; Novak, 1976). Robidoux and Trudel (2006) argue that “it has not merely been the game but the physically aggressive and reckless manner in which it was played that connoted an ideal of the Canadian *sportsman*, necessarily distinct from other sport-nation identities” (Robidoux & Trudel, 2006, p. 116-117). The characteristics of the ideal Canadian 'sportsman' and the symbolism of the 'good Canadian' are forged from shared hockey experiences and traditions. Wilson (2006) provides some evidence for this stating:

Early experiences of playing hockey [and] the desirable values and characteristics that a young Canadian would embrace and adopt (for example, being gritty, tough, hard-working, and determined) are consistent with orthodox perceptions of what it means to be a 'good Canadian'. (p. 53)

Constructed from shared hockey experiences, the characteristics of the ideal 'sportsman' and 'good Canadian' are embedded in and constitute the foundation of our national identity. However, Hobsbawm and Ranger (1983) assert that national identities are symbolic social constructions that are often reproduced through invented traditions and other cultural practices. Similarly, the concept of what constitutes a distinctly 'Canadian' style of play and the characteristics of the ideal 'Canadian hockey player' are socially constructed practices and identities perpetuated through myth and tradition.

When examining the historical development of sport in Canada, and hockey in particular, the deliberate development of a distinctly Canadian national identity was

formulated in opposition to British imperialism and American influence (Cormack & Cosgrave, 2013; Kidd & MacFarlane, 1972; Robidoux, 2002; Jackson, 1994; Jackson & Ponic, 2001). The expression of national identity is expressed out of similarity and difference and when compared to other nations, an identity is forged through "the use of stereotypes, symbols, and practices (including sport) that supposedly embody a sense of cultural uniqueness" (Jackson, 1994, p. 431). Therefore, the cultural value of hockey is its ability to provide a distinctive cultural practice on the world stage that represents Canada as a self-defined and visible entity (Laba, 1992; Earle, 2002). Although hockey is not Canada's only cultural distinction, it is widely the most recognized. Therefore, potentially changing the style of play Canada is known for and successful at—checking and physicality—to a more European style—based on skating and passing skills (Allain, 2008; Grossman & Hines, 1996; Maguire, 1996; Gruneau & Whitson, 1993)—is viewed as potentially diminishing the qualities and characteristics that make hockey identifiably Canadian (Novak, 1993).

The construction of national identity and Canadian hockey practices are “a contested terrain of meaning, a site of ideological struggle” (Jackson, 1994 p.443). The struggle for national identity and shared meanings is explored by researchers Whitson and Gruneau in their books *Hockey Night in Canada* (1993) and *Artificial Ice* (2006). In *Artificial Ice*, Wilson (2006) argues that a variety of global cultural influences in conjunction with a culturally diverse population challenges the notion that hockey is a ubiquitous cultural experience which bonds Canada together. In fact, other sports such as soccer has surpassed minor hockey as the most popular participation sport in the 5 to 14 year old demographic in Canada (Wilson, 2006). As hockey struggles to maintain and

attract new participants (Mick, 2012; Brady, 2011; Hockey Canada, 2012), some immigrant children, and those who are disenfranchised with the hypercompetitiveness found in hockey, concerned with the risk of injury, or who simply cannot afford the rising registration and equipment costs are marginalized from partaking in a cultural practice that some consider to be essential to the construction of a collective national culture and identity (Brady, 2011; Donnelly & Kidd, 2003; Mick, 2012). Nonetheless, hockey continues to be viewed by the Canadian public as cultural symbol, a mythologized, national unifying force (Cormack & Cosgrave, 2013; Laba, 1992; Robidoux, 2002; Novak, 1993), and something that is still distinctively Canadian (Gruneau & Whitson, 1993; Rutherford, 1990). Accordingly, the physical component of the game has been constructed as the essence of Canadian hockey and the foundation of a unique Canadian cultural identity.

Dominant Discourse: The Cultural Conservative Viewpoint

The dominant discourse informing minor hockey practices places Canadian hockey supremacy—maintained through a physically dominant and aggressive style of play—before youth safety arguing that preserving the integrity of the game is the priority. One of the major trends currently found in adult-organized youth sports programs is the increasing emphasis on the 'performance ethic' (Coakley & Donnelly, 2009; Comeau, 2013). That is, "participants in youth sports, even in house leagues and recreational programmes, are encouraged to evaluate their experiences in terms of developing technical skills and progressing to higher personal levels of achievement" (p.130-131). With this focus on achievement—the emphasis of the quantification of sport and the principles of competition—it is not surprising that an emphasis on elite player development is part of the

current discourse that is pervasive in modern sport (Coakley & Donnelly, 2009; Comeau, 2013; Gruneau & Whitson, 1993; Volkwein, 1995). Although there has been a number of studies examining issues of masculinity (Adams, 2006; Allain, 2008, 2011; Messner, 1990; Theberge, 1997; White & Young, 2007), aggression and violence (Colburn, 1986; Faulkner, 1974; Loughhead & Leith, 2001; Rosenberg & Stevens, 2013; Smith, 1974; Weinstein, Smith, & Wiesenthal, 1995), and while they remain a part of the dominant cultural conservative discourse in ice hockey, the focus of this paper is the notions physicality, competition, hypercompetitiveness, and elite player development as traditional components of the 'Canadian' game.

It has been argued that the prevailing values, beliefs, and norms present in the minor hockey system is derived from the sport's overall professionalization, commodification, and rationalization (Gruneau, 1999; Johns & Johns, 2000; Vaz, 1978, 1982), leading to rational-bureaucratic forms of organization of state and voluntary sport associations, a focus on record setting and skill acquisition, as well as the continued development of a field of specialized sport scientists and coaches (Gruneau, 1999; Whitson & Macintosh, 1990). Vaz (1974) succinctly summarizes the changes in the minor hockey value system:

Despite the ideology of the Minor Hockey League (with its emphasis on sportsmanship and fair play, good citizenship, loyalty and the development of 'moral character') it is no longer possible to conceal the fact that youngsters who play organized hockey (in Canada) are engaged in work like activity, and it is a myth to believe that their sole motivation is the pursuit of pleasure. (p. 34)

Moreover, these notions reveal how the professional leagues have attempted to impose particular attitudes, behaviours, and playing styles in Canadian Minor hockey. Listed as one of eleven affiliated organizations and hockey partners by Hockey Canada (2012), the National Hockey League (NHL) contributes to the production of the cultural conservative

discourse and places considerable pressure on minor hockey leagues and players to conform to professional demands and expectations (Colburn, 1986; Gruneau & Whitson, 1993; Weinstein, Smith, & Wiesenthal, 1995). For example, player selection by coaches, particularly when body checking is introduced at younger age groups, has the tendency to prioritize the attributes of size, strength, toughness, and hyper-aggressiveness over other attributes such as skating and shooting when a win-at-all-costs mentality is over-emphasised (Gruneau & Whitson; 1993; Vaz, 1982). The former attributes are deemed necessary for players to achieve success at the pro level inevitably resulting in minor hockey players learning to play NHL style hockey (Gruneau & Whitson, 1993; Vaz, 1974) where the actions of hockey players are the result of institutionalized behaviour; they are learned and are a structural part of a larger system (Colburn, 1986; Kissick, 2007; Vaz, 1978, 1982; Weinstein, Smith, & Wiesenthal, 1995). Accordingly, Body checking, illegitimate acts (rule violations), violence, and aggression are a form of institutionalized behaviour resulting from the structural inevitability of hockey's system and conformity to a general set of norms by various formal and informal control systems (Colburn, 1986; Vaz, 1978, 1982; Weinstein, Smith, & Wiesenthal, 1995). That said, Hockey Canada is being forced to revisit its approach due to public pressure about youth safety in light of the rash of head injuries in both professional and minor leagues as well as advancements made in understanding the short and longterm effects of concussion by medical reseachers (Cole, 2011; L. Johnson, 2011; Harmon et al., 2013; Tator, 2012). Since professional hockey is considered the pinnacle of hockey success, it is unsurprising that until recently the minor hockey system adapted to the standards set by professional leagues.

The professionalization, commodification, and rationalization of hockey only partly explain the transmission of the professional hockey value system to the minor leagues. Rather than viewing hockey as a site where competing ideologies are contested or as a cultural terrain where the struggle for meaning between dominant and subordinate groups takes place in the everyday lives of people (Andrews & Loy, 1993; Beal, 2002), hockey is constituted by a multiplicity of profound and pervasive discourses that give meaning to and construct hockey practices. In this instance, ideology refers to “the mental frameworks—the languages, the concepts, categories, imagery of thought, and the systems of representation—which different classes and social groups deploy in order to make sense of, define, figure out and render intelligible the way society works” (Hall, 1986 p. 29). The struggle for the authority to shape legitimate hockey knowledge and practices between competing discourses is exercised through power relations. In other words, the NHL plays a substantial role in the production and diffusion of the cultural conservative discourse through its uneven power relations with Hockey Canada instead of imposing its ideology from the top-down through class power. Since discourse is supported by institutions as they construct, disseminate, and reinforce certain discourse over others, The NHL is positioned as an authority of what constitutes ‘*real*’ hockey. Accordingly, the NHL takes part in the formation of the cultural conservative discourse through the establishment of a system that legitimizes, disperses, and controls knowledge and the threshold of acceptable behaviour (Foucault, 1972, 1990; Sheridan, 1980).

Even though the "National Hockey League and the seven Canadian NHL teams continue to provide funding to aid in coaching, officiating and regional minor hockey development" (Hockey Canada, 2012, p.39), Hockey Canada still operates in a mostly

autonomous fashion. With increasing criticism of the traditional, conservative hockey practices of the dominant discourse, a reverse discourse has emerged by prioritizing participant safety. This reverse discourse is explored in the following section.

Reverse discourse: Prioritizing the safety of youth participants

The heightened awareness of athletic health and safety (Coakley & Donnelly, 2009; Donnelly, & Kidd, 2003) provides a competing discourse, a different view on the practice and meanings ascribed to sport. According to Coakley and Donnelly (2009) “there seems to be an increasing culture of caution surrounding youth sports and physical activity, with increased supervision and surveillance, legislation in the face of concerns about injuries, sexual abuse, and other safety concerns” (p. 131). A Canadian national survey carried out in 2002 by CCES/Decima indicates that 16% and 13% of the 2,001 respondents identified that an overemphasis on winning and competition and the cost of participation are significant problems in community sports programs (Donnelly & Kidd, 2003). Moreover, 18% of respondents indicated that injury is a serious issue while violence (10%) was one of the most serious problems facing community sport organizations (Donnelly & Kidd, 2003; see also Rick Hansen Institute, 2013). Even with the predominant assumptions about the way sports should be played and organized, namely, using a highly competitive professional or pyramid model where opportunities for less talented or smaller participants become fewer as they grow older (Donnelly & Kidd, 2003), academic and medical researchers have argued for an alternative sport model with a greater emphasis on participant safety, particularly in North American minor hockey (Cusimano, Nastis, & Zuccaro, 2013; Emery, Hagel, Decloe, et al. 2010). This not only demonstrates a competing discourse, but a reverse discourse which prioritizes the safety of participants.

Although the beginning of any discourse cannot be easily traced (Foucault, 1972, 1990; Pringle & Pringle, 2012), the critique of dominant cultural conservative discourse can be linked back to when recreation ('house') leagues were criticized by researchers in the 1970s in Canada for over-emphasizing winning at all costs and focusing excessively on the outcome of games (Coakley & Donnelly, 2009; Donnelly & Kidd, 2003). These critiques led to 'best practice initiatives' promoting fair play and positive participation experiences (Coakley & Donnelly, 2009). Meanwhile, because of the decline of minor hockey registration in the 1980s, its excessive violence and ensuing risk of injury drew the attention of hockey practitioners and public interest over concerns of hockey being unsafe (Coakley & Donnelly, 2009; Donnelly & Kidd, 2003; Marcotte & Simard, 1993). These concerns led to a number of studies on the subject (Brust, Leonard, Pheley, & Roberts, 1992; McMurtry, 1974; Vaz, 1982). In particular, researcher Edmund Vaz (1982) suggested a reward system (a 'fair play' point system where teams are awarded additional points in the standings for fewer penalties) in order to encourage less violent and aggressive behaviours. This paved the way for the implementation of 'fair play' leagues in the province of Québec (Marcotte & Simard, 1993; Roberts, Brust, Leonard, & Hebert, 1996). In fact, the 'fair play' solution started with parents who were 'informed' (i.e. who were proactive in obtaining safety information and advocated prioritizing the safety of youth participants) and provided the impetus of educating other stakeholders involved in minor hockey (Coakley & Donnelly, 2009).

Presently, there is increased emphasis by the media and academics about player safety due to the increased number of incidents of professional hockey players receiving season/career ending injuries, particularly those involving concussions (The Canadian Press,

2011; Cole, 2011; Cusimano et al., 2013). While much public scrutiny of injury in hockey has focused on professional cases, injury in minor hockey is just as problematic (King & LeBlanc, 2006; Yard & Comstock, 2006), leading to a public debate regarding how to 'fix' minor hockey to make it safer for its players while attracting more participants to the game. Some researchers contend that rules changes are the most effective method for injury prevention since they addresses both cultural and behavioural changes (Cusimano, Nastis, & Zuccaro, 2013), but rule changes addressing the distinctive Canadian style of game or brand—its physicality—are difficult to modify because of a host of socio-cultural reasons (Robidoux & Trudel, 2006). Nevertheless, academics, medical practitioners, and safety advocates continue to challenge more traditional, conservative hockey practices.

While the medical and sports sciences continue to generate knowledge highlighting the dangers of body checking (Emery, Hagel, Decloe, et al. 2010; Emery & Meeuwisse, 2006; Macpherson, Rothman, & Howard, 2006) and the effects of concussions (Cusimano, et al., 2011; L. Johnson, 2011; Marchie & Cusimano, 2003), it is coaches and former players advocating old-time hockey based on toughness, intimidation, violence and other the Anglo-Canadian lunch-pail values of effort, hard work, sacrifice, and fisticuffs (Dowbiggin, 2008; Novak, 1993) that have been positioned as the holders of legitimate knowledge regarding proper Canadian hockey practices. Coaches rather than academics "hold privileged positions in a performance discourse because of their claims to expertise, experience, wisdom and resources" (Johns & Johns, 2000, p. 229). Therefore, in what Foucault (1990) deemed 'the system of legitimate knowledge', the coach's position within hockey affords them the title of the expert concerning truth/knowledge claims of what constitutes proper Canadian hockey practices. From a historical standpoint, prioritizing the safety of youth hockey players was

once considered a marginalized discourse. However, this discourse is gaining authority, is increasingly at the forefront of public debates, and often written and spoken about in the same language in which it was first dismissed (Foucault, 1990). This denotes that the discourse prioritizing youth safety does not simply run counter to the dominant cultural conservative discourse. The demand for its legitimacy to be acknowledged stems from both 'informed' hockey parents (Coakley & Donnelly, 2009) and from the support of medical and academic institutions that take part in its production and transmission (Foucault, 1972). Although NHL norms and values were once considered the ones that 'count' compared with "the values and goals of recreational reformers, physical educators, and even legislators" (Gruneau & Whitson, 1993, p.162), there has been a shift towards prioritizing participant safety, with North American minor hockey governing bodies adjusting their body checking policy based on the knowledge claims of scientific research about best hockey practices (USA Hockey, 2011ab; Hockey Canada AGM, 2013; The Canadian Press, 2013). Unfortunately, body checking and safety issues are often approached from the perspective of 'crisis management' or due to public scrutiny rather than in a systematic and proactive manner (Donnelly & Kidd, 2003).

Local Parental Perspectives: Negotiating the 'Soul' of the Game vs. Player Safety

As part of a larger observational study examining the situational factors and contextual details of injury in Peewee (ages 11-12) and Bantam (ages 13-14) hockey, a component of the study involved speaking with the team parents about their views about competitive minor hockey and potential concerns they had about participant safety. Over a two year period, 16 formal interviews with Ontario and Québec hockey parents were conducted, along with a number of informal discussions before, during and after games. The

interview data provides insight into the meanings parents ascribe to contemporary hockey practices and the manner in which parents navigate their way through competing discourse concerning 'traditional' hockey values and the escalating concerns about participant safety.

To start, it was evident that parents in general supported the notion that competitive minor hockey is informed by professional hockey standards both in terms of its physicality, but also its hypercompetitiveness. Most Peewee and Bantam parents enrol their kids in 'spring hockey' and/or specialty hockey development camps while some partake in dry-land training (light weights, cardio) during the season in addition to team sessions. When not playing hockey in the spring, many kids partake in some form of off-season training to improve their on ice performance, and, in doing so, minor hockey has become nearly a year-round endeavour. In one interview a parent explained that her child does not always play spring hockey but: "When he doesn't play spring hockey he's doing a treadmill training session. So it's still hockey oriented, but that's you know, that's for his development and he feels he needs to push himself if he wants to try and stay at that top level" (Interview, February 19, 2012). Moreover, some Québec and Ontario Peewee hockey parents in our study believed that Québec kids were behind Ontario kids in terms of skill development. This was viewed as the consequence of Québec delaying body checking until Bantam. This viewpoint is partly due to the acknowledgement that body checking is a skill that will always be a part of hockey as one Ontario Peewee hockey dad put it: "It's preparing kids for the next levels of hockey. . . body checking's all the way through hockey right? At any level, whether the kids are looking for a scholarship, or a junior, or whatever" (Interview, February 26, 2012).

Interestingly, while most parents want their children to have every competitive advantage so

that they will have the best chance to make it to the highest levels of the sport, they did not want their children's safety compromised in the process.

The concerns parents had about player safety are being impacted by a reverse discourse that is continuing to gain authority in Canadian hockey culture (Coakley & Donnelly, 2009; Hockey Canada AGM, 2013; The Canadian Press, 2013). With heightened awareness of concussions in minor hockey (Cusimano, et al., 2011; Marchie & Cusimano, 2003), and the implementation of the new 'Head Contact' rule² for the 2011-12 season, the majority of parents were in favour of the new injury prevention initiatives developed by Hockey Canada. One dad from Québec, whose son plays at the Bantam level, indicated that players need to be protected: "[As] for the head shot rule for the refs and stuff to call it, I have no problem with that. I think sometimes it gets crazy but you know what? You got to protect the head" (Interview, December 16, 2011). Future initiatives suggested by interviewees included increased education for parents and children highlighting the short and long term consequences of concussions, improve the quality of body checking instruction, and softening protective equipment. It was pointed out by several parents that the responsibility for the wellbeing of youth participants is shared by all hockey stakeholders.

The negotiation between the dominant and reverse discourse is particularly evident in the body checking initiation debate where there is little consensus among parents. Some believe that body checking should be introduced as young as Atom (ages 9-10) often citing that there is less size disparity and kids are not big or strong enough to hurt each other. Others believe that Pee wee is the appropriate age/level for size disparity and skill

² For Minor and Female hockey; this rule penalizes any contact, accidental or otherwise, with an opponent's head, neck, or face with any part of the body, stick, or equipment (Hockey Canada, 2011).

development reasons. Others still insist that introducing body checking in Bantam is more suitable for youth since they would have gained the basic skills of skating, passing, and shooting while being more cognitively and physically prepared. Reducing the time of exposure to the risk of injury was also given as an argument favoring initiation in Bantam. Even with the emerging social climate of a 'culture of caution' (Coakley & Donnelly, 2009) gaining authority and research evidence underlining the dangers of body checking, the notions of physicality are still constructed as the 'essence' of the Canadian game. During an interview with one parent from Ontario, referring to a game where there was a big collision between two large Peewee players, she indicated that: "Yeah I mean hits like that (...) I'm sure every person in here who felt a little shrill of excitement (...) it's part of what we understand hockey to be and to me it's contact it's still part of hockey" (Interview, February 19, 2012).

The construction of physicality as an essential feature of 'Canadian' hockey causes tension regarding preserving 'Canadian' hockey tradition versus player safety. After her son suffered a severe concussion two years ago from a hit from behind, one Québec parent said she was now always afraid that her son, who played Bantam hockey at the time of the interview as a thirteen year old, would be hit from behind. Despite this injury incident she explained that she supports the introduction of body checking at Peewee because: "When you learn it younger you can hit in a clean way without having a penalty. It hurts...but that's the game. If you don't want physical contact well then don't play hockey, go play curling, you know" (Interview, February 16, 2012). Although she prefers to see skilled players and good hockey such as during the Olympics, she went on to explain:

That's the game you know. If there is no checking, no fights, no nothing...will it still be hockey? Some people say yeah, but then it's kind of the soul of the game is based a bit on being physical, well here in North America. (Interview, February 16, 2012).

Male interviewees are equally adamant that physicality is how we understand the game while still expressing an awareness of the need and value for prioritizing player safety. A Pee wee dad from Ontario, who makes no distinction between body checking and body contact, put it this way:

The head contact rule has had a real impact; it's had a positive impact this year [pause]. I think if I were to make a statement I would like to see body contact introduced in Atom. I think I would like body contact introduced in some levels of house [recreational] league [pause]. I think body contact is an important aspect of hockey and that by taking it out and a movement to taking it out is taking out a critical element. I think players get hurt, but I think by throwing away body contact is throwing away a key component about what hockey is and what it's about. Can we do a better job in teaching it and using it as a tool and technique? Absolutely, absolutely. (Interview, February 22, 2012).

In this way, both men and women are trying to make sense of, and negotiate this discursive field, not only as distinctive groups (hockey conservatives or safety advocates), but within their own minds as well. Moving forward, the question remains how to protect youth players while still maintaining the physical brand of hockey Canada is known for.

The competing cultural conservative-safety discourse has created ambivalence regarding the appropriate direction minor hockey should take on the issue of body checking. Paired with the belief that body checking and physicality are the essence of the "Canadian" game, the elevated emotional intensity surrounding the body checking debate is not surprising (CBC News, 2013; A. Johnson, 2013). The ambivalence of hockey parents regarding what they want from minor hockey is reflected in how Hockey Canada governs minor hockey. With the merger of Hockey Canada and the Canadian Hockey Association, both the mission and mandate of Hockey Canada (n.d.) are embedded with competing

discourse leading to careful negotiation and, ultimately, impacting minor hockey governance.

At the Crossroads: Hockey Discourse and the Implications for Youth Safety

As the self-proclaimed 'national guardian' of the game, Hockey Canada has positioned itself as the gate-keeper of legitimate hockey practices (Hockey Canada, 2012). In doing so, Hockey Canada faces the difficult task of managing the sport in light of this competing discourse. Although earlier changes to body checking policy have been made to maintain "Canadian" hockey integrity (Maguire, 1996; Robidoux & Trudel, 2006; Tetley, 2012; Whitson & Gruneau, 2006), Hockey Québec, Hockey Alberta, Hockey Nova Scotia, and most recently Hockey Canada, have all made the step to delay the introduction of body checking until the Bantam level in reaction to public pressure to improve player safety (Hockey Canada AGM, 2013; The Canadian Press, 2013). Delaying when to introduce body checking is not a solution unto itself; suddenly exposing youth to full contact without mandatory training would seem reckless at best (Emery & Meeuwisse, 2006; USA Hockey, 2011b). But in addition to training, devising some form of graduated introduction to 'body contact' would enable youth to gradually immerse themselves into a physical contact environment and to be better prepared to give and receive checks. Although efforts for some sort of a graduated system are underway, there is nothing in place to date. What is certain at this point, however, is that there has been significant public backlash to whatever direction Hockey Canada takes. In this latest move to delay body checking the emotionality of the debate has intensified, so too have the dominant and reverse discourse.

Caught in the middle of competing cultural conservative-safety discourse are the parents of youth playing in minor hockey. Since "the success of hockey has always mattered

to many Canadians" (Moore, 2002, p.314), issues surrounding body checking are debated with great passion and emotion. In response to the latest decisions by Hockey Canada and its provincial branches to raise the age/level of body checking initiation, some Canadians are infuriated that hockey is being changed and fear that it will lose its essence, namely its physicality (Grossman & Hines, 1996; Moore, 2002; Robidoux & Trudel, 2006; Whitson & Gruneau, 2006). Some have expressed concerns about the debilitating effects these decisions will have on Canada's international success (The Canadian Press, 2013). Meanwhile, others applaud Hockey Canada and its thirteen member branches for finally responding to safety advocates and public scrutiny (The Canadian Press, 2013). Canadian hockey parents are also caught in the middle between these competing discourses. The public debate and ambivalence amongst hockey stakeholders is reflected in the views of local minor hockey parents that were interviewed. Their differing views on the appropriate age of body checking introduction and preserving 'Canadian' hockey integrity versus player safety, demonstrates a competing discourse, causing tension and passionate debate. Some parents unknowingly take conflicting positions by simultaneously constructing physicality as the 'essence' of hockey while also advocating behavioural and rule changes aimed at body checking as they try to make sense of this predicament in their own minds. The legitimacy of certain hockey practices over others and the meanings and understandings ascribed to them are ultimately contested through discourse (Foucault, 1972, 1990; Rail, 2002). Since discourse cannot be separated from power (Foucault, 1979) the cultural conservative-safety discourse is the articulation of power and knowledge, directing Canadians in terms of their experiences of what hockey is, how it is played, and who carries legitimate knowledge or not. This helps us understand why the reverse discourse by the medical research community has had such

difficulty gaining traction, despite its obviousness and value (protecting children who play the sport). Thus, the difficulty in transforming hockey practices lies in the discourse which constructs and shapes them.

Conclusion

Canadian Minor hockey is comprised of a multiplicity of discourse that confers meaning and shapes Canadian hockey practices (Foucault, 1972). Presently, there is a dominant cultural conservative discourse which prioritizes a physically dominant and aggressive style of play arguing that elite player development and maintaining the integrity of the 'Canadian' game is the priority. However, there is a reverse discourse that is advocating for improved safety which involves reforming hockey rules and reducing situations which are exposing players to unnecessarily high risk of injury—primarily body checking. This reverse discourse has created a true public controversy about the overall safety of the sport and what direction hockey governing bodies should be taking to mitigate the risk of injury. The most recent steps taken by Hockey Canada to prioritize player safety by removing body checking from the Pee wee level has not brought about resolution, but rather an intensification of the debate.

While it is certain that any contact sport comes with some risk of injury, efforts to minimize the risk of injury should be vigilant and ongoing. It is arguable that Hockey Canada does bear some responsibility in maintaining Canadian hockey heritage, and part of this heritage is international success, but as a public institution its priority needs to be on participant safety, positive playing experiences, and the encouragement of lifelong participation. From its inception, and subsequent merger with the Canadian Hockey Association in 1994, Hockey Canada has struggled to maintain both sides of this duality and

as such is caught in the middle between a cultural conservative discourse and an emergent player safety discourse. The recent changes in body checking policy by Hockey Canada (Hockey Canada AGM, 2013; The Canadian Press, 2013) illustrate the direction Hockey Canada is currently heading, but if coupled with poor showings at international hockey events, it will be interesting to see what type of counter-measures are taken to secure hockey supremacy. What is fascinating, at least from an academic perspective, is the generation of competing discourse that are impacting Canadian amateur hockey practices. What might seem like innocuous efforts to ensure the safety and well being of youth participating in the national winter pastime are from one perspective perceived as an attack on the sport and on Canadian cultural identity. Sadly these reactionary perspectives are hindering constructive dialogue between hockey cultural conservativists and sport safety advocates, consequently impeding progressive injury prevention strategies. The most recent decision to delay body checking is an example of this in that it is not a graduated approach to physical contact, nor does it come with systematic training for participants. In other words, rather than addressing the issue of youth being suddenly exposed to body checking in a proactive and systematic manner, Hockey Canada has simply delayed it in a response to public pressure to improve player safety.

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Part III: Conclusion

Chapter Four

Overall Discussion and Synthesis

This study began as a qualitative investigation into the how and why of injury by assessing the situational factors and contextual details of injury. Initially, the focus was to provide a comparative contextual analysis of body checking versus non-body checking hockey, which included girls hockey. However, the larger research initiative along with this thesis evolved to investigate the appropriate age of body checking introduction and examined boys hockey only. Moreover, when it became clear that a quantitative, statistical framework needed to be employed, this thesis developed into more of a mixed methods model. This made it a challenge to satisfy each disciplinary lens regarding the results and this thesis, to a certain extent, is a negotiation of this. Nevertheless, the aims of this study were as follows;

- 1) What are the situational factors and contextual details of injury in youth minor body checking hockey?
 - a. What type of injury predominates?
 - b. What were the leading causes?
- 2) What are the differences in injury between Pee wee and Bantam Leagues?
- 3) At what age/level is the most appropriate for body checking initiation?
- 4) What are the parental perspectives on health and safety issues in minor hockey?
- 5) What is the impact of competing cultural conservative-safety discourses on the establishment of legitimate Canadian minor hockey meanings and practices, and the implementation of the rules and regulations that govern them? Specifically, what is the impact of these competing discourses in conjunction with the deep seeded

emotional connection hockey stakeholders have with the game on the implementation of progressive injury prevention initiatives?

Over the course of the data collection phases and as the project evolved, a decision was made to focus less on the situational factors (#1) and more on the injury reporting methods that were developed for this study. This decision was made because the manner in which injuries are documented have a tremendous impact on injury reporting not only in terms of frequency, but also in terms of what types of injuries are being reported. In article one, I point to the importance of employing a multi-pronged mixed method observational design and utilizing a broader definition of injury. In so doing, a more comprehensive injury reporting system allows for documenting how and why injuries are occurring through firsthand observation, frame by frame video analysis, and follow-up through training staff and parents whenever necessary. Article two puts this comprehensive methodology to use to examine differences in introducing body checking at the Peewee level or delaying the introduction to Bantam. With Hockey Canada and its member branches making the decision to delay body checking to Bantam, the information from this thesis assists in understanding the potential merit of their move. What the research for this article indicates is that body checking was the number one mechanism of injury in both Peewee (76%) and Bantam (59%), yet Peewee players sustained significantly more body checking related injuries than players in Bantam ($\chi^2:4.76$; $p:0.03$). What this article provides is an important first step in supporting the decision to delay the introduction of body checking as injury rates do not necessarily decline, but body checking injuries do. The issue of injury prevention, however, is not solely an issue of on ice injury mechanisms and, if organizations like Hockey Canada are going to make the game safer, it is critical to move beyond the ice and begin examining

the broader socio-cultural climate surrounding the sport. Thus in article three I examine the issue of hockey safety through a critical socio-cultural lens. Through this analysis I reveal how the pervasiveness of discourse shapes belief systems and parental perspectives about issues concerning safeguarding traditional hockey practices versus prioritizing player safety, ultimately impacting the implementation of progressive injury prevention strategies. Below I expand on the significance of the findings from this thesis in an effort to contribute to ice hockey injury prevention.

When examining the injury prevention literature, ice hockey injury research primarily relies on voluntary prospective and retrospective secondary reporting systems to generate injury data. Researchers utilizing these methods have been able to document the frequency of injury but have not advanced knowledge of the nature, cause, and socio-cultural context of injury. Unfortunately, traditional definitions of injury, requiring a participant to either miss time (a minimum of 24 hours or one practice/game session) beyond the injury incident or to seek medical attention from a physician, hospital, or emergency department, do not account for other injurious situations where players play through pain and/or conceal injury. Minor injuries are not necessarily debilitating but if they are not handled appropriately, the wear and tear on the body from these lesser injuries can lead to chronic issues, potentially negatively impact playing experiences and participation rates (Butcher et al., 2002; Hockey Canada, 2012; Winton Sarvis, 2013; MacGregor, 2012; Mirtle, 2012; Yard & Comstock, 2006). Moreover, this form of injury reporting typically utilizes voluntary prospective designs which require participants to willfully report injury occurrences to researchers via team personnel leading to a tendency to underreport minor injuries and provide a minimal amount of information about how the injury occurred.

Therefore, this research problem is best approached from both quantitative and qualitative approaches by utilizing mixed methods.

The aforementioned limitations of operational definitions and the inconsistencies of traditional injury reporting practices illustrate the need for research using an observational design with a broader, more 'encompassing' injury definition, to complement larger quantitative studies and provide a more detailed assessment of the risks and circumstances surrounding injury. Accordingly, the first article delineates traditional injury reporting practices, outlines an observational research design for documenting the circumstances surrounding injury incidents in youth hockey, and proposes a broader definition of injury. The objective is to document more minor injuries *in situ* that would go unreported using previous injury reporting definitions and methods. Specifically, the proposed multipronged observational approach consisted of using self-designed (i.e. informed by field work and previous research) observation grids to document minor injury and having coaches and trainers fill out Post-Game Injury Assessments to obtain more detailed information for severe injuries whenever a player misses a minimum of one period. Moreover, firsthand observations were written down via field notes while all observed games were video recorded. Combined with follow-up with team personnel and parents, access to game sheets, bi-weekly research team meetings, and extensive data analysis, this research design made for a comprehensive injury reporting and verification system. Lastly, these methods were supplemented with both formal and informal interviews with parents, coaches, and trainers.

From this observational research approach, a broader definition emerged which best captured the variety of injury situations players experienced over the course of the study. Working from previous studies (Bernard et al., 1993; Dumas & Laforest, 2009; Fuller et al.,

2007; Meeuwisse, Sellmer, & Hagel, 2003), we defined injury as any physical trauma that has occurred as a result of participation in an organized competition whereby a player:

- (1) is in discomfort;
- (2) missed playing time but returned to the current game;
- (3) missed playing time and did not return to the current game; and
- (4) missed subsequent game(s)

With this definition, researchers are able to record subtle injuries while also including a missed-time component (missed sessions) for comparisons with larger epidemiological research. Article one was formulated primarily as a methods paper, rather than a report of the quantitative or qualitative data, indicating that a more holistic knowledge of injury can be attained utilizing the mixed methods approach outlined therein and that this design also creates a more comprehensive system for documenting injury.

This mixed methods approach allowed for both the quantitative and qualitative assessment and comparison of league play by following three different teams playing in two separate leagues (Ontario and Québec) with different ages of body checking introduction. Specifically, at the time of this study, Ontario introduced body checking in Pee wee (ages 11-12) while Québec introduces it in Bantam (ages 13-14). To understand the controversy surrounding when to introduce body checking and examine whether it is better to delay body checking or introduce it earlier, injury data from the 2009-10 and 2011-12 seasons was analyzed. The results indicate that no significant differences in overall injury frequency between Pee wee and Bantam when weighted by Athletic Exposure (χ^2 : 0.22; p :0.64). Furthermore, there were no significant statistical differences in injury profiles as a result of delaying body checking or introducing it earlier. In other words, Pee wee and Bantam players

have a tendency to be injured in similar ways and in similar circumstances. The only significant difference between Pee wee and Bantam was in terms of body checking; Pee wee players sustained more body checking related injuries than their Bantam counterparts 76% versus 59% ($\chi^2:4.76$; $p:0.03$) where the odds of being injured due to body checking is 2.158 times higher in Pee wee than in Bantam (β_{ex} 2.158; 95% CI: 1.07-4.34; $p:0.03$). Moreover, the vast majority of body checking related injury occurred on legal actions (79% in Pee wee and 84% in Bantam) as deemed by the on ice officials. This provides evidence that youth players are being injured on routine or typical 'hockey plays' rather than on violent or dangerous ones. Therefore there does not appear to be any more risk to introducing body checking in Bantam rather than in Pee wee. In fact, there may even be benefits as introducing body checking later reduces the frequency of body checking related injury.

Since minor hockey in Canada is situated in a socio-cultural context which values the highly physical dimension of the sport, body checking remains an integral part of the game despite this study and many others illustrating the risks associated with of body checking (Emery, Kang, Shrier, et al., 2010; Hagel, Marko, Dryden, et al., 2006; Macpherson, Rothman, & Howard, 2006). To understand the resistance to efforts aimed at reducing the risk of injury and making the sport of hockey safer for youth to play, particularly in relation to body checking, the aims of the third article was to critically analyze the debate about preserving the quintessential elements of 'Canadian' hockey (i.e. elite player development and hockey supremacy, physicality, and hypercompetitiveness) versus prioritizing the health and safety of participants. The intention was to examine the broader competing cultural conservative-safety discourses (Foucault, 1972, 1990), and to use local parental perspectives as an exemplar of how wider, national, discourses play out at the local level. Understanding

how discourse shapes how people are thinking about issues of participant safety in Canadian youth hockey can help explain the difficulties of policy implementation and change and the emotionality surrounding the body checking debate.

Focusing primarily on secondary sources (scholarly literature and news media) and supplemented by interview data, this socio-cultural analysis illustrated how the profound pervasiveness of discourse shapes belief systems around preserving the integrity of 'Canadian' hockey and how people think about improving the safety of the sport and minimizing risk. These competing discourses create ambivalence, tension, and passionate debate concerning efforts to make the game safer amongst safety advocates as well as conservative hockey practitioners and enthusiasts. Emotionality often supersedes logic as seen in delaying body checking rather than removing it entirely despite research indicating that checking is the number one mechanism of injury (King & LeBlanc, 2006; Marchie & Cusimano, 2003). Ultimately, discourse impacts the implementation of progressive—that is, forward-thinking, in an active rather than in a reactive or ad hoc manner—injury prevention initiatives in Canadian minor hockey and this analysis provides researchers and policy makers with an explanation as to why behaviours, such as body checking, which are known to increase injury are tolerated, even encouraged, remain a part of minor hockey.

As a result of the research presented herein, there are three primary contributions being made. First, multi-pronged approaches with observational designs and broader injury definitions are needed to better understand injury. This type of methodological approach also complements larger epidemiological injury studies. Second, if Hockey Canada and their 13 member branches are going to keep body checking in minor hockey then the results from this study indicate that delaying body checking is the more prudent approach. This approach

should include a graduated, systematic, and mandatory introduction to body checking for all participants. Moreover, a graduated body checking program in accordance with the 'Progressive Checking Skill Development Program' implemented by USA Hockey (2011ab) where body checking is only allowed during practices at the Pee wee level before it is introduced during games in Bantam along with strategies to increase the amount of allowable player contact in both Novice (age 8) and Atom (ages 9-10), is recommended. Third, the critical analysis of the socio-cultural context of injury advances our understanding of how competing cultural conservative-safety discourses give meaning to, and, shape what constitutes proper 'Canadian' hockey practices and how discourse impacts the implementation of best practice initiatives. However, this study did have several limitations and they are discussed in the following section along with the implications for future research.

Limitations and Future Research

As is typical with observational research, data collection and analysis was time consuming and required a vast amount of human resources. This study was limited in the amount of games and injury situations recorded, resulting in a sample size much smaller than classic epidemiological studies. Thus, results may not be generalizable to other situations and settings. No follow up with opposing teams' coaches and trainers were done to confirm injury severity in terms of 'missed subsequent game' and 'number missed'. Finally, comparisons between studies may be difficult because of the broader definition that was utilized in this study. To overcome these limitations, suggestions for future research directions in terms of observational designs, injury rates, and issue focused semi-structured interviews are considered in the ensuing paragraphs.

Observational design. Most injury prevention programs are based on information provided by retrospective secondary (based on medical and insurance databases) and prospective voluntary research designs with restrictive injury definitions. Therefore, additional research using observational and mixed methods designs is needed to understand injury beyond the enumeration of physically debilitating or chronic injury incidents and better inform injury prevention initiatives. In particular, research replicating this study by utilizing the same protocols (i.e. repeating this study on a larger scale) to increase the sample size and to compare and corroborate results is necessary. When possible, multiple cameras should be used to capture injury incidents from several angles to provide the necessary video footage for a more detailed analysis of each occurrence of injury. Lastly, the heights and weights for the entire league under study should be obtained. In doing so, a greater comprehension of the role of anthropometric differences (body mass) on injury outcomes can be determined. Knowing the body mass of players can provide a direct comparison between smaller and larger players and allow researchers to determine if injury was the result of a larger player body checking a smaller one.

Injury rates. As noted above, future research should include follow up with coaches and trainers of opposing teams to ascertain the injury severity of opposing players in terms of whether or not they missed a subsequent game(s) and the total number of games missed. By including the number of games missed of opposing players, a more thorough analysis of the impact of the situational factors and contextual details on injury severity can be done. Consequently, comparisons of injury rates between observational studies and larger quantitative studies that use injury definitions based on missed playing time (either in days or number of sessions) and medical attention would be less problematic. In terms of the

examination of injury rates, there are three areas where additional attention is required: 1) in light of the nationwide delay of body checking to the Bantam level, the documentation of injury at Bantam is needed to investigate injury rates as a result of this rule change; 2) studying teams in connection with body checking training received will advance our understanding of the impact of the type of body checking training on injury rates; and 3) referee play-calling. The evaluation of the play-calling of referees would permit researchers to properly ascertain the effectiveness of a rule change, particularly in the case of the newly implemented 'Head Contact Rule' (Hockey Canada, 2011). The impact of penalized versus non-penalized plays on injury is vital for understanding if injuries are the result of aggression, violence, and reckless play rather than on the result of routine 'hockey plays'. Referees play a critical role in the interpretation and implementation of regulations as well as affecting athlete behaviour. This area is definitely worthy of future exploration.

Issue focused semi-structured interviews. Future investigations should carry out qualitative interviews with Hockey Canada officials along with executives from its provincial branches and local hockey associations. The perspectives of minor hockey administrators from different levels of governance are needed to gain a better understanding of the workings of competing discourses and their effects on minor hockey meanings and practice. In other words, future research with minor hockey administrators can provide insight into how minor hockey organizations address health and safety concerns (particularly in relation to body checking), the development of progressive injury prevention initiatives, and how discourse impacts their implementation.

Concluding Remarks

This study has provided new perspectives on the use of an observational methodology when documenting and analyzing injury in youth ice hockey. In combination with a broader definition of injury, these types of research designs are needed to further understand *how* and *why* injury is occurring in minor hockey. The results indicate that although there are few injury differences between Peewee and Bantam level players, Peewee players sustain more body checking related injuries than their Bantam counterparts. Since it is unlikely that body checking will not be eliminated entirely from youth hockey, and most body checking related injury are occurring on routine actions tied to game play, its introduction needs to be implemented in a graduated approach where players are required to undergo systematic body checking training.

The issue of injury prevention is not simply mechanistic, in that one must also understand injury within a socio-cultural context, particularly one that encourages and values hyper-physicality. In Canada the issue of youth hockey safety is becoming a growing public concern and body checking has been repeatedly cited as the primary mechanism of injury. Yet efforts to delay or remove body checking altogether have been met with great resistance. Moving forward in implementing an injury prevention strategy requires being aware of the contested views stakeholders have about the state of the sport and what is required to protect players yet maintain the integrity of the sport. Since discourse shapes and determines the availability of cultural practices and the meanings and understandings ascribed to them (Foucault, 1972, 1990), it facilitates an understanding of how deeply ingrained and pervasive belief systems of both safety advocates and conservative hockey practitioners and enthusiasts are concerning prioritizing the safety of hockey participants or

preserving 'Canadian' hockey integrity. Accordingly, minor hockey stakeholders should be critically aware of the competing cultural conservative-safety discourses by engaging in ongoing questioning and open dialogue with both hockey conservatives and safety advocates. Hockey stakeholders should also be conscious of how discourse shapes and normalizes sporting practices, particularly those that are known to be harmful to its participants (Shogan, 1999). Ultimately, this knowledge can be used by injury prevention researchers by outlining a methods template to investigate injury in minor hockey. Additionally, this knowledge can be used by minor hockey administrators to inform best practice initiatives and programs with the intention of reducing injury.

Part IV: Statement of Contributions

Statement of Contributions

Article One

Charles Boyer and Dr. Michael Robidoux took part in the conceptualization of the methodology utilized in the study. Both Mr. Boyer and Dr. Robidoux assisted in structuring the paper, reviewed all stages of the manuscript, and approved the final manuscript as submitted. I was the lead author but received notable editorial aid from the aforementioned two authors. Matthew Davey, Mitchell Green, and Dr. Michael Spivock provided assistance by reviewing, revising, and approving of the final manuscript. Dr. Spivock also helped to conceptualize the presentation of research results.

Article Two

Dr. Michael Robidoux, Dr. Jean Harvey, and Dr. Eric MacIntosh helped me with conceptualizing and designing the study as well as guiding the study during the proposal stage. Both Mr. Boyer and Dr. Robidoux assisted in designing the data collection instruments. I coordinated and supervised data collection with two hockey teams (2009-10 and 2011-12), analyzed the data, and was the lead author on the paper. Mr. Boyer coordinated and supervised data collection for one team (2009-10), analyzed the data, and reviewed and revised the initial manuscript. The other authors contributions are as follows: A) Mitchell Green coordinated and supervised data collection with one of the one of the teams (2011-12) and reviewed and revised the initial manuscript; B) Matthew Davey helped me to collect the data with one of the teams (2011-12) and provided editorial assistance during the initial stages of the manuscript; C) Dr. Michael Spivock carried out the quantitative statistical analysis, assisted in drafting the results section, reviewed and approved the final manuscript as submitted; and D) Dr. Robidoux supervised the project,

data management, reviewed all stages of the manuscript, and approved the final manuscript as submitted.

Article Three

Dr. Michael Robidoux provided guidance in the construction of the semi-structured interview guide. Dr. Robidoux, Mitchell Green, and Matthew Davey assisted in the collection and transcription of interview data. Mr. Boyer took part in the formulation of the initial semi-structured interview guide (2009-10) and the collection and interpretation of initial informal interview data. Lastly, Dr. Michael Spivock assisted with the conceptualization and data analysis stages while providing editorial assistance by reviewing the final manuscript. I partook in the formulation of the interview guide, the collection, transcription, and interpretation of interview data, and was the lead author. I received editorial help from Dr. Robidoux who, in addition to approving the final draft, reviewed and revised during all stages of the paper.

Part V: References

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Appendices

Appendix A: Ethics Approval Letters

File Number XXX-XX-XX

Date (mm/dd/yyyy): 12/01/2009



Université d'Ottawa **University of Ottawa**
 Service de subventions de recherche et d'éthologie Research Grants and Ethics Services

Ethics Approval Notice Health Sciences and Science REB

Principal Investigator / Supervisor / Co-investigator(s) / Student(s)

First Name	Last Name	Affiliation	Role
Michael	Robidoux	Health Sciences / Human Kinetics	Principal Investigator
Stephen	Adams	Health Sciences / Human Kinetics	Co-investigator
Charles	Boyer	Health Sciences / Human Kinetics	Co-investigator
Marshall	Kendall	Health Sciences / Human Kinetics	Co-investigator
Hassan	Saeed	Health Sciences / Human Kinetics	Co-investigator

File Number: XXX-XX-XX

Type of Project: Professor

Title: Comparative Study of Injury in Youth Competitive Hockey in Quebec and Ontario

Approval Date (mm/dd/yyyy)	Expiry Date (mm/dd/yyyy)	Approval Type
12/01/2009	11/30/2010	Ia

(Ia: Approval, Ib: Approval for initial stage only)

Special Conditions / Comments:
N/A

File Number:



Date (mm/dd/yyyy): 12/01/2009

Université d'Ottawa University of Ottawa
Service de subventions de recherche et d'éthologie Research Grants and Ethics Services

This is to confirm that the University of Ottawa Research Ethics Board identified above, which operates in accordance with the Tri-Council Policy Statement and other applicable laws and regulations in Ontario, has examined and approved the application for ethical approval for the above named research project as of the Ethics Approval Date indicated for the period above and subject to the conditions listed the section above entitled "Special Conditions / Comments".

During the course of the study the protocol may not be modified without prior written approval from the REB except when necessary to remove subjects from immediate endangerment or when the modification(s) pertain to only administrative or logistical components of the study (e.g. change of telephone number). Investigators must also promptly alert the REB of any changes which increase the risk to participant(s), any changes which considerably affect the conduct of the project, all unanticipated and harmful events that occur, and new information that may negatively affect the conduct of the project and safety of the participant(s). Modifications to the project, information/consent documentation, and/or recruitment documentation, should be submitted to this office for approval using the "Modification to research project" form available at: http://www.rges.uottawa.ca/ethics/application_dwn.asp

Please submit an annual status report to the Protocol Officer 4 weeks before the above-referenced expiry date to either close the file or request a renewal of ethics approval. This document can be found at: http://www.rges.uottawa.ca/ethics/application_dwn.asp

If you have any questions, please do not hesitate to contact the Ethics Office at extension 5841 or by e-mail at: ethics@uOttawa.ca.

Germain Zongo
Protocol Officer for Ethics in Research
For Dr. Daniel Lagarec, Chair of the Health Sciences and Sciences REB

2

550, rue Cumberland Ottawa (Ontario) K1N 6N5 Canada
(613) 562-5841 • Téléc./Fax (613) 562-5338
<http://www.rges.uottawa.ca>

550 Cumberland Street Ottawa, Ontario K1N 6N5 Canada
Téléc./Fax (613) 562-5338
<http://www.ssr.uottawa.ca>

File Number:



Date (mm/dd/yyyy): 09/13/2011

Université d'Ottawa **University of Ottawa**
 Bureau d'éthique et d'intégrité de la recherche Office of Research Ethics and Integrity

Ethics Approval Notice
Health Sciences and Science REB

Principal Investigator / Supervisor / Co-investigator(s) / Student(s)

<u>First Name</u>	<u>Last Name</u>	<u>Affiliation</u>	<u>Role</u>
Michael	Robidoux	Health Sciences / Human Kinetics	Principal Investigator
Stephen	Adams	Health Sciences / Human Kinetics	Co-investigator
Charles	Boyer	Health Sciences / Human Kinetics	Co-investigator
Marshall	Kendall	Health Sciences / Human Kinetics	Co-investigator
Hassan	Saeed	Health Sciences / Human Kinetics	Co-investigator

File Number:

Type of Project: Professor

Title: Comparative Study of Injury in Youth Competitive Hockey in Quebec and Ontario

<u>Renewal Date (mm/dd/yyyy)</u>	<u>Expiry Date (mm/dd/yyyy)</u>	<u>Approval Type</u>
12/01/2010	11/30/2011	Ia

(Ia: Approval, Ib: Approval for initial stage only)

Special Conditions / Comments:

N/A

File Number:

Date (mm/dd/yyyy): 09/13/2011



Université d'Ottawa
Bureau d'éthique et d'intégrité de la recherche

University of Ottawa
Office of Research Ethics and Integrity

This is to confirm that the University of Ottawa Research Ethics Board identified above, which operates in accordance with the Tri-Council Policy Statement and other applicable laws and regulations in Ontario, has examined and approved the application for ethical approval for the above named research project as of the Ethics Approval Date indicated for the period above and subject to the conditions listed the section above entitled "Special Conditions / Comments".

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If you have any questions, please do not hesitate to contact the Ethics Office at extension 5841 or by e-mail at: ethics@uottawa.ca.

Signature:

Germain Zongo
Protocol Officer for Ethics in Research
For Daniel Lagarec, Chair of the Sciences and Health Sciences REB

2

550, rue Cumberland 550 Cumberland Street
Ottawa (Ontario) K1N 6N5 Canada Ottawa, Ontario K1N 6N5 Canada
(613) 562-5841 • Téléc./Fax (613) 562-5338
<http://www.research.uottawa.ca/ethics/index.html>
<http://www.recherche.uottawa.ca/deontologie/index.html>

File Number:



Date (mm/dd/yyyy): 03/06/2012

Université d'Ottawa **University of Ottawa**
 Bureau d'éthique et d'intégrité de la recherche Office of Research Ethics and Integrity

Ethics Approval Notice

Health Sciences and Science REB

Principal Investigator / Supervisor / Co-investigator(s) / Student(s)

<u>First Name</u>	<u>Last Name</u>	<u>Affiliation</u>	<u>Role</u>
Michael	Robidoux	Health Sciences / Human Kinetics	Principal Investigator
Stephen	Adams	Health Sciences / Human Kinetics	Co-investigator
Matthew	Davey	Health Sciences / Human Kinetics	Co-investigator
Mitchell	Green	Health Sciences / Human Kinetics	Co-investigator

File Number:

Type of Project: Professor

Title: Comparative Study of Injury in Youth Competitive Hockey in Quebec and Ontario

<u>Renewal Date (mm/dd/yyyy)</u>	<u>Expiry Date (mm/dd/yyyy)</u>	<u>Approval Type</u>
12/01/2011	11/30/2012	Ia

(Ia: Approval, Ib: Approval for initial stage only)

Special Conditions / Comments:

The REB has reviewed and approved the following modification:

Research design: The researchers are adding an anthropomorphic evaluation, a functional movement screen evaluation, a fitrodyne evaluation for speed and power and a jump and land test. Players who participate will be shown corrective exercises and proper hockey warm-up;

Consent and Assent forms: They have been modified to include the new measures.

File Number: _____

Date (mm/dd/yyyy): 03/06/2012



Université d'Ottawa **University of Ottawa**
Bureau d'éthique et d'intégrité de la recherche Office of Research Ethics and Integrity

This is to confirm that the University of Ottawa Research Ethics Board identified above, which operates in accordance with the Tri-Council Policy Statement and other applicable laws and regulations in Ontario, has examined and approved the application for ethical approval for the above named research project as of the Ethics Approval Date indicated for the period above and subject to the conditions listed the section above entitled "Special Conditions / Comments".

During the course of the study the protocol may not be modified without prior written approval from the REB except when necessary to remove subjects from immediate endangerment or when the modification(s) pertain to only administrative or logistical components of the study (e.g. change of telephone number). Investigators must also promptly alert the REB of any changes which increase the risk to participant(s), any changes which considerably affect the conduct of the project, all unanticipated and harmful events that occur, and new information that may negatively affect the conduct of the project and safety of the participant(s). Modifications to the project, information/consent documentation, and/or recruitment documentation, should be submitted to this office for approval using the "Modification to research project" form available at:
http://www.rges.uottawa.ca/ethics/application_dwn.asp

Please submit an annual status report to the Protocol Officer 4 weeks before the above-referenced expiry date to either close the file or request a renewal of ethics approval. This document can be found at:
http://www.rges.uottawa.ca/ethics/application_dwn.asp

If you have any questions, please do not hesitate to contact the Ethics Office at extension 5841 or by e-mail at: ethics@uOttawa.ca.

Signature:

Germain Zongo
Protocol Officer for Ethics in Research
For Daniel Lagarec, Chair of the Sciences and Health Sciences REB

2

550, rue Cumberland Ottawa (Ontario) K1N 6N5 Canada
550 Cumberland Street Ottawa, Ontario K1N 6N5 Canada
(613) 562-5841 • Téléc./Fax (613) 562-5338
<http://www.research.uottawa.ca/ethics/index.html>
<http://www.recherche.uottawa.ca/deontologie/index.html>

Appendix B: Observation Grids 2009-10 and 2011-12

2009-2010 Injury Study Observation Grid

Team Name: _____
 Game Number: _____
 Player Name: _____
 Date: _____

Appendix 1: Observation Grid				
	Injury severity using first aid criteria: (1) Slight injury: Need comforting; (2) Medium injury: First aid, minor injury; (3) Severe injury: First aid, major injury; (4) Very severe injury: Medical attention needed	Injury severity in terms of time missed: (1) Missed shift; (2) Missed period; (3) Missed game; (4) Missed games	Transgressional actions leading to injury: (1) Instrumental transgressional; (2) Instrumental non-transgressional	Enumerating causation/mechanisms of injury: (1) Contact with player; (2) Contact with stick; (3) Contact with puck; (4) Contact with ice; (5) Contact with boards
Upper body injury				
Lower body injury				

Observation Grid 2011-2012		Game:	Date:		
Team:	Injury is defined as: any physical trauma . . . whereby a player: (1) Is in discomfort; (2) Missed playing time but returned to the current game; (3) Missed playing time and did not return to the current game; (4) Missed subsequent game(s)	Injury severity in terms of time missed: (1) Missed shift; (2) Missed period; (3) Missed game; (4) Missed games: # _____	A) Transgressional* actions leading to injury: (1) Instrumental transgression; (2) Instrumental non-transgression B) Was a penalty called on the play? Y/N -If 'Yes', what penalty?	Enumerating causation/mechanism of injury: (1) Contact with player; (2) Contact with stick; (3) Contact with puck; (4) Contact with ice; (5) Contact with boards (8) Other:	Situational factors of injury:
Upper body injury					
Head					
Lower body injury					

*Transgression: nonconformity with rules Instrumental: physical actions tied to game play

Appendix C: Post-Game Injury Assessment (PGIA)

Post-Game Injury Assessment

Assessment Criteria:

Any player who, as result of unwanted physical trauma, **misses at least one period** away from game play qualifies for the implementation of the Post-Game Injury Assessment (PGIA). The PGIA is to be completed at the completion of the game in which a player was tended to by the team trainer. It is the team trainer's responsibility to complete the PGIA and submit it to the researcher group within one game of the sustained injury.

Date: _____ (m/d/y)

Team Name: _____

Game Number: _____

Player Name: _____

Age: _____ (m/d/y)

Height: _____ (inches)

Weight: _____ (lbs)

1. What was score of game at time of injury: _____
2. At what place did this injury occur?
 - a. Home
 - b. Away
 - c. Neutral site
 - d. Other: _____
3. Injury occurred during:
 - a. First period
 - b. Second period
 - c. Third period
 - d. Other: _____

4. Injury is a:
 - a. New injury sustained in 1) Practice or 2) Game
 - b. Previous injury from this season sustained in *practice* and aggravated/made worse in the current game
 - c. Previous injury from this season sustained in a *game* and aggravated/made worse in the current game
 - d. Recurrence/aggravation of injury from previous season (Hockey)
 - e. Recurrence of other sport injury and what sport: _____
 - f. Recurrence of non-sport injury

5. The injury involved:
 - a. Collision with other player
 - b. Collision with boards
 - c. Collision with other player and boards
 - d. Collision with ice
 - e. Collision with other player and ice
 - f. Contact with stick or puck
 - g. Body check given
 - h. Body check received
 - i. No apparent collision or contact (other): _____

6. The injury involved:
 - a. Skating with head down/unaware of surroundings
 - b. Retrieving puck from dump in
 - c. Cutting into middle of ice
 - d. Top of crease confrontation
 - e. Other _____

7. Was the injury an:
 - a. Instrumental transgression (physical action tied to game play; non-conformity with the rules)
 - b. Instrumental non-transgression (physical action tied to game play; conformity with the rules)

8. Was there a penalty involved in the play that caused the injury?
 - a. Yes, what penalty: _____
 - b. No

9. Was the injury:
 - a. Musculoskeletal or specific body part injured
 - i. Knee
 - ii. Thigh groin
 - iii. Shoulder
 - iv. Hip

- v. Arm/elbow
- vi. Head
- vii. Spine
- viii. Chest/rib
- ix. Fingers
- x. Chin
- xi. Wrist

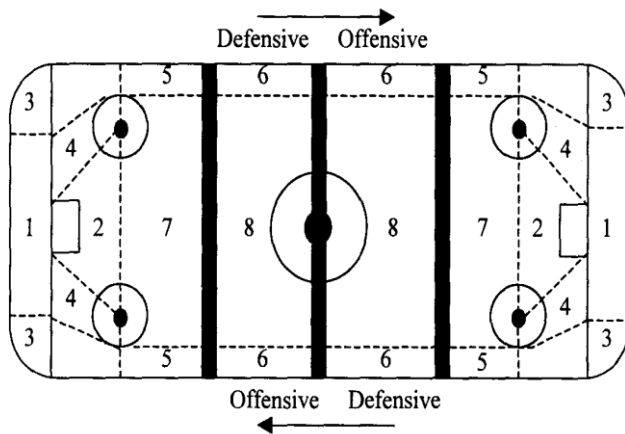
b. Less specific

- i. Contusion, where: _____
- ii. Sprain, where: _____
- iii. Strain, where: _____
- iv. Laceration, where: _____
- v. Fracture, where: _____
- vi. Dislocation, where: _____
- vii. Concussion, how severe: _____

10. Position played at time of injury

- a. Center
- b. Left-wing
- c. Right-wing
- d. Left Defense
- e. Right Defense
- f. Goalie

11. Which area best represents where the injury occurred:



(*Gilbert & Trudel, 2000, p. 295)

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Appendix D: Ethics Recruitment Forms



Université d'Ottawa • University of Ottawa

Faculté des sciences de la santé
École des sciences de l'activité physique

Faculty of Health Sciences
School of Human Kinetics

Monsieur Éric Vézina
Président
L'Association de Hockey Mineur de Hull

Bonjour Monsieur Vézina,

Nous vous contactons à titre de membres de l'*International Ice Hockey Research Academy* de l'Université d'Ottawa. La mission de l'Académie est de promouvoir le développement du hockey à travers des stratégies de recherche innovatrices qui visent à optimiser l'expérience de jeu pour les joueurs et les joueuses de tous les niveaux et de tous les âges. Un de nos champs de recherche est la prévention des blessures. Nous en sommes présentement à élaborer, en partenariat avec Hockey Canada, un programme de recherche permettant de surveiller et de mieux comprendre les blessures dans le hockey mineur. Plus précisément, nous cherchons à établir une étude au niveau Peeewe AA et Bantam BB compétitifs dans la région d'Ottawa et Hull (respectivement) afin d'étudier la prévalence de blessure dans les ligues avec contact à différents âges de l'introduction.

Nous aimerions établir un partenariat avec l'Association de Hockey Mineur de Hull afin d'amasser des données à l'occasion de la deuxième phase de cette étude.

L'objectif général de cette étude est d'optimiser l'expérience hockey des participants. Lors de cette étude, nous prévoyons observer et enregistrer sur vidéo toutes les parties des ligues ciblées et réaliser des évaluations des blessures survenues afin de:

- A. consigner les comportements conduisant à des situations de blessures ou de blessures potentielles;
- B. enregistrer les blessures à mesure qu'elles se produisent en situation de jeu; et de
- C. fournir des détails contextuels à propos des situations de blessures afin de mieux comprendre comment et pourquoi les blessures surviennent.

Les co-chercheurs (Stephen Adams, MA, MM. Matthew Davey et Mitch Green) seront responsables du travail d'observation sur le terrain, de l'analyse des vidéos et de l'évaluation des blessures. La participation à l'étude implique de contribuer à un système de déclaration des blessures qui vise à enregistrer des données sur les blessures survenues au cours de la partie. La déclaration de blessures se fait par le biais des joueurs, qui rapportent eux-mêmes toute blessure survenue au cours d'une partie et répondent à quelques questions sur cette blessure. Les joueurs qui ont été

identifiés comme impliqués dans une situation de blessure, mais qui ne l'ont pas rapporté, pourraient être approchés pour qu'ils répondent à des questions sur la situation observée par les chercheurs.

Avant le début de quelque travail de terrain que ce soit, nous vous aimerions vous rencontrer afin de discuter de la possibilité de réaliser notre recherche auprès de votre organisation.

Si cette initiative vous intéresse, nous aimerions alors vous rencontrer pour discuter avec les équipes et les entraîneurs qui pourraient être intéressés dans notre étude. Nous tiendrons ensuite une rencontre avec les entraîneurs potentiel. En outre, pendant le camp d'entraînement ou après la formation de l'équipe, nous nous réunirons avec les entraîneurs, les parents, et les joueurs suivant une pratique de leur choix. Nous expliquerons : la nature de notre étude, les exigences liées à la participation à celle-ci, de même que les avantages, les risques potentiels et les résultats anticipés associés à cette étude. Nous répondrons en outre à toute autre questions. Nous fournirons également nos coordonnées au cas où les personnes rencontrées aimeraient nous contacter en privé. Notre but est de faire en sorte que toutes les personnes impliquées se sentent aussi confortables que possible et nous prendrons toutes les mesures nécessaires à la réalisation de ce but.

Il est important de noter que la participation à cette étude est entièrement volontaire et les participants peuvent se retirer de l'étude à tout moment. De plus, l'anonymat et la confidentialité sont garantis pour tous les participants. Aucune information recueillie ne sera transmise directement à quiconque dans l'association de hockey. Les résultats de cette recherche seront partagés par le biais de documents publiés et des présentations publiques, notamment auprès de Hockey Canada, de l'AHMH et de l'Ottawa District Minor Hockey Association, le tout dans le but de réduire la prévalence et la sévérité des blessures dans le hockey mineur. Pour toute question, n'hésitez pas à communiquer, à tout moment, avec Michael Robidoux, ou avec le Service de subventions de recherche et déontologie de l'Université d'Ottawa [Téléphone : 613 562-5841, courriel : ethics@uottawa.ca].

Salutations distinguées,

Michael Robidoux, Ph.D.
Professeur Agrégé
International Ice Hockey Research Academy
Université d'Ottawa
Tél: (613) 562-5800



Université d'Ottawa • University of Ottawa

Faculté des sciences de la santé
École des sciences de l'activité physique

Faculty of Health Sciences
School of Human Kinetics

Mrs. Dodie Malcolm
President
Ottawa District Hockey Association

Dear Mrs. Malcolm:

We are approaching you at this time as members of the International Ice Hockey Research Academy at the University of Ottawa. The mission of the Academy is to promote the development of hockey through innovative research strategies aiming to optimize playing experiences for male and female players of all abilities and skill levels. One of the targeted areas of research is injury prevention and in partnership with Hockey Canada we are constructing a research program to properly monitor and understand injury in youth hockey. More specifically, we are seeking to establish a study at the Peewee (AA) and Bantam competitive levels (BB) in the regions of Ottawa and Hull (respectively) to study the prevalence of injury in body checking leagues with different ages of initiation.

Our intention is to form a partnership with the Ottawa District Minor Hockey Association in order to gather observational data in the second phase of this study.

The general aim of this study is to optimize participants' hockey experiences. Through this study we intend to observe and videotape all league games and conduct post-game injury assessment to:

- A. record all on ice behaviour that either leads to injury or potential injury;
- B. enumerate injuries as they occur in playing situations; and
- C. provide contextual details about injury situations to better understand how and why injuries are occurring.

The co-investigators (Stephen Adams, MA, MM. Matthew Davey and Mitch Green) will be responsible for the observational fieldwork, video analysis, and injury assessments. Injury reporting would consist of players self-reporting any injury incurred during games and answer a brief list of questions pertaining to the injury. Players who have not come forward but who were identified as being involved in an injurious situation may also be approached and be asked to answer questions pertaining to the situation observed during the game.

Prior to any fieldwork we would like to meet you to discuss the possibility of doing our research with your organization. If this initiative appears to be of interest to you, we would then like to meet and discuss this with teams and coaches who might be interested in the study. We will then hold a

meeting with potential coaches. Moreover, during training camp or after team selection, we would meet with coaches, parents, and players following a practice of their convenience. At that point we will explain what is involved in the study, what participation would consist of, the benefits of the study, potential risks, proposed outcomes, and any other questions they may have. We will also provide our contact information if they wish to contact us privately. It is our aims to make everyone involved feel as comfortable as possible and to take any measure we can to ensure such goals are met.

It is important to note that participation is voluntary and they can withdraw at anytime. Furthermore, all participants of this research will be guaranteed complete anonymity and confidentiality and any information collected will not be shared directly with anyone else in the hockey organization. The findings for this research would be shared via public lectures and published documents including presenting the findings to Hockey Canada, the Ottawa District Minor Hockey Association, and l'Association de Hockey Mineur de Hull, to help reduce the prevalence and severity of injury in youth hockey. If you have any questions at any point, please contact Michael Robidoux or the Office of Research Services, University of Ottawa [Phone: (613) 562-5841 or by e-mail ethics@uottawa.ca].

Sincerely,

Michael Robidoux, Ph.D.
Associate Professor
International Ice Hockey Research Academy
University of Ottawa
Tel: (613) 562-5800



Université d'Ottawa • University of Ottawa

Faculté des sciences de la santé
École des sciences de l'activité physique

Faculty of Health Sciences
School of Human Kinetics

Madame/Monsieur,

Nous vous contactons à titre de membres de l'*International Ice Hockey Research Academy* de l'Université d'Ottawa. La mission de l'Académie est de promouvoir le développement du hockey à travers des stratégies de recherche innovatrices qui visent à optimiser l'expérience de jeu pour les joueurs et les joueuses de tous les niveaux et de tous les âges. Un de nos champs de recherche est la prévention des blessures. Nous en sommes présentement à élaborer, en partenariat avec Hockey Canada, un programme de recherche permettant de surveiller et de mieux comprendre les blessures dans le hockey mineur. Plus précisément, nous cherchons à établir une étude au niveau de Pee wee (AA) et Bantam (BB) compétitif dans la région d'Ottawa et Hull (respectivement) afin d'étudier la prévalence de blessure dans les ligues avec des mise en échecs à différents âges de l'introduction. Nous aimerions établir un partenariat avec l'*Association de Hockey Mineur de Hull* et le Ottawa District Minor Hockey Association afin d'amasser des données à l'occasion de la deuxième phase de cette étude.

L'objectif général de cette étude est d'optimiser l'expérience hockey des participants. Lors de cette étude, nous prévoyons observer et enregistrer sur vidéo toutes les parties des ligues ciblées et réaliser des évaluations des blessures survenues afin de:

- A. consigner les comportements conduisant à des situations de blessures ou de blessures potentielles;
- B. enregistrer les blessures à mesure qu'elles se produisent en situation de jeu; et de
- C. fournir des détails contextuels à propos des situations de blessures afin de mieux comprendre comment et pourquoi les blessures surviennent.

Les co-chercheurs (Stephen Adams, MA, MM. Matthew Davey et Mitch Green) seront responsables du travail d'observation sur le terrain, de l'analyse des vidéos et de l'évaluation des blessures. La participation à l'étude implique de contribuer à un système de déclaration des blessures qui vise à enregistrer des données sur les blessures survenues au cours de la partie. La déclaration de blessures se fait par le biais des joueurs, qui rapportent eux-mêmes toute blessure survenue au cours d'une partie et répondent à quelques questions sur cette blessure. Les joueurs qui ont été identifiés comme impliqués dans une situation de blessure, mais qui ne l'ont pas rapporté, pourraient être approchés pour qu'ils répondent à des questions sur la situation observée par les chercheurs.

Avant le début de quelque travail de terrain que ce soit, nous vous aimerions vous rencontrer afin de discuter de la possibilité de réaliser notre recherche auprès de l'équipe de votre enfant. Lors de cette rencontre, nous expliquerons : la nature de notre étude, les exigences liées à la participation à

celle-ci, de même que les avantages, les risques potentiels et les résultats anticipés associés à cette étude. Nous répondrons en outre à toute autre question. Nous fournirons également nos coordonnées au cas où les personnes rencontrées aimeraient nous contacter en privé. Notre but est de faire en sorte que toutes les personnes impliquées se sentent aussi confortables que possible et nous prendrons toutes les mesures nécessaires à la réalisation de ce but.

Il est important de noter que la participation à cette étude est entièrement volontaire et les participants peuvent se retirer de l'étude à tout moment. De plus, l'anonymat et la confidentialité sont garantis pour tous les participants. Aucune information recueillie ne sera transmise directement à quiconque dans l'association de hockey. Les résultats de cette recherche seront partagés par le biais de documents publiés et des présentations publiques, notamment auprès de Hockey Canada, de l'Association de Hockey Mineur de Hull et du Ottawa District Minor Hockey Association, le tout dans le but de réduire la prévalence et la sévérité des blessures dans le hockey mineur. Pour toute question, n'hésitez pas à communiquer, à tout moment, avec Michael Robidoux, ou avec le Service de subventions de recherche et déontologie de l'Université d'Ottawa [Téléphone : 613 562-5841, courriel : ethics@uottawa.ca].

Salutations distinguées,

Michael Robidoux, Ph.D.
Professeur Agrégé
International Ice Hockey Research Academy
Université d'Ottawa
Tél: (613) 562-5800



Université d'Ottawa • University of Ottawa

Faculté des sciences de la santé
École des sciences de l'activité physique

Faculty of Health Sciences
School of Human Kinetics

Dear Sir/Madam:

We are approaching you at this time as members of the International Ice Hockey Research Academy at the University of Ottawa. The mission of the Academy is to promote the development of hockey through innovative research strategies aiming to optimize playing experiences for male and female players of all abilities and skill levels. One of the targeted areas of research is injury prevention and in partnership with Hockey Canada we are constructing a research program to properly monitor and understand injury in youth hockey. More specifically, we are seeking to establish a study at the Peewee (AA) and Bantam (BB) competitive levels in the regions of Ottawa and Hull (respectively) to study the prevalence of injury in body checking leagues with different ages of initiation. Our intention is to form partnerships with the *Ottawa District Minor Hockey Association* and l'Association de Hockey Mineur de Hull in order to gather observational data in the second phase of this study.

The general aim of this study is to optimize participants' hockey experiences. Through this study we intend to observe and videotape all league games and conduct post-game injury assessment to:

- A. record all on ice behaviour that either leads to injury or potential injury;
- B. enumerate injuries as they occur in playing situations; and
- C. provide contextual details about injury situations to better understand how and why injuries are occurring.

The co-investigators (Stephen Adams, MA, MM. Matthew Davey and Mitch Green) will be responsible for the observational fieldwork, video analysis, and injury assessments. Injury reporting would consist of players self-reporting any injury incurred during games and answer a brief list of questions pertaining to the injury. Players who have not come forward but who were identified as being involved in an injurious situation may also be approached and be asked to answer questions pertaining to the situation observed during the game.

Prior to any fieldwork we would like to meet you to discuss the possibility of doing our research with your child's team. At which point we will explain what is involved in the study, what participation would consist of, the benefits of the study, potential risks, proposed outcomes, and any other questions you may have. We will also provide our contact information if you wish to contact us privately. It is our aims to make everyone involved feel as comfortable as possible and to take any measure we can to ensure such goals are met.

It is important to note that participation is voluntary and they can withdraw at anytime. Furthermore, all participants of this research will be guaranteed complete anonymity and confidentiality and any information collected will not be shared directly with anyone else in the hockey organization. The findings for this research would be shared via public lectures and

published documents including presenting the findings to Hockey Canada, the *Ottawa District Minor Hockey Association*, and l'Association de Hockey Mineur de Hull, to help reduce the prevalence and severity of injury in youth hockey. If you have any questions at any point, please contact Michael Robidoux or the Office of Research Services, University of Ottawa [Phone: (613) 562-5841 or by e-mail ethics@uottawa.ca].

Sincerely,

Michael Robidoux, Ph.D.
Associate Professor
International Ice Hockey Research Academy
University of Ottawa
Tel: (613) 562-5800

Appendix E: Ethics Consent Forms



HOCKEY CANADA
2424 University Drive NW, 2424, promenade University N.O., Calgary, AB T2N 3Y9
Phone/Tel : (403) 777-3636 Fax/Teleo : (403) 777-3635 www.hockeycanada.ca

October 19, 2009

To Whom It May Concern,

Re: Comprehensive Injury Reporting and Impact on Participation Rates

Hockey Canada is supportive of the research initiative entitled "Comprehensive Injury Reporting and Impact on Participation Rates" proposed by Dr. Michael Robidoux of the University of Ottawa.

As the governing body for hockey in Canada, Hockey Canada is committed to growing the game and ensuring everyone involved enjoys their experience. Due to the physical nature of the sport, there is the potential risk of injury. It is important that Hockey Canada's membership have a source for accessing injury information that can serve a number of purposes including a clear understanding of the mechanisms of injury along with the overall the measurement of injuries rates.

This research initiative will assist Hockey Canada's membership to recognize the need for establishing injury databases. Should you have any additional questions or requests of Hockey Canada in support of Dr. Robidoux's research proposal, please do not hesitate to contact me at your convenience at

Yours in sport,

Paul Carson, Director Development
Hockey Canada



To whom it may concern,

The Association de Hockey Mineur de Hull is aware of and supports the University of Ottawa youth hockey injury study entitled “**Comprehensive Injury Reporting and Impact on Participation Rates**”. As partners in this research program, we expect to be informed of all research findings and to participate in all components of the study. We are confident that this research program will be valuable in providing minor hockey associations and Hockey Canada with information that will assist in reducing the risk of injury in youth hockey.

Sincerely,

Stephane Bertrand

President Association du hockey mineur de Hull



Ottawa District Minor Hockey Association

Mike Depratto

To whom it may concern:

The Ottawa District Minor Hockey Association is aware of and supports the University of Ottawa youth hockey injury study entitled “**Comprehensive Injury Reporting and Impact on Participation Rates**”. As partners in this research program, we expect to be informed of all research findings and to participate in all components of the study. We are confident that this research program will be valuable in providing minor hockey associations and Hockey Canada with information that will assist in reducing the risk of injury in youth hockey.

Thank-you for your time and consideration with regards to this joint effort. Please do not hesitate to contact the undersigned if questions arise.

Sincerely,

Mike Depratto, President ODMHA



To whom it may concern,

The Association de Hockey Mineur de Hull is aware of and supports the University of Ottawa youth hockey injury study entitled “**Comprehensive Injury Reporting and Impact on Participation Rates**”. As partners in this research program, we expect to be informed of all research findings and to participate in all components of the study. We are confident that this research program will be valuable in providing minor hockey associations and Hockey Canada with information that will assist in reducing the risk of injury in youth hockey.

Sincerely,

Éric Vézina

Président - Association du hockey mineur de Hull



OTTAWA DISTRICT MINOR HOCKEY ASSOCIATION

September 8, 2011

Dodie Malcolm
President ODMHA

To whom it may concern

The Ottawa District Minor Hockey Association is aware of and supports the University of Ottawa youth hockey injury study entitled "**Comprehensive Injury Reporting and Impact on Participation Rates**". As partners in this research program, we expect to be informed of all research findings and to participate in all components of the study. We are confident that this research program will be valuable in providing minor hockey associations and Hockey Canada with information that will assist in reducing the risk of injury in youth hockey.

Thank you for your time and consideration with regards to this joint effort. Please do not hesitate to contact the undersigned if questions arise.

Sincerely

Dodie Malcolm, President ODMHA



Université d'Ottawa • University of Ottawa

Faculté des sciences de la santé Faculty of Health Sciences
École des sciences de l'activité physique School of Human Kinetics

INFORMED CONSENT

TITLE OF THE STUDY:

Comparative Study of Injury in Youth Competitive Hockey in Quebec and Ontario

INVESTIGATORS:

Dr. Michael Robidoux, Associate Professor, School of Human Kinetics (SHK), University of Ottawa

Marshall Kendall, Ph.D. Candidate, SHK, uOttawa

Charles Boyer, M.A. Candidate, SHK, uOttawa

Stephen Adams, Ph.D. Candidate, SHK, uOttawa

Hassan Saeed, Honours Student, SHK, uOttawa

COMMUNITY PARTNERS:

Hockey Canada, Ottawa District Minor Hockey Association, Association du Hockey Mineur de Hull, Ottawa Girls Hockey Association.

PURPOSE OF THE RESEARCH

Document injury in youth ice-hockey bodychecking and non-bodychecking leagues in Ontario and Quebec. The research involves game observations to enumerate injuries as they occur in playing situations. In addition to quantifying the amount of injuries, this research will provide contextual details about injury situations to better understand how and why injuries are occurring.

PARTICIPATION IN THE STUDY

This study is primarily an observational study where researchers will observe and record on ice play of league hockey games. Participation in the study involves participating in an

injury report system to help monitor injury during the games. Injury reporting would consist of players self-reporting any injury incurred during games and answer a brief list of questions pertaining to the injury. Players who have not come forward but who were identified as being involved in an injurious situation may also be approached and be asked to answer questions pertaining to the situation observed during the game by researchers. The post-game injury assessment will take about 5 minutes.

It is important to note that video recordings of the games will be stored in locked filing cabinets in Dr. Robidoux's office at the University of Ottawa for a period of 10 years. The recordings will only be accessible to the members of the research team. Recordings will be destroyed after 10 years.

BENEFITS

The primary benefit of this study is that at the conclusion of the study we will be presenting the findings to our hockey partners; Hockey Canada, Association du Hockey Mineur de Hull, Ottawa District Minor Hockey Association and the Ottawa Girls Hockey Association, to help reduce the prevalence and severity of injury in youth hockey.

CONFIDENTIALITY AND ANONYMITY

All participants will remain anonymous. Research participants will be categorized by a number with only Researchers and Research Assistants knowing what number corresponds to whom. All video documentation will be altered via digital editing software to avoid identification. If a participant withdraws the interview data will be destroyed immediately and will not be used.

VOLUNTARY PARTICIPATION

Participation in this study is entirely voluntary and participants can withdraw from the study at any time and/or refuse to answer any questions, without suffering any negative consequences.

RIGHTS OF THE PARTICIPANTS

The researchers guarantee that:

- Participants can withdraw from the project at any time.
- The confidentiality of the information gathered as well as the anonymity of all participants will be rigorously protected as indicated above.

COMMUNICATION OF RESULTS

At the conclusion of the study research results will be presented via a written plain language summary and oral presentation to the study partners, Hockey Canada, Association du Hockey Mineur de Hull, Ottawa District Minor Hockey Association and the Ottawa Girls Hockey Association.

Any information about your rights as a research participant may be addressed to the Protocol Officer for Ethics in Research, 550 Cumberland Street, Room 159, Ottawa, ON K1N 6N5. Tel. (613) 562-5841 or email: ethics@uottawa.ca.

There are two copies of the consent form, one of which you may keep.

If you have any questions about the conduct of the research project, you may contact Dr. Michael Robidoux at (613) 562-5800.

CONSENT:

I the undersigned, agree to participate in the above research study. The study has been explained to me, I have had the opportunity to ask questions about my child’s involvement and to receive additional details that I wanted to know about the study. I understand that by accepting to participate, I am in no way waiving my right to withdraw from the study at any time.

I have been given a copy of this form.

Parent/Legal Guardian’s signature: _____

Date: _____

Signature of Researcher: _____

Date: _____



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École des sciences de l'activité physique

Faculty of Health Sciences
School of Human Kinetics

FORMULAIRE DE CONSENTEMENT

TITRE DU PROJET:

Étude comparative sur les blessures dans le hockey de compétition pour les jeunes au Québec et en Ontario.

CHERCHEURS:

Michael Robidoux, Ph.D., professeur agrégé, École des sciences de l'activité physique (ÉSAP), Université d'Ottawa

Marshall Kendall, étudiant au doctorat, ÉSAP, uOttawa

Charles Boyer, étudiant à la maîtrise, ÉSAP, uOttawa

Stephen Adams, étudiant au doctorat, ÉSAP, uOttawa

Hassan Saeed, étudiant au baccalauréat, ÉSAP, uOttawa

PARTENAIRES COMMUNAUTAIRES:

Hockey Canada, *Ottawa District Minor Hockey Association*, Association du hockey mineur de Hull, *Ottawa Girls Hockey Association*.

BUT DE LA RECHERCHE

Documenter les cas de blessures dans les ligues de hockey sur glace pour les jeunes avec et sans contact en Ontario et au Québec. Cette recherche implique des observations de parties de hockey de manière à recenser les blessures à mesure qu'elles se produisent en situations de jeu. En plus de quantifier le nombre de blessures, cette recherche fournira des détails contextuels sur les situations où les blessures se sont produites de manière à mieux comprendre comment et pourquoi les blessures surviennent.

PARTICIPATION À L'ÉTUDE

Cette étude est avant basée sur l'observation en ce que les chercheurs assisteront à des parties de ligues de hockey et enregistreront des données sur les situations de jeu. La participation à l'étude implique de contribuer à un système de déclaration des blessures qui

visé à enregistrer des données sur les blessures survenues au cours de la partie. La déclaration de blessures se fait par le biais des joueurs, qui rapportent eux-mêmes toute blessure survenue au cours d'une partie et répondent à quelques questions sur cette blessure. Les joueurs qui ont été identifiés comme impliqués dans une situation de blessure, mais qui ne l'ont pas rapporté, pourraient être approchés pour qu'ils répondent à des questions sur la situation observée par les chercheurs. Les entrevues de déclaration des blessures prendront environ 5 minutes à compléter.

Il est important de noter que des enregistrements vidéos des parties seront conservés dans des filières verrouillées dans le bureau du Professeur Robidoux à l'Université d'Ottawa pour une période de dix (10) ans. Les enregistrements seront seulement accessibles aux membres de l'équipe de recherche. Les enregistrements seront détruits au bout de cette période de dix ans.

AVANTAGES

L'avantage premier de cette étude est que, lorsqu'elle sera terminée, ses résultats seront présentés aux partenaires de l'étude, soit Hockey Canada, l'Ottawa *District Minor Hockey Association*, l'Association du hockey mineur de Hull et l'Ottawa *Girls Hockey Association*, le tout dans le but d'aider à réduire la prévalence et la sévérité des blessures dans le hockey pour les jeunes.

CONFIDENTIALITÉ ET ANONYMAT

L'anonymat est garanti pour tous les participants. Les participants seront identifiés par un numéro, les correspondances aux noms des participants étant connues des chercheurs et des assistants de recherche seulement. Toute la documentation vidéo sera altérée à l'aide d'un logiciel spécialisé afin d'éviter que les participants puissent être identifiés.

PARTICIPATION VOLONTAIRE

La participation à cette étude est entièrement volontaire et les participants peuvent soit se retirer de l'étude, soit refuser de répondre à toute question à tout moment et ce, sans possibilité de conséquences négatives.

DROITS DES PARTICIPANTS

Les chercheurs garantissent que:

- les participants peuvent se retirer de l'étude en tout temps;
- la confidentialité des informations recueillies et l'anonymat de tous les participants seront rigoureusement protégés et ce, de la manière indiquée plus haut.

COMMUNICATION DES RÉSULTATS

À la fin de l'étude, les résultats seront présentés sous la forme d'un sommaire en langage courant et d'une présentation orale aux partenaires de l'étude, soit Hockey Canada, l'*Ottawa District Minor Hockey Association*, l'Association du hockey mineur de Hull et l'*Ottawa Girls Hockey Association*.

Pour toute question concernant vos droits en tant que participant à cette recherche, veuillez contacter le Responsable de l'éthique en recherche de l'Université d'Ottawa, 550, rue Cumberland, pièce 159, Ottawa (Ontario) K1N 6N5. Tél.: 613 562-5841; courriel: ethics@uottawa.ca.

Il existe deux copies du formulaire de consentement, dont une que vous pouvez conserver.

Pour toute question sur la conduite du projet de recherche, veuillez contacter le Professeur Michael Robidoux au (613) 562-5800.

CONSENTEMENT

Je, soussigné, consens à participer au projet de recherche décrit plus haut. L'étude m'a été expliquée et j'ai eu l'occasion de poser des questions sur mon implication. J'ai également reçu de l'information sur tout détail supplémentaire que j'ai voulu connaître à propos de l'étude. Je comprends que le fait de consentir à participer à la présente étude ne me prive pas de mon droit de me retirer de l'étude en tout temps.

J'ai reçu une copie de ce formulaire.

Signature du parent/ gardien: _____ Date: _____

Signature du chercheur: _____ Date: _____

Note: L'utilisation du masculin sert uniquement à alléger le texte et désigne autant les hommes que les femmes.



YOUTH ASSENT FORM

Title: Comparative Study of Injury in Youth Competitive Hockey in Quebec and Ontario

This form may have some words that you do not know. Please ask the researcher to explain any words that you do not know.

What is this study about: To learn about how often injury occurs in boys' hockey and to understand why these injuries might be happening.

What happens to me if I choose to be in this study?

Our research team will watch and video tape your hockey games to see if any injuries have occurred. If you have received any type of injury, whether it was small or not, we ask that you report this to the team trainer. The trainer will ask you a few questions about the injury. If we think that an injury might have occurred, we would also ask the trainer to approach you to find out if you were injured or not.

What will happen with the information I give you?

When discussing or writing about this research, we will never use your name. The information you give us will not be shared with anyone outside of the training staff, your parents and us, the researchers.

What if I do not feel like participating in the study?

You do not have to participate and can refuse to answer any questions at any point of the study. You will not be penalized for not taking part in our study.

Questions?

If you have any questions about being in this study, you can call or have your parent(s) call: Stephen Adams, University of Ottawa student or my supervisor, Michael Robidoux at 613-562-5800.

Consent:

I have read this form and I understand the information about this study. I am willing to be in this study.



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Faculté des sciences de la santé
École des sciences de l'activité physique

Faculty of Health Sciences
School of Human Kinetics

FORMULAIRE DE SANCTION

TITRE DU PROJET: Étude comparative sur les blessures dans le hockey compétitif pour les jeunes au Québec et en Ontario

Ce formulaire pourrait contenir certains termes que vous ne connaissez pas. Veuillez s'il vous plaît demander aux chercheurs de vous expliquer tous les termes que vous ne connaissez pas.

Sujet de l'étude:

Pour identifier la fréquence de blessures dans le hockey masculin et de comprendre pourquoi certaines blessures surviennent.

Qu'advient-il de moi si je choisis d'être dans cette étude?

Notre équipe de recherche va regarder et enregistrer vos parties de hockey avec des cassettes vidéo pour voir si des blessures ont eu lieu. Si vous avez eu une blessure, peu importe la nature ou le degré de sévérité, nous vous demandons de le signaler au préposé à la santé de l'équipe. Le préposé vous posera quelques questions au sujet de la blessure. Si nous croyons que vous vous êtes blessé pendant une partie, nous allons demander au préposé de vous approcher pour voir si vous vous êtes bel et bien blessé. Si c'est le cas, il vous posera plus de questions au sujet de la blessure.

Qu'allez-vous faire avec l'information que je vous donne?

En discutant ou en écrivant au sujet de cette recherche, nous n'utiliserons jamais votre nom. Les informations que vous allez nous donner ne seront pas partagées avec personne en dehors de la formation du personnel, de vos parents et nous, les chercheurs.

Que faire si je ne veux pas participer à l'étude?

Vous n'avez pas à participer et vous pouvez refuser de répondre aux questions à tout point de l'étude. Vous ne serez pas pénalisé pour ne pas prendre part à notre étude.

Questions?

Si vous avez des questions par rapport à votre participation à l'étude, vous ou votre parent/gardien pouvez communiquer avec Stephen Adams étudiant à l'Université d'Ottawa ou mon superviseur, Michael Robidoux, au 613-562-5800.

Consentement:

J'ai lu ce formulaire et je comprends les informations au sujet de l'étude. J'accepte de prendre part à cette étude.

Appendix F: Informal and Semi-Structured Interview Guides

Hockey Jeunesse Mâle de Québec 2009-10

Guide d'entrevue semi-structuré

Partie A: jeunesse

- 1) Combien de temps avez-vous joué au hockey?
- 2) Combien d'années au niveau de la représentation?
- 3) Es ce que vous regarder le hockey a la télévision?
- 4) Qu'aimez-vous le plus au sujet de jouer au hockey?
- 5) Aimez-vous la pièce de contact du jeu?
- 6) Qu'aimez-vous à ce sujet?
- 7) Y a t-il quelque chose que vous n'aimez pas à ce sujet?
- 8) Auriez-vous des mises en échec introduit à votre niveau?
- 9) Avez-vous déjà été blessé en jouant au hockey?
- 10) Êtes-vous jamais craint d'être blessés en jouant?

Partie B: Parent(s)

- 1) Comment décririez-vous l'expérience de votre enfant à jouer au hockey cette année?
- 2) Y a t-il des préoccupations que vous avez en tant que parent regarder vos enfants jouer au hockey?
- 3) Qu'est-ce que vous pensez de mises en échec au hockey chez les jeunes?
- 4) Que pensez-vous sur l'Ontario introduisant les mises en échec au niveau pee-wee?
- 5) Votre enfant a t-même été blessé en jouant au hockey? Quelle était la circonstance?
- 6) Si oui, a telle affecté la participation de votre enfant en toute façon?
- 7) Pensez-vous que le hockey peut être rendu plus en sécurité?

Quebec Parent's Semi Structured Interview Guide 2011-12 (FR)

- I. Pouvez-vous décrire votre implication dans le hockey mineur?
- II. Depuis combien de temps votre enfant joue au hockey? Depuis combien de temps au niveau compétitive/ Double lettre?
- III. Comment décririez-vous l'expérience de votre enfant au hockey cette année?
- IV. Y a-t-il des préoccupations que vous avez en tant que parent à propos de votre enfant jouant au hockey?
 - a. A votre avis, quelle est une blessure? Comment voyez-vous des blessures?
- V. Comment vous sentez-vous par rapport à l'introduction des mises en échec au niveau Pee wee /Bantam?
- VI. Que pensez-vous de l'orientation actuelle de Hockey Canada sur la sécurité des joueurs?
 - a. Pensez-vous que Hockey Canada / Conseil d'administration a bien pris des mesures vers la promotion de la sécurité des joueurs dans la ligue de hockey de votre enfant?
 - b. Pensez-vous que le hockey peut être rendu plus sécuritaire? Si oui, comment?
 - c. Comment pouvons-nous rendre le hockey plus amusant et agréable pour les joueurs de hockey mineur?
- VII. Comment pensez-vous que le nouveau règlement «Contact Avec La Tête» a affecté le jeu?
- VIII. Voyez-vous des changements à la culture du hockey à cause de la sensibilité actuelle envers la sécurité des joueurs?
 - a. Attitudes et comportements

Ontario Parent's Semi Structured Interview Guide 2011-12

- I. Can you describe your involvement in minor hockey?
- II. How long has your child played hockey? How long at the representative level?
 - a. Does your child play/participate in any other sports? (do they play spring/summer hockey)?
 - b. Is your child involved in any form of off-ice training programs/weight training/power skating?
- III. How would you describe your child's experiences playing hockey this year?
- IV. Are there any concerns you have as a parent watching your child play hockey?
 - a. In your opinion, what is an injury? How do you view injury?
- V. How do you feel about the introduction of body checking at the Peewee/Bantam level?
- VI. How do you feel about Hockey Canada's current direction on player safety?
 - a. Do you feel that Hockey Canada/Governing body has adequately taken steps towards promoting player safety in your child's/athlete's organized hockey league?
 - b. What do you think can be done to make hockey safer?
 - c. How can we make hockey more fun and enjoyable for minor hockey players?
- VII. How do you think the new 'checking to the head' rule has affected the game?
 - a. What are your views on the role of referee in rule enforcement?
- VIII. Do you see any changes with hockey's culture because of the current sensitivity towards player safety?
 - a. Attitudes and behavior
- IX. Do you feel that playing in the competitive setting has had an effect on "pigeon holing" specific players .ie playing with the same players, forward vs defense, offensively gifted players receiving "quality" scoring opportunities over others
- X. How did the governing bodies prepare you and your son for introduction to bodychecking
- XI. What in your eyes constitutes a "good hockey player"
- XII. Do you have any other children that play hockey-related
- XIII. Have you or your significant other played hockey/competitive sport?
- XIV. It has been repeatedly shown in literature that injury rates in minor hockey bodychecking leagues are much higher than those without. Why do you believe it continues to be introduced at the competitive level?

Appendix H: Raw Injury Definitions: Local Parental Quotes

Physical trauma causing discomfort/hindrance (no missed time)

#1) JPT-BT

Researcher: So, so, we just touched a little on injury, I just want to expand on that a little bit, umm, from your perspective, what is injury?

JPT-BT: Umm injury is any, I guess trauma that is suffered on the ice, usually in a game. It can happen in practice, aahhh, where by the time he comes back the next game or practice there is still some lingering discomfort that is going to make him not be able to play to his fullest and is going to, you know, [pause] cause him some difficulty I guess.

Researcher: Right so, so, some hindrance regardless of whether he actually misses a full game or, or just plays kind of through the injury.

JPT-BT: Yup, Yeah

#2) MH-PW

Researcher:.... I was wondering what your view, perspective is on injury, of, of, what injury is to you?

MH-PW: Um, well I'd say any, any, hits that um, forceful, you know, there, there's so many differences, as far as I'm concerned where a check, you know is going in, and, if its, if its, a matter a matter some someone displacing the player off the puck, without them going flying into the boards, 'cause, you know, flying to the boards, you can get injured, you know. Um, but doing anything there's an element of , of getting injured. Um, if it's an, um unfortunate little incidents can happen, which can injure a player. Um, whatever hurts that player, to me that's an injury.

Researcher: Mmmhmm, but not they missed a game, or...

MH-PW: Exactly. To me that's...

Researcher: Very distressed kind of thing.

MH-PW: Exactly. Becau, I mean, and again, with the age, with the young, you know the fact that they uh, the fact that their bones are still not completely fused together. Just, you know, even if themselves just like, they slip and try to avoid going into the boards in a certain way, can break a couple a bones, because, you know, these kids are, they're not finished developing.

MH-PW: You know, so tho, and those bones are extremely, extremely fragile, especially deburg, an injured player make them feel awful. To me you know what? That's an injury, and as a parent we need to make sure you follow the instructions til their ready and alright to go on. And um, and also the attention to, that, that the coaches or trainers might pay to the fact that you know, Johnny was going along and slipped an edge and, came into the the boards. When Johnny came, even if Johnny doesn't look to be, is not crying, and, and , visible limping, checks and balances says Johnny gets off, are you okay? Checking it out with Johnny, and really continuous emphasizing that this no matter what we're doing when you get off the ice and you don't feel a hundred percent, and whatever the case may be. To communicate that. And sometimes that doesn't happen and it might be days later where you know, actually I think it was from when I went into the boards, whatever, whatever. In the meantime, you know some hurts, injury, left untreated, limps and gets worse.

#3) DR-PW

Researcher: Okay. Um, so, when we were talking about injury there, um, in your own personal opinion what, what do you feel is like a definition of injury? Like, uh, just for example, um, do you feel that it's based of off, missing a shift, missing a period, or is it any, uh, instances of discomfort that a player may feel?

DR-PW: I, I think a definition of an injury would be anything that prevents you to, to a fact to you're playing with discomfort. Is, is a form an injury. Uh, be it in the head, be it a should, be it the groin, if it's something which, which you're playing with a little bit of, of, discomfort, you know your impact because of, of an injury.

#4) *GS-PW*

Researcher: Um, so, in your own opinion then, what is the definition of, of an injury?

GS-PW: Um, two things right? You played hockey. Are you injured? Or are you hurt?

GS-PW: If you're hurt, you can still play. If you're injured you can't play.

GS-PW: So I define injury as, you know, if you got a bump of a bruise, you know, or a sore calf, or a shot in the back of the leg, or whatever. That's not an injury, that's, you're just hurt.

GS-PW: An injury is when you can't perform, I think, at the level that you need to perform to help your team.

#5) *B-PW*

Researcher: Um, so another big part of this study is, uh, is building a definition of what an injury is. So, to you what constitutes an injury?

B-PW: Um, I guess when you see physical injury, like uh, bruising or swelling, or you know.

B-PW: Like with a concussion though I guess you don't see that (laughs)

#6) *CC-PW*

Researcher: umm so another thing we are looking at is the definition of injury, so umm, what is your own personal definition of what an injury is?

CC-PW: Well it's physical but it's also mental. Like it's, I think, umm you know you can see a kid fall and hurt their leg, ok that's...uum...I've come to understand the concussion world a lot better so when I see a kid go down and I, I, you know like X did this last week I mean they are down, you, you know that they've been hit, like umm actually when he went down I said to my husband he's, he's not well and he goes "he'll be ok" and I just looked at him and ran back behind the bench because I, I, could see, he's just, you could see, ummm and I think injury to happens when kids aren't understood and their motivations, for being, like playing isn't understood when so a coach who yells at a kid for something a coach who uses language, kind of abusive language, that I mean that's an injury as well you just don't see it. But when you see a kid who just doesn't want to go to practice or you see a kid whose esteem is down or you see a kid who doesn't see worthy of the team you know, that that to me is an injury as well.

Researcher #2: Maybe just to qualify that too because one of the things that ahh when we document injury, well when the students are documenting injury, they're they're saying ok well we have different levels like in terms of severe injury, you know time missed versus when somebody who just limps to the bench but doesn't miss any time and so this is a difficult grey area when we describe and document injury. So we could say well injuries, there was only two injuries and we could say that is because, you, you could say that was because they were severe injuries. But if you had documented say for example when kids, even if they just took a shot off the leg and now they are limping to the bench but they, they are playing the next shift, they might have a little bruise or whatever, would that qualify as an injury?

CC-PW: Yeah, absolutely, absolutely, for sure. Anything that does damage to the body and the spirit is is injurious to a person.

#7) *MM-PW*

Researcher: umm so, ahh, another thing someone else in the program is looking at is parental definition of injury, so umm what would you say is an injury?

MM-PW: Umm, anything he complains about really, is enough for me to be concerned because he doesn't complain about anything

Researcher: Oh, ok

MM-PW: Uumm I wouldn't really consider a bruise to be an actual injury but anything that is affecting the way that he, you know lifts his arm or if he is limping, he is injured. I've played sports enough myself to know that [inaudible] so anything that is affecting his day to day activities, and,

that's an injury for me, but I don't consider just a bruise, such it up, it's it's a bruise, but if it's effecting what else he's doing then I would consider that to be an injury of some sort. I wouldn't say it warrants a trip to the hospital or the doctor but, if he's complaining about it then he's actually hurt so.

#8) BN-BT

Researcher: So in your opinion, what, what constitutes an injury, like what, what do you feel is an injury for a hockey player?

BN-BT: [pause] An injury is...for me like [pause] for sure like... a bruise, broken bone, aah a concussion, a had a concussion, for me ahh is the most severe one. I would prefer my kid to get a broken bone versus a concussion. I...for me that is it. Having a big, bad...having a bad bruise or broken, broken...breaking something or a head, concussion, for me I think these are really the three that for me are really injuries. You'll, you'll get the common, you know really small one there or you will get scratched by the hockey like [gestures], it's part of the sport but yeah umm getting a big bruise, that's probably the three.

#9) MV-BT

Researcher: uumm how about from, from your perspective, we, we talked about injury but we didn't really define what injury is, or what it consist of, so from you're, you're perspective, what is an injury?

MV-BT: an injury is umm [pause] how can I say that? It's when there is a stressor put to your muscles or bones or, that will cause either pain or aah discomfort and that will need a healing process.

Researcher: ok, ok. And, and, ahh this healing process...uum... if they don't miss any game time, does that still count for you as an injury or do they have to you know at least miss a practice or some sort of playing time or?

MV-BT: No to me an injury is an injury because umm you could be three days without uum a practice or a game

Researcher: Right, right

MV-BT: And if you have ahh a swollen, let's say uum wrist from a stick, slashing from a stick, you get it at the end of a game and it could be swollen and then stiff the next day and, and, maybe be ready by day three or day four to umm play again without missing a game.

Researcher: Right, but obviously the player was still in distress or has some sort of discomfort that wouldn't impede them from playing or

MV-BT: Yes, exactly, exactly.

Missing time whether it's a shift, practice or game

A) ME-PW

ME-PW: "basically I tell the kinds 'unless you're bleeding or have a broken bone get up and get to the bench' you know...[audio omitted]...so an injury? I guess missing ahh, well, missing period or ahh missing a game I guess would be considered an injury"

B) JL-BT

Researcher: ...What is an injury for you? I mean, we've been discussing injuries but uum what would be considered an injury for you?

JL-BT: Well if you can't play, you're injured, you're injured. If you play, well that means, I don't, I consider that as being [gestures]...you can be bruised or it hurts, but if you can continue to play a game the injury is not the same like if you are out. You know, I think that ahh...yup, I think that you can play even though it hurts.

That's kinda just kind of part of the game, you know if you have a bruise well

You know, and then you pass a couple of turn maybe and then you'll see and then if it's really bad. But for sure injuries is aah I mean you still...you know, broken, often it happens la clavicule, je veux dire, a shot on your ankle if it's broke, a puck in the face or you know, well a concussion or you know a stick here [gestures]... [audio omitted]...an injury is if you cannot play you are injured. I don't know.

C) *CE-PW*

Researcher: so what is your own, I guess your own definition of injury?

CE-PW: of an injury?

Researcher: Yeah

CE-PW: Are we talking about head injury primarily or any injury?

Researcher: Any injury

CE-PW: Uuum Jeeze well if you want to go simple, anything that says, that makes a kid say it hurts.

Uum I guess whether you classify it as he hurt himself or he has an injury I think an injury is something that puts a kid out of action for any period of time whether it be one practice or weeks or months.

Other definitions

i) *SP-BT*

Researcher: What is an injury?

SP-BT: what is an injury? Well I guess the scariest is a hit from behind

Researcher: Ok

SP-BT: The scariest is a hit from behind. And like a bad check, a real check from behind where the kid stays down and has got a neck injury, which has happened twice this year in our team. Two, two left ..one left here, X left here on an ambulance and one other kid left from YY in the tournament. That, that was scary. Well for the rest, injuries, you know, I don't know, wrist and stuff like that. It's not really scary...

ii) *PE-PW*

Researcher: Another major aspect of this whole study was umm based around the definition of injury, and I was just wondering, what, what, do you feel injury is? Like, what is your definition?

PE-PW: Um you are always going to get bumps and bruises, ok and like everything else you've got to learn how to play through those bumps and bruises, but to me an injury is something ummm [pause] I don't want to say, basically, if you can't, can't play the next night or the next shift then that's an injury. If you can't, can't continue playing then you, you're injured.

Researcher: So physically and mentally then I guess you'd say?

PE-PW: Yup. We had a boy at the beginning of the year that didn't want to go on the ice because he was intimidated by another player. I said great, let's stay on the bench and I will put you on when he's not on the ice.

Researcher: And that could almost be I guess a mental injury.

PE-PW: Yup.

Researcher: it's interesting ehy [chuckles]

PE-PW: You know what? That's funny because I remember that at the beginning of the year, first tournament we played X.X he didn't...you know, said he didn't want to go on the ice and I said "why" and he said that " well I'm afraid of that number YY or number ZZ" and I said "that's fine, you want to go on the ice when he's not on?" He says "yeah, ok" "so we'll do that".