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Aggressive behavior in professional ice hockey: A cross-cultural comparison of North American and European born NHL players

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Abstract

Objectives: The current investigation examined the mediating role of an athlete's birthplace (e.g., North America, Europe) on the use of aggressive behavior in professional ice hockey. In doing so, the study attempts to uncover whether or not the use of aggressive behavior in professional ice hockey is better understood according to within-competition determinants (e.g., score differential) or should be explored in the future using broader social factors (e.g., cultural socialization).
Design and method: The study was archival in nature and utilized the penalty records from the first 200 games of the 2003–2004 NHL regular season. A total of 2185 penalties were recorded and categorized according to Widmeyer and Birch's [1978. *Results from an aggression questionnaire administered to professional hockey players at Huron Hockey School.* Unpublished manuscript, University of Waterloo, Waterloo, Ont.] and Widmeyer and McGuire's [1997. Frequency of competition and aggression in professional ice hockey. *International Journal of Sport Psychology, 28*, 57–66] hockey aggression criteria.
Results: The results indicated that North American players committed significantly more aggressive, and non-aggressive, acts than did their European counterparts. However, the distribution of both group's aggressive acts were relatively similar when examined according to the determinants under investigation (e.g., score differential). Subsequent analyses revealed that no significant performance differences existed between the two groups, indicating that either style of play is conducive to success in the NHL.
Conclusion: These results appear to refute the commonly held notion that aggressive behavior is a natural by-product of the frustration inherent within hockey, and also that such behaviors facilitate performance. Rather, these behaviors may be better explained as learned responses that are modeled and reinforced

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differently for each athlete. Moreover, that these early learning experiences play an important role in shaping the future behavioral repertoires of these athletes, and are therefore deserving of future attention.

Keywords: Aggression; Hockey; Violence; Cross-cultural; Socialization

Introduction

Violent and aggressive behaviors have become relatively common in the sport of ice hockey, with a substantial body of literature concerned with the determinants and consequences of these behaviors (McMurty, 1974; Pascall, 2000; Tenenbaum, Stewart, Singer, & Duda, 1997). However, studies interested in these intentionally harmful behaviors have focused solely on the conduct of North American ice hockey players, and thus have neglected a large segment of the sport's participants (e.g., Europeans). This investigation attempts to address this limitation by examining the use of aggressive behavior with an international sample of professional ice hockey players.

One of the barriers facing researchers interested in examining hockey aggression cross culturally lies in the fact that Europeans and North Americans play the game of ice hockey under considerably different conditions. More specifically, the European game of ice hockey is played on international size ice surfaces ($200' \times 100'$), while the North American game is played on the NHL size ice surfaces ($200' \times 85'$). At first glance this may not seem like a substantial difference, but in a game where physical contact and a confined playing surface are believed to be at least partially responsible for aggressive behavior, such a difference is significant (Wennberg, 2004). Also, the Europeans play by the international ice hockey rulebook, which includes differences in the use of the red line (e.g., no two line passes in Europe) and also the degree to which certain infractions are penalized. This second difference may not necessarily be due to a different conceptualization of the infraction, rather the formal punishment associated with these indiscretions. For example, fighting is almost entirely absent from the European game of hockey, whereas it is a relatively frequent occurrence in North American hockey games. According to the IIHF or European rule book, athletes engaged in fisticuffs will be assessed a 10 min misconduct penalty, whereas the NHL or North American rule book, only stipulates a 5 min penalty. Nevertheless, such external and confounding factors have made the direct comparison of North American and European hockey very difficult.

In light of the fact that aggressive behavior has never been empirically studied cross-culturally, it is interesting that a marked difference in the exhibition of aggressive behavior is believed to exist between North American and European hockey players (Beacon, 1998; Buczkowski, 2000; Grossman & Hines, 1996; McCreath, 2002). These behavioral differences are currently anecdotal; however, such speculations do provide the impetus to examine these behaviors using a more diverse sample of players.

Fortunately for the study of aggressive behavior in hockey, the national hockey league (NHL) has become increasingly more heterogeneous over the years, with European born players currently accounting for over one-third of the NHL roster (IIHF, 2001). As a result, aggressive behavior in hockey can now be examined using an international sample of players participating under common competitive conditions (e.g., rink size, penalty infractions). In doing so, the influence of previously cited influential factors (e.g., score differential, player position) may be re-evaluated on a more diverse

sample of athletes, with broader social explanations (e.g., socialization, cultural values) concerning the etiology of aggressive behavior in hockey also being explored.

Currently, two theoretical frameworks dominate the research concerned with aggressive behavior in hockey. Both explanations are supported by a body of literature, yet neither has included an international sample of players. As a result, the current study may also help advance our theoretical understanding of the etiology of these sporting behaviors.

Frustration–aggression hypothesis

According to the frustration–aggression hypothesis (Berkowitz, 1989), when an individual is blocked from achieving a particular goal (e.g., possessing the puck, winning), feelings of frustration often result. These feelings of frustration then increase the likelihood that an athlete will vent these emotions in an aggressive manner, with this aggression usually being directed towards the source of the frustration (e.g., an opposing player). For example, in a controlled laboratory setting, Leith (1989) found that individuals who were on the losing end of a competitive task would administer more frequent and more powerful shocks to their opponent, than would those who were deemed successful.

Hockey studies concerned with this explanation have sought to understand which environmental and contextual factors increase the likelihood that an athlete will become frustrated and subsequently exhibit aggressive behavior. Such studies have demonstrated that larger score differentials (Goginsky, 1989; Russell & Drewry, 1976; Wankel, 1972), playing on the road (Kelly & McCarthy, 1979; LeFebvre & Passer, 1974), losing (LeFebvre & Passer, 1974; McGuire, 1990; Russell & Drewry, 1976), playing a defensive position (Widmeyer & McGuire, 1997), and the third period of play (Cullen & Cullen, 1975; Kelly & McCarthy, 1979; Russell & Drewry, 1976; Widmeyer & Birch, 1984), are all associated with increased levels of frustration and subsequently more frequent aggressive outbursts. Therefore, according to this theoretical position any understanding of the frequency and distribution of aggressive behavior in hockey should include comparisons across these precipitating factors.

The findings from this line of research are often used to naturalize the use of aggressive behavior in hockey as an innate reaction to the frustration inherent within the game (Gee & Sullivan, 2005). For example, it is not uncommon to hear rationalizations following acts of aggression such as ''boys will be boys''. Such justifications have allowed these behaviors to subsist within the sport of hockey, and have been instrumental in convincing society as a whole that these behaviors are simply expressions of masculinity (Smith, 1978).

With respect to our international sample of hockey players, this theoretical approach would speculate that European and North American players would display similar amounts of aggressive behavior. In addition, the distribution of both groups' aggressive infractions will be similar according to the hypothesized precipitating factors (e.g., score differential)

Social learning theory

In accordance with the social learning framework (Bandura, 1962), athletes learn and adopt aggressive behavior by observing others (i.e., models) perform these acts, and then decide to

replicate these behaviors based on the consequences of that model's behavior (i.e., reward or punishment). Simply put, an individual who observes an athlete committing an aggressive act (e.g., fighting), and also observes them being rewarded for doing so (e.g., applause, financial compensation), will likely replicate that behavior in a similar context because it is assumed that they will receive similar reinforcement. Thus, athletes engage in aggressive behaviors because they associate them with reward, which they themselves have either received in the past for acting aggressive or have witnessed others receiving rewards for acting similarly (Widmeyer, Bray, Dorsch, & McGuire, 2002). The exact opposite scenario can be used to explain why certain athletes behave less aggressively. These athletes associate aggressive behavior with punishment (or a lack of reward) either because they themselves have been punished in the past, or they have witnessed others punished for displaying similar behaviors.

A great deal of observational or social learning takes place during childhood (Bandura, 1962, 1977), primarily within the family setting. Here parents teach their children how to behave appropriately by modeling such behaviors and subsequently rewarding the children for successful attempts. The same can be said for early sporting experiences, both direct and vicarious, with children quickly learning what is expected of them within this social context. Therefore, if violent and aggressive hockey behaviors (e.g., fighting) are exhibited in front of a child, and these acts are subsequently rewarded (e.g., applause), the child will quickly associate such behaviors as acceptable within that social context (Bandura, 1977). Nevertheless, differences in the exposure to such models, or differential consequences associated with these acts (e.g., reward vs. punishment), would significantly influence the behavioral repertoire of the observer. Consequently, according to this theoretical explanation, differences in the use of aggressive behavior between European and North American hockey players may be the result of varied exposure to such acts, or the rewards/punishment associated with such behaviors within their different hockey contexts.

The bulk of the evidence supporting a social learning explanation for human aggression can be found outside of the sporting domain. For example, studies have shown that children exposed to videogames and movies that glorify violence often exhibit increased levels of aggression following the exposure (Anderson & Dill, 2000; Ballard & Wiest, 1996). Also, that children who are from violent or abusive homes often adopt similar behavioral profiles (Farrington, 1997) presumably because they learn that such behaviors are a quick and easy way to deal with confrontation. Altogether, this body of literature appears to demonstrate that an individual's attitudes, personality, and behavioral repertoire are predominantly influenced by their significant others (e.g., family, friends) and peripherally by the dominant cultural norms and mores that are disseminated through the media.

Within a hockey context, several studies have provided support for the notion that aggressive behaviors and/or pro-aggressive attitudes towards aggression are learned via modeling. For example, Smith (1974) found that amateur players' perceptions of their coach, parents, and teammates acceptance of aggression were significantly correlated with these athletes' aggressive penalty records. Moreover, in a later study Smith (1978) found that 70% of the young athletes he interviewed picked up aggressive tactics from watching professional hockey on television. For example, one athlete stated that he learned how to deliver "sneaky elbows, little choppy slashes, Bobby Clarke style" (p. 191). Smith subsequently cross referenced these comments with the players' actual penalty records, and found that these athletes actually adopted these tactics into their own competitive experiences.

Research concerned with pro-aggressive attitudes and legitimacy perceptions towards aggression have also tended to support a social learning perspective. Overwhelmingly, these investigations have found that more experienced athletes (athletes who have participated in their respective sport for a longer period of time) have more positive perceptions and judgments towards the use of aggressive behavior in sport (Bredemeier, Shields, Weiss, & Cooper, 1987; Conroy, Silva, Newcomer, Walker, & Johnson, 2001; Silva, 1984). These authors have argued that the longer athletes are exposed to pro-aggressive norms and values, the more likely it is that that they will adopt a similar viewpoint. As a result, playing experience may be an important determinant of aggressive behavior and will be considered within this investigation.

Returning back to the premise of this investigation, the social learning framework would attribute early socialization experiences (e.g., reward/punishment, model/no model) to the hypothesized differences in aggression believed to exist between North American and European players. Therefore, North Americans and Europeans may be exposed to different attitudes, perceptions, and ideas surrounding aggressive behavior in hockey, and as a result, display different behavioral repertoires in accordance with these dispositions.

Overall, a difference between North American and European players' aggressive tendencies in this study would suggest that these differences are associated with external or broader social influences, and not the contextual sources of frustration hypothesized in the frustration–aggression explanation. However, if no differences exist between North American and European players, a frustration–aggression explanation would appear to be the most relevant.

Aggression–performance relationship

One of the most widely held, and unfounded, beliefs among North American hockey players, parents and coaches alike, is that aggressive behavior and performance are positively related (Widmeyer, 1984). These individuals believe that aggressive tactics provide their team with a psychological advantage, which inevitably translates into an overall performance advantage (Smith, 1975). However, the empirical research conducted on this hypothesized relationship has been equivocal.

At the individual level, McCarthy and Kelly (1978a) found that highly aggressive players (i.e., those with the greatest number of aggressive penalties) tabulated significantly more goals and assists, when compared to players who received relatively few aggressive penalties. In a second study, however, these authors replicated their results with respect to goals scored, but were unable to reproduce their earlier findings pertaining to assists (McCarthy & Kelly, 1978b). More recently, Sheldon and Aimar (2001) found that aggressive acts were more likely to precede successful ice hockey behaviors (e.g., steal the puck from an opponent, score a goal) than to follow unsuccessful ones (e.g., failed attempts to steal puck, shots that missed the net). Again, this supports a positive association between the two constructs. On the other hand, Russell (1974) found no relationship between physical aggression and individual scoring among ice hockey players, while Widmeyer and Birch (1979) found no differences in the level of aggression between athletes selected as "all-stars" versus those that were not. As a result, the relationship between aggression and performance at the individual level of analysis is still unclear.

At the team level, the results appear to be even more equivocal. Cullen and Cullen (1975) and Worrell and Harris (1986) both found that the teams which incurred the most penalties, were significantly more likely to win the competitive contest. On the other hand, McCaw and Walker (1999) found that winning the Stanley Cup final series was actually associated with incurring fewer penalties as a team, therefore demonstrating a negative relationship between performance and aggression. And finally, Wankel (1972), Widmeyer and Birch (1979, 1984), McGuire, Courneya, Widmeyer, and Carron (1992), and Englehardt (1995), all concluded that no relationship exists between the number of penalties a team receives for aggressive behavior and the outcome of the game and/or season.

In light of these findings however, athletes continue to perceive aggressive behavior as performance enhancing. Both Faulkner (1973, 1974) and Smith (1978, 1979), and more recently Pascall (2000), have demonstrated that athletes perceive coaches and scouts as admiring these behaviors, and that by demonstrating aggressive tendencies athletes believe they can progress within their sport. Smith (1978) affirmed these assumptions, by observing that larger less talented players were often selected before smaller more skilled players, presumably because of their ability to ''dish out'' and receive physical punishment.

With respect to the current investigation, the aggression–performance rhetoric has been used for sometime to re-affirm North American hockey supremacy. As the above results illustrate, this diatribe exists without empirical support. Therefore, this investigation attempted to assess the effect of differing levels of aggressiveness on the performance (i.e., goals, assists, shots total points) of North American and European hockey players in the NHL.

Purpose

The purpose of the current investigation was to assess whether North American and European NHL players differed in their use of aggressive behavior. In doing so, we have attempted to test competing theoretical explanations (Frustration–aggression Theory and Social Learning Theory) in order to illuminate the potential etiology of aggressive behavior in hockey.

Secondly, this investigation assessed whether or not differences in aggression were accompanied by differences in overall performance (e.g., goals, assists).

Hypotheses

Firstly, in accordance with previously cited anecdotal reports we hypothesized that North American players would commit significantly more aggressive acts than would European born players; thus, supporting a social learning perspective.

Secondly, that the five factors previously hypothesized to increase aggression via frustration (e.g., score differential, period, player position, game location, team status), would influence the distribution of North American players' aggressive acts, but not those of the European players.

Thirdly, that if any behavioral differences (i.e., aggressive penalty infractions) were found between North American and European born players, that these differences would be significantly reduced when player experience (i.e., number of years in the NHL) was taken into account.

And finally, that committing aggressive infractions would have no significant influence over hockey players' performance indices.

Method

Data base

Data was collected from the first 200 games of the 2003–2004 NHL regular season. This represents roughly 1/4 of the entire season and is comparable to other investigations that have employed an archival design (Russell & Russell, 1984). All 30 NHL teams competed on multiple occasions during this time period. The relevant information was obtained from the official game reports posted on the NHL's official website (www.nhl.com).

For each infraction, information was recorded for both the player [(a) position (offensive, defensive), (b) NHL experience (0–3 years, 4+ years), (c) birthplace (North American, European), and (d) game location (home, away)] and the actual penalty infraction [(i) the score differential (0–2 goals, 3+ goals), (ii) the period (first, second, third), and (iii) the aggressor's team status (winning, losing, tied)]. With respect to athlete birthplace, instances in which a player was born in a European country and subsequently immigrated to North America at an early age were omitted.

Performance and demographic information (see Table 1) were obtained for those players in the NHL who tabulated 20 or more points over the 2003–2004 season ($n = 354$). The 20-point criterion was established in order to eliminate players who only competed in a small number of games (e.g., call ups), and therefore generate a sample that was indicative of regular NHL players. In accordance with previous research (McCarthy & Kelly, 1978a, b), performance was measured according to goals, assists, shots, and total points.

Assessing aggression

Using penalty records as indices for aggressive behavior has recently been criticized in the literature (Kirker, Tennenbaum, & Mattson, 2000). These authors highlight at least two major shortcomings inherent in this methodological approach: (a) missed calls, (b) penalties that are not aggressive.

Table 1
Demographics and performance indices

	North American ($N = 219$)	European ($N = 135$)
Games played in 2003–2004	72.6 (10.6)	71.2 (11.1)
Shifts/game	23.7 (3.8)	23.4 (3.7)
Ice time (min)	17.7 (3.6)	18.1 (3.6)
Shots on goal over season	141 (14.1)	144.1 (54.1)
Goals	14.7 (7.3)	15.0 (8.2)
Assists	23.6 (10.4)	24.5 (9.6)
Total points	38.3 (15.2)	39.5 (16.2)
Penalty minutes (min)	53.0 (35.9)	38.6 (23.9)
Shot	Right 87 (39.7%)	Right 36 (26.7%)
	Left 132 (60.3%)	Left 99 (73.3%)
Years in NHL	9.00 (5.2)	7.3 (4.0)
Weight (lb)	202.0 (19.5)	202.9 (14.9)

According to Kirker et al. (2000) game officials only possess limited attentional resources, and with the speed and physicality present within ice hockey it is inevitable that some behaviors are simply going to go unseen. However, in a study conducted by Katorji and Cahoon (1992), it was demonstrated that only 4.8% of the aggressive acts, as recorded by two independent observers, went unseen by the game official. Therefore, according to Widmeyer and McGuire (1997), the fact that not all aggressive acts are penalized is likely to have very little impact on a study of aggressive behavior in which penalties are used as the operational indices.

The second criticism of Kirker et al. (2000) pertains to the fact that not all penalties in ice hockey have underlying aggressive motives (e.g., delay of game, too many players on the ice). This shortcoming was addressed some time ago by researchers who made a distinction between aggressive and non-aggressive penalties (Wankel, 1972; Widmeyer & Birch, 1978, 1984; Widmeyer & McGuire, 1997). As a result, the current study adhered to the guidelines set out by Widmeyer and Birch (1978) and Widmeyer and McGuire (1997), in which fourteen behaviors (fighting, spearing, butt-ending, high sticking, slashing, cross-checking, instigating, roughing, boarding, charging, kneeing, elbowing, checking from behind, and head butting) were reported by athletes to be committed with the intent of harming an opponent at least 80% of the time. Two additional behaviors were included (attempt to injure, unsportsmanlike conduct), as they are issued specifically when intentional harm is observed. Unsportsmanlike conduct penalties often take a verbal form (e.g., shouting at game officials, swearing) and are issued when threats are made by a player to either an opponent or the game official. Such threats are meant to intimidate (e.g., psychologically harm) an opponent/game official, and as a result, unsportsmanlike conduct adheres to the conceptual definition of aggression (Tenenbaum et al., 1997). Moreover, by including this form of verbal aggression, we have attempted to address the seemingly common oversight of verbal aggression in the sporting literature (Stephens, 1998). Consequently, these 16 behaviors were used as indicators for aggressive behavior, while all other infractions were classified as non-aggressive (e.g., tripping, holding, interference).

Procedure

The two groups (European and North American) were compared according to the total number of aggressive and non-aggressive acts committed. Subsequent comparisons across the previously mentioned contextual factors (i.e., score differential, period, team's status, game location, position) were then made in order to test the tenets of the frustration explanation. The perpetrators of these acts were then categorized according to birthplace and NHL experience (i.e., European veterans, European rookies, North American veterans, and North American rookies) and the frequency of their indiscretions were assessed. As the information was accumulated at a nominal level of measurement, chi-square analyses were conducted. Bonferronni adjustments were employed in order to avoid inflating Type I error (p's $< .01$).

Finally, the two groups (European and North American) were then examined according to their performance indices. This was done in order to provide further insight into how differences (or no differences) in the use of aggressive behavior influences NHL players' seasonal performance. At this point, due to the unequal sample sizes, a Mann–Whitney U test was performed.

Results

Aggressive behavior

A total of 2185 penalties were issued across the 200 games under investigation. Of these, 1266 were classified as aggressive (Widmeyer & Birch, 1984; Widmeyer & McGuire, 1997) with the remaining 919 receiving a non-aggressive classification. The frequency distribution of the aggressive and non-aggressive infractions can be found in Table 2.

With respect to the exhibition of aggressive behavior, a significant difference was observed between European and North American players χ^2 (1, $n = 1266$) = 325.32, $p < .001$. More specifically, North American born athletes committed 953 acts of aggression, while European born players committed 313 infractions. These results support our first hypothesis, and therefore appear to be in accordance with a social learning explanation.

A similar significant trend was observed between North American and European born players for non-aggressive penalties, χ^2 (1, $n = 919$) = 45.52, $p < .001$. Again, North American players committed 559 non-aggressive infractions, while European players were penalized 360 times for these behaviors.

In order to shed more light on these observed behavioral differences, North American and European players were compared across all 16 aggressive infractions (see Table 2). Significant differences were observed for fighting [χ^2 (1, $n = 263$) = 159.79, $p < .001$], unsportsmanlike conduct [χ^2 (1, $n = 71$) = 21.42, $p < .001$], instigator [χ^2 (1, $n = 12$) = 8.33, $p < .01$], boarding [χ^2 (1, $n = 51$) = 12.26, $p < .001$], charging [χ^2 (1, $n = 21$) = 8.05, $p < .01$], cross-checking [χ^2 (1, $n = 98$) = 13.22, $p < .001$], slashing [χ^2 (1, $n = 167$) = 23.77, $p < .001$], roughing [χ^2 (1, $n = 331$) = 92.52, $p < .001$], and high sticking [χ^2 (1, $n = 198$) = 16.99, $p < .001$] infractions, with North Americans committing significantly more than Europeans. However, no significant differences were observed for elbowing, spearing, kneeing, attempt to injure, and hitting from behind penalties (p's $> .01$). With respect to non-aggressive infractions (see Table 2), significant differences were found for interference [χ^2 (1, $n = 149$) = 12.41, $p < .001$] and holding [χ^2 (1, $n = 155$) = 13.07, $p < .001$] penalties, while no significant differences were found for holding the stick, tripping, obstructive holding, goalie interference, hooking, obstructive tripping, clipping, abusive language, obstructive hooking, and obstructive interference (p's $> .01$).

When European and North American players' aggressive penalties were combined and compared across the five frustration-inducing factors (i.e., score differential, position, period, game location, team status), interesting results emerged (see Table 3). Combined, these players' aggressive penalties significantly differed according to the score differential [χ^2 (1, $n = 1266$) = 541.54, $p < .001$], and player position [χ^2 (1, $n = 1266$) = 65.52, $p < .001$]. More specifically, the majority of aggressive acts transpired when the score differential was relatively small ($n = 1047$) as compared to large ($n = 219$), and were committed by offensive players ($n = 777$) more frequently than defensive players ($n = 489$). On the other hand, no significant differences were observed according to the period of play [χ^2 (2, $n = 1261$) = 4.74, $p = .09$], status of the aggressor's team [χ^2 (2, $n = 1266$) = .697, $p = .706$], and the game location [χ^2 (1, $n = 1266$) = .028, $p = .866$].

In order to address our second hypothesis, the distribution of North American and European players aggressive acts were assessed across the five factors independently (see Table 4). Both

Table 2
Frequency distribution of aggressive and non-aggressive penalties

	North American		European	
	Number of penalties	%	Number of penalties	%
Aggressive				
Roughing*	253	16.7	78	11.6
Fighting*	234	15.5	29	4.3
High sticking*	128	8.5	70	10.4
Slashing*	115	7.6	52	7.7
Cross-checking*	67	4.4	31	4.6
Unsportsmanlike*	55	3.6	16	2.4
Boarding*	38	2.5	13	1.9
Elbowing	23	1.5	12	1.8
Charging*	17	1.1	4	.6
Instigator*	11	.7	1	.1
Kneeing	5	.3	2	.3
Attempt to injure	3	.2	1	.1
Spearing	2	.1	1	.1
Hitting from behind	1	.1	1	.1
Non-aggressive				
Hooking	114	7.5	93	13.8
Holding*	100	6.6	55	8.2
Tripping	98	6.5	67	10.0
Interference*	96	6.3	53	7.9
Ob. hooking	49	3.2	36	5.3
Holding stick	42	2.8	26	3.9
Goalie interference	33	2.2	16	2.4
Ob. interference	13	.9	6	.9
Ob holding	9	.6	4	.6
Ob. tripping	3	.2	5	.7
Clipping	2	.1	1	.1
Abusive language	1	.1	0	0
Total	1512	100	673	100

* Significant at $p < .001$.

European and North American players' aggressive behaviors significantly differed according to the score differential [χ^2 (1, $n = 953$) = 188.66, $p < .001$; χ^2 (1, $n = 313$) = 359.10, $p < .001$, respectively] and player position [χ^2 (1, $n = 953$) = 14.34, $p < .001$; χ^2 (1, $n = 313$) = 51.25, $p < .001$], while not significantly differing according to the period of play [χ^2 (2, $n = 953$) = 3.00, $p = .223$; χ^2 (2, $n = 313$) = 3.48, $p = .176$, respectively], team status [χ^2 (2, $n = 953$) = 1.23, $p = .540$; χ^2 (2, $n = 313$) = 1.87, $p = .393$] and game location [χ^2 (1, $n = 953$) = 1.41, $p = .235$; χ^2 (1, $n = 313$) = .765, $p = .382$]. In all instances North American athletes recorded higher frequencies of aggressive behavior; however, the distribution of these acts across the five frustration-inducing factors was identical for both groups. These results do not support our

Table 3
Combined distribution of aggressive behavior across the five frustration-inducing factors

Factor	Frequency ($n = 1266$)		
Score differential*	Two or less goals 1047	Three or more goals 219	
Position*	Offensive 777	Defensive 449	
Game location	Home 636	Away 630	
Team status	Winning 424	Losing 433	Tied 409
Period ($n = 1261$)	First 418	Second 453	Third 390

* Significant at $p < .001$.

Table 4
North American and European players' independent distributions across the five frustration-inducing factors

Factor	North American ($n = 953$)	European ($n = 313$)
Score differential		
Two goals or less	769*	278*
Three goals or more	184*	35*
Position		
Offensive	587*	190*
Defensive	366*	123*
Team status		
Winning	312	112
Losing	337	96
Tied	304	105
Game location		
Home	490	146
Away	463	167
Period	($n = 949$)	($n = 312$)
First	324	94
Second	335	118
Third	290	100

*Significant at $p < .001$.

second hypothesis, as these factors did influence the distribution of European born players' aggressive behavior.

In accordance with suggestions outlined in the previous literature supporting a social learning perspective, the influence of players' experience in the NHL was assessed in conjunction with the

frequency of their aggressive penalties. A significant difference emerged for both European and North American athletes, with more experienced players (i.e., >3 years in the NHL) committing significantly more aggressive acts than rookies (i.e., <3 years in the NHL) [χ^2 (1, $n = 313$) = 93.42, $p < .001$; χ^2 (1, $n = 953$) = 138. 27, $p < .001$, respectively]. When the two groups were combined, both North American rookies and veterans were found to be significantly more aggressive than European rookies and veterans. However, European veterans' aggressive behaviors did not significantly differ from North American rookies' aggressive behavior. In addition, the relative proportion of aggressive behaviors between North Americans and Europeans was smaller among veterans (73.1%—North American, 26.9%—European) than it was between rookies (80.6%—North American, 19.4%—European). These results illustrate that more experienced athletes in the NHL commit more aggressive acts, and that over time European born players begin to behave in a manner that more closely resembles the North American style of hockey (i.e., more frequent use of aggressive behaviors).

Aggression–performance

In order to address the secondary purpose of this investigation (to assess whether differences in aggressive behavior are accompanied by differences in performance), North American and European players were compared according to performance indices (e.g., goals, assists, shots, total points). As was mentioned above Mann–Whitney *U* tests were used to test for group differences.

No significant performance differences (p's > .05) were observed between North American and European players for goals ($M = 14.7$; $M = 15.0$), assists ($M = 23.6$; $M = 24.5$), shots ($M = 141.1$; $M = 144.1$) and total points ($M = 38.3$; $M = 39.5$) across the 2003–2004 regular season. These results support our hypothesis, in that aggressive differences between North American and European players did not translate into performance differences.

Discussion

The purpose of the current investigation was to assess whether European and North American hockey players differed in their use of aggressive behavior, as well as to examine if these different playing styles translate into subsequent performance differences. The results support the widely held notion that North American players are significantly more aggressive than their European counterparts. Not only did North American players commit significantly more aggressive penalties, but they also received substantially more non-aggressive penalties when compared to European born players. However, these distinctly different playing styles with respect to aggression did not significantly influence individual performance measures. Both North American and European players compiled approximately 39 points over the 2003–2004 season.

The results of this investigation supported our primary hypothesis. North American players were penalized significantly more times for aggressive infractions than were European born players. This difference in the use of aggressive behavior has been assumed for some time, but until now has never been empirically tested under common competitive conditions (e.g., rink size, rules).

Theoretically speaking, this cultural difference in the use of aggressive behavior adds credence to the argument surrounding a social learning explanation. Because North American and European players differed significantly in their use of aggressive behavior, the often-cited argument that aggression is a natural by-product of ice hockey was not supported. Rather, we believe that the observed differences in the use of aggressive behavior are the result of early socialization experiences, with North American hockey players receiving more pro-aggressive messages and reinforcement from socializing agents (e.g., family, coach, teammates, media) than do European born players. This investigation was unable to directly assess cultural influences; however future research concerned with cross-cultural differences in aggression would be wise to include these social factors.

The finding that more experienced NHL players commit significantly more aggressive acts than do rookie players also supports a learning perspective (Conroy et al., 2001; Silva, 1984). Veteran athletes have been exposed to the NHL's pro-aggressive attitudes and norms longer, and are therefore more likely to exhibit such behaviors in an attempt to receive reinforcement (e.g., applause, praise from coach, respect). On the other hand, rookie athletes may still be trying to understand what is expected of them, and therefore learning vicariously through the more experienced players. The marked cultural difference between North Americans and Europeans was again apparent, irrespective of NHL experience. European rookies committed the fewest acts of aggression, presumably because of their previous socialization experiences. North American rookies however maybe exposed to this "win at all costs" philosophy earlier (e.g., junior hockey) and are therefore socialized to display some amount of aggressive behavior (Smith, 1978, 1979). Interesting however, was the degree to which European veterans started to close the gap on North American veterans. In other words, the longer that European players were in the NHL, the more closely they resembled North American players' aggressive style of play. Over time these European players may learn that aggressive behaviors (e.g., fights) are rewarded within the North American context (e.g., applause, larger contracts, team selection) and therefore behave in accordance to receive recognition.

The finding that North American and European aggressive acts were distributed similarly across the proposed situational and environmental factors (i.e., score differential, period, team status, home vs. away, position) is also very informative. This appears to demonstrate that these situational and contextual contingencies do heighten the likelihood of an aggressive outburst. Ultimately however, our analysis suggests that cultural differences and early socialization experiences influence how athletes respond to these instances of frustration. Therefore, North American players appear to be more likely to respond in such situations by engaging in fighting, spearing, and cross-checking, whereas European born players appear less likely to respond in an aggressive manner. Nevertheless, previous research was correct in highlighting the necessity to include situational and contextual factors in a study of aggressive behavior (Cullen & Cullen, 1975; Kelly & McCarthy, 1979; LeFebvre & Passer, 1974; McGuire, 1990; Russell & Drewry, 1976; Widmeyer & Birch, 1984; Widmeyer & McGuire, 1997). Therefore, interventions designed to reduce the frequency of aggressive outbursts in hockey will not only have to address the broader socialization of violence (e.g., family, media), but also attend to the environmental factors that appear to facilitate these within-competition outbursts.

Finally, the conclusion that an aggressive style of play does not provide athletes with any significant performance advantages, appears to be a profound one. Smith (1978, 1979) and

Faulkner (1973, 1974) both demonstrated that North American athletes perceived an aggressive style of play as advantageous to performance. These athletes reported that coaches and scouts demand these aggressive attributes, and that one could progress in hockey by possessing these qualities, irrespective of skill and ability (Smith, 1978). Consequently, this unwavering belief on the part of athletes is a substantial reason why these behaviors continue to subsist. Hopefully, results such as the ones provided in this investigation can shift attention away from aggression's role as a performance facilitator, and help focus the discussion around other attributes that may be more influential (e.g., skating ability, puck handling ability, shooting accuracy).

There are some notable limitations of this study that need to be addressed and improved upon in the future. First, due to the archival nature of this investigation only a limited amount of information about the players that committed these aggressive acts was available. As a result, the questions and comparisons that we posed were limited by the scope of the original data collection. Consequently, future investigations would be wise to collect their own demographic and psychographic information about the players, including such constructs as: achievement motivation (Duda & Huston, 1995), motivational climate (Miller, Roberts, & Ommundsen, 2005) legitimacy perceptions (Conroy et al., 2001), sportspersonship (Miller et al., 2005), and perceptions of parents' and coaches' aggressive beliefs (Smith, 1978, 1979). This information will not only allow for more empirical options, but also provide more comprehensive explanations for any observed behavioral differences. Also, the use of qualitative techniques may illuminate players' experiences with hockey and the socialization of aggression, which will ultimately provide a better understanding of this process. Secondly, this investigation grouped all non-North American players as Europeans. It is quit possible that different socialization practices exist among these countries, and that the exposure to aggressive behavior in hockey may also substantially differ. As a result, our understanding of cross-cultural differences in aggressive behavior would be enhanced if more precise comparisons could be made. Thirdly, because this investigation was concerned solely with aggressive behavior in hockey the results are not presently generalizable past this activity. However, because the current investigation proposes that broader social forces are responsible for aggressive outbursts (not sport-specific conditions), it should follow that similar observational learning could explain aggressive behaviors in other sports. For example, Mugno and Feltz (1985) in an attempt to replicate Smith's (1978) hockey study found that high school football players learned to be aggressive in a similar fashion to Smith's (1978) hockey players. However, these between-sport differences need to be addressed using a diverse sample of athletes in order to provide convincing external validity for these results. And finally, even though this study consisted of 200 games, it is still cross-sectional in nature and therefore only provides a snap shot of the current situation. More longitudinal studies would demonstrate how these different behavioral repertoires develop in Europe as compared with North America, and then how, and how fast, they converge within the context of the NHL. Moreover, because this was the first investigation to address the cross-cultural nature of aggressive behavior within hockey, a replication (preferably larger) of this study is warranted to test the validity and reliability of our findings.

In summary, this study provides preliminary support for a cross-cultural difference in the use of aggressive behavior in professional hockey. Future studies should aim to uncover the particular social and cultural factors responsible for these observed behavioral differences, so that future interventions can be developed in accordance.

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