



March, 2006
Volume 8, Issue 1

Using A Direct Observation Approach To Study Aggressive Behaviour In Hockey: Some Preliminary Findings

Chris Gee

*Department of Exercise Sciences
University of Toronto*

Phillip Sullivan

*Department of Physical Education and Kinesiology
Brock University*

ABSTRACT

A considerable amount of research has been conducted on the use of aggressive behaviour in hockey; however, such studies have often been compromised by their choices in methodology (Kirker, Tenenbaum, & Mattson, 2000). The purpose of the current investigation was to test the utility of a videotaped observation (VO) approach on the study of aggressive behaviour, and to compare the results with previous findings. Subjects were male varsity hockey ($n = 79$) players competing at a neutral location where two video cameras had been placed to record the action. The competitive tapes were coded by two independent observers using a validated operational list, with a high inter-rater reliability ($> 90\%$). The VO design accounted for significantly more aggressive infractions [$X^2(1, N = 74) = 28.60, p < .001$]; thus, highlighting its ability to overcome previous limitations. Furthermore, this more inclusive sample of behaviours provided substantially different results when tested according to the score differential, period, player position, and team status (i.e., winning, losing, tied). These discrepancies are explained according to the methodological differences. Finally, limitations of the VO design are discussed and its future value to the study of aggressive behaviour in sport is highlighted.

Introduction

Behaviours intended to harm another individual (the key word being intent), commonly referred to as aggressive behaviours, are by no means new to the sport of hockey. In fact, Widmeyer and McGuire (1997) argue that aggressive behaviours and hockey have always gone hand in hand, presumably because of the frustration inherent in the game. Therefore, it should come as little surprise that a great deal of empirical research has been conducted in an attempt to uncover those factors that contribute to the facilitation of these behaviours. Unfortunately, despite the overwhelming interest shown by academics, a comprehensive and reliable knowledge base concerning the dynamics underlying these aggressive behaviours is still lacking (Kirker et al., 2000). Overwhelmingly, this shortcoming has been traced back to a variety of methodological limitations inherent in previous research, including the lack of ecological, construct, and predictive validity, along with the overall absence of reliability measures (Stephens 1998; Widmeyer, Dorsch, Bray & McGuire, 2002). Nevertheless, researchers have continued to utilize these methodological approaches, presumably due to a lack of alternatives. In doing so, the problem of aggressive behaviour in hockey has continued to escalate (Pascall, 2000), while our understanding has remained relatively stagnant. Consequently, any advancement in our understanding of these behaviours is going to have to first be preceded by methodological innovation (Stephens, 1998). A more comprehensive understanding of these behaviours has been deemed critical by legislative bodies in order to reverse the violent trend currently being witnessed within amateur hockey (McMurty, 1974; Pascall, 2000).

Two distinct methodologies have dominated the study of aggressive behaviour in hockey. The first is a self-report methodology. This method attempts to assess athletes' perceptions of, and attitudes towards, aggressive behaviour within competition. More specifically, this method provides subjects with sporting scenarios depicting various aggressive behaviours, and subsequently has them rate the legitimacy (i.e., acceptability) of these acts under a variety of circumstances (e.g., the game official was not looking). Several self-report instruments have been developed to assess these attitudes and legitimacy perceptions, including the Carolina Sport Behaviour Inventory (CSBI; Conroy, Silva, Newcomer, Walker, & Johnson, 2001), Injurious Sport Acts Series (ISAS; Bredemeier, Shields, Weiss, & Cooper, 1987), Continuum of Injurious Acts (CIA; Bredemeier, 1985), and the Bredemeier Athletic Aggression Inventory (BAAGI; Bredemeier, 1978).

However, several questions have been raised regarding the validity of assessing aggressive behaviour in this manner. One of the primary concerns raised by researchers is the fact that this approach does not directly examine the construct under question (i.e., aggressive behaviour). Rather, this approach assesses perceptions of, and attitudes towards, these behaviours, and subsequently assumes that those who are more accepting of these acts will inevitably display such behaviours within competition. Unfortunately, proponents of this approach have seldom, if at all, assessed these constructs in relation to an individual's actual competitive behaviour. In fact, Stephens (1998), in a review of the measurement techniques used in the area of aggressive behaviour, called on researchers

to “compare with observational measures and related constructs to establish [these instrument’s] criterion validity” (p. 285). In response to this apparent shortcoming, Loughhead and Leith (2001) assessed a variety of intrapersonal (e.g., perceptions of behaviour) and interpersonal (e.g., coaches attitude towards aggression) constructs in relation to athletes’ actual competitive behaviours (i.e., penalties). The authors observed a negative correlation between hockey players’ perceptions of certain aggressive acts and their actual competitive behaviours. Therefore, those athletes who perceived themselves as playing a highly aggressive style of hockey, actually committed fewer aggressive penalties than those players who perceived themselves as playing in accordance with the rules. Similar results in hockey were published earlier; however, different self-report measures were employed (Worrell & Harris, 1986).

Researchers have also called into question the ecological validity of using self-report measures in the study of sport specific aggressive behaviour (Bredemeier & Shields, 1984; 1986a; 1986b; Stephens, Bredemeier, & Shields, 1997). For practical reasons, it is impossible to distribute these instruments while athletes are engaged in the competitive environment. Therefore, researchers have had to settle for assessing these constructs in pre-game, practice, and/or post-game situations. Unfortunately, as Bredemeier and colleagues have demonstrated, athletes use different patterns of moral reasoning (i.e., decisions concerning what is right and wrong) while engaged in competition. Consequently, since the choice to employ aggressive tactics is believed to be at least partially morally driven (Bredemeier & Shields, 1984; 1986a; 1986b), the context in which these behaviours are studied appears to be of the utmost importance.

The second, and most widely used methodology, involves using penalty infractions as operational indices for aggressive behaviour (Kelly & McCarthy, 1979, McCarthy & Kelly, 1978; McCaw & Walker, 1999; McGuire, 1990; Widmeyer & Birch, 1979; 1984). Proponents of this penalty record approach argue that it overcomes several of the limitations inherent in self-report designs (e.g., ecological validity, examines actual behaviour); thus, providing a more valid assessment of sport specific aggressive behaviour (Vokey & Russell, 1992).

Those studies which have adopted a penalty record approach have overwhelmingly been focused on uncovering situational and environmental factors believed to facilitate aggressive outbursts. For example, an increase in aggressive penalties has been associated with larger score differentials (Goginsky, 1989; McGuire, 1990; Wankel, 1973), the third period (Kelly & McCarthy, 1979; Russell & Drewry, 1976; Wankel, 1973), player position (Widmeyer & Birch, 1984), and losing in general (LeFebvre & Passer, 1974; Leith, 1989; Volkamer, 1971). Overall, these situations are believed to be fuelled by frustration and therefore increase the likelihood that players will react aggressively (Widmeyer, Bray, Dorsch, & McGuire, 2002).

As was stated earlier, the penalty record approach has been the most widely used methodology in the study of sport specific aggression. Nevertheless, this approach has recently come under heavy criticism, which has inevitably cast scepticism over previously cited research (Kirker et al., 2000). First, due to the speed and physicality

present in the game of hockey, combined with the fact that game officials only have limited attentional resources, a percentage of aggressive behaviours have been shown to go unseen (Gee, 2004; Gee & Sullivan 2004a; 2004b; Sheldon & Aimar, 2001; Stephens, 1998; Widmeyer & Birch, 1979, 1984). Secondly, game officials have been shown to be biased according to crowd loyalty when assessing penalties, with significantly fewer penalties being issued to home teams (Lehman & Reifman, 1987; Pollard, 1986; Russell & Russell, 1984; Sheldon & Aimer, 2001; Sumner & Mobley, 1981). And finally, research suggests that several aggressive behaviours (e.g., slashing, cross checking) within the game of hockey have become somewhat normalized, and as a result, these acts oftentimes are not penalized and therefore not subjected to empirical analyses (Kirker et al., 2000; Stephens, 1998). These instances of aggression appear to fall under what has commonly been referred to as the “unwritten rule book”.

Combined, these limitations appear to cast substantial doubt over the overall validity and reliability of examining aggressive behaviour in this manner (Gee, 2004; Kirker et al., 2000; Russell & Russell, 1984; Sheldon & Aimar, 2001; Widmeyer & Birch, 1984). More specifically, due to the large number of aggressive behaviours omitted using a penalty record approach, a representative sample of behaviours has yet to be assessed. Moreover, because the game official is independently responsible for penalizing players’ behaviour, the reliability of such decisions is unknown.

In an attempt to address the limitations of the penalty record approach, while accentuating its strengths, researchers have recently turned to direct observation (Gee, 2004; Katorji & Cahoon, 1992; Kirker et al., 2000; Sheldon & Aimar, 2001; Worrell, 1980). Similar to the use of penalty records, aggressive behaviours can be examined within their natural competitive climate when employing a direct observation methodology. As was mentioned earlier, these environmental considerations have been shown to be paramount in ensuring the validity of studying this behavioural construct (Bredemeier & Shields, 1984; 1986a; 1986b). However, this is where the similarities between the two methods stop. Central to the direct observation approach, is the removal of responsibility for coding aggressive acts away from the game official, and placing that responsibility on objective independent observers. Therefore, unlike the game official who must pay attention to all aspects of the game (e.g., scoring, too many men on the ice, penalties), the independent observers are only responsible for coding the specified aggressive behaviours. Furthermore, because they are not affiliated with either team, and their actions (i.e., coding) have no bearing over the competitive outcome, they should experience little hesitation when coding these particular behaviours. Moreover, unlike the game official, independent coders do not have to stop the competitive action in order to include these acts of aggression. And finally, because there are multiple individuals responsible for coding these behaviours, reliability analyses can be conducted to ensure that only appropriate behaviours are included. Overall, these design modifications are believed to maximize the inclusiveness of the sample being generated, while providing psychometric reassurance (i.e., reliability) that only those behaviours adhering to the operational criteria are being included.

Accentuating the previously mentioned strengths, is the fact that direct observation designs can now be employed using video cameras (Gee, 2004; Kirker et al., 2000; Sheldon & Aimar, 2001). By allowing coders to stop, rewind, and pause the competitive action, more valid and reliable coding has been documented. Unfortunately, since this technique is relatively new to the study of aggressive behaviour, research has been solely concerned with perfecting this technique, and not on actual competitive behaviour. As a result, the purpose of the current investigation was to employ a videotaped observation (VO) design in an attempt to assess the frequency and distribution of aggressive acts, according to four previously cited influential factors [period of play, position of the aggressor (i.e., offensive, defensive), score differential (i.e., <2 goals, >3 goals), and the status of the aggressor's team at the time of the incident (i.e., winning, losing, tied)]. In doing so, we hope to highlight the strengths and weakness of employing such a methodology in the study of aggressive acts, while also comparing our results with those previously published.

Method

Participants

Subjects were male varsity ice hockey players ($N = 79$) competing in a tournament held at a neutral location (goalies were not included in the investigation). The players had competed at this level of hockey for an average of $2.33 + 1.13$ years and were between 20 – 26 years of age. All teams had competed against each other previously and therefore possessed some amount of familiarity. A total of four teams competed in the three games that were under investigation (2 teams competed twice). The recording of these three games took place over a two day period.

Procedure

League administrators and coaches were approached and informed of the study. Once permission was granted from these individuals the teams as a collective group were approached and solicited for consent. The consent process occurred far in advance (i.e., roughly 3 weeks) of the tournament, in an attempt to minimize any social desirability biases. On game day, two cameras were placed in unobtrusive locations on opposite sides of the rink. The cameras were placed at center ice, in order to provide the most detailed picture of the entire playing surface. Camera operators were instructed to capture as many of the players as possible at any one time, while always maintaining a relatively clear picture (i.e., viewing the players' numbers).

Assessing Aggression

As was stated earlier, the “intent to harm” is the defining characteristic of aggressive behaviour. Therefore, an attempt must be made to ensure that only those behaviours that possess this intent are included. In two separate studies, conducted over a decade apart, athletes were interviewed as to why they commit certain on-ice infractions (Widmeyer & Birch, 1984; Widmeyer & McGuire, 1997). Repeatedly (> 80%), athletes reported using

fourteen behaviours (slashing, cross-checking, boarding, fighting, charging, butt-ending, head-butting, kneeling, spearing, high sticking, elbowing, instigating, checking from behind, roughing) with the intent to either physically or psychologically harm their opponent. As a result, these fourteen behaviours have been labeled as 'aggressive' infractions within hockey, and have been the focus of several investigations (Dorsch & Widmeyer, 1993; Gee, 2004; Kirker et al., 2000; Widmeyer & Birch, 1984; Widmeyer & McGuire, 1997). Consequently, within hockey, these behaviours are believed to be indicative of aggression and have therefore become the most widely used operational indices.

Training

A substantial amount of training is required before commencing a videotaped observation design. Due to the speed, physicality and number of players inherent in several of the power/performance sports (including hockey), a lot of action takes place simultaneously. As a result, coders need to become familiar with the pace of the game so that they may be able to spread their attention over several players. Also, through experience coders will develop a certain amount of foresight, which will allow them to predict when certain acts are inevitable (e.g., loose puck in front of the net). Finally, coders must become familiar with the operational definitions and discuss between each other potential contingencies. It is extremely important that the coders are able to distinguish between what is part of the game and what is not, and do so in a reliable manner.

Coding

The tape from the bench side of the rink, as opposed to the side with the penalty box, was selected for primary analysis. Only one tape was selected so that coders watched the same footage, and also to avoid the possibility of behaviours being coded twice. The other tape was available to coders in the chance that certain information (e.g., player number, act itself) was not readily available on the original tape. However, future research endeavors should be able to obtain similar results using a single camera design. The tapes were subsequently coded by two independent observers, both experienced in the game of hockey, using a random reliability procedure. The authors used random 10 minute intervals for comparison, and displayed excellent inter-rater agreement (> 90%). The competitive action was coded according to a list of operational definitions provided by Kirker et al. (2000). This list was previously approved by a panel of experts and was therefore believed to possess appropriate face, content, and construct validity (see Appendix A). As an example, a cross-checking code was administered "when a player used the stick with both hands to block across the upper body of a player" (Kirker et al., 2000). Again, only the fourteen behaviours for which aggressive motives have been documented, were coded.

Each behaviour was then coded according to the period of play, position of the aggressor, score differential, and finally, the status of the aggressor's team at the time of

the incident (i.e., winning, losing, tied). These factors were chosen because they have been studied on several occasions using the penalty record approach.

The influence of each factor on the distribution of aggressive behaviour was assessed through individual chi-square analyses. In an attempt to minimize Type I error, Bonferonni adjustments were introduced (Vincent, 1999). As a result, an alpha level of .01 was employed.

Results

A total of 74 aggressive behaviours were coded from the three games under investigation. In accordance with the assumptions underlying the development of the videotape observation design, we found that the majority of aggressive acts did go unsanctioned by the game official, $X^2(1, N = 74) = 28.60, p < .001$. Of the 74 behaviours coded by the two independent observers, only 14 received actual on-ice penalization.

With respect to team status (i.e., winning, losing, tied), no significant differences were observed, $X^2(2, N = 74) = 3.43, p = .180$. Therefore, winning ($n = 25$), losing ($n = 31$), and tied ($n = 18$) teams committed relatively equal numbers of aggressive acts.

Also, there was no significant difference observed between players occupying different positions, $X^2(1, N = 74) = .865, p = .352$. Both offensive ($n = 44$) and defensive ($n = 33$) players committed relatively the same number of aggressive acts.

With respect to the score differential at the time of the infraction, significantly more aggressive acts were committed when the score differential was relatively small ($n = 54$), as compared to instances of larger score differentials ($n = 20$), $X^2(1, N = 74) = 15.62, p < .001$.

And finally, the number of aggressive acts did not differ according to the period of play, $X^2(2, N = 74) = 4.65, p = .098$. A similar number of aggressive acts were observed in the first ($n = 16$), second ($n = 30$), and third ($n = 28$) periods. In addition, there were no overtime situations across the three games under investigation.

Discussion

The purpose of the current investigation was to test the utility of a direct observation approach when examining determinants of aggressive behaviour. Previous research has been plagued by the consistent finding that a substantial number of aggressive acts go unnoticed by the game official (Gee, 2004; Katorji & Cahoon, 1992; Russell & Russell, 1984; Stephens, 1998; Widmeyer & Birch, 1984). In accordance with published suggestions (Stephens, 1998), this investigation employed a videotaped observation design, in the hopes of increasing the accuracy of assessing these behavioural constructs (Kirker et al. 2000; Sheldon & Aimar, 2001).

Consistent with previous findings (Kirker et al., 2000; Russell & Russell, 1984; Stephens, 1998), the majority of aggressive acts did go unnoticed by the game official (81%). More specifically, an additional 60 aggressive acts were included in this investigation that would have subsequently eluded empirical attention if a penalty record approach was employed. This is not to say that the video observation design is perfect, but rather, it appears to provide a substantially more representative sample of aggressive behaviours, from which results can be extrapolated. These improvements in sampling can be at least partially attributed to the benefits of coding behaviours from a tape, when compared to doing it in real time. Moreover, the use of multiple coders in this investigation appeared to overcome some of the biases that have been directed towards game officials, including the “unwritten rule book”, the home field advantage, and their limited attentional resources (Gee, 2004; Russell & Russell, 1984; Sheldon & Aimar, 2001; Stephens, 1998). Consequently, by including only those behaviours that two independent observers coded, it is assumed that only appropriate aggressive behaviours were subjected to data analysis. Moreover, by having two people code the behaviours, personal biases such as experience with hockey, favourite team, and attentional capacity can be protected against, as both parties must independently code the behaviours in order to have them included.

The bulk of the research conducted on aggressive behaviour in hockey has been done so in order to gain an understanding of what factors are associated with facilitating these behavioural outbursts. However, due to the systematic measurement error inherent in these designs, the accuracy of their findings has been called into question (Gee, 2004; Kirker et al., 2000; Stephens, 1998). Consequently, we still know very little about what factors increase the likelihood that aggressive behaviours will be employed. As this current investigation was only concerned with three games, the results presented here should be treated as preliminary.

By far the most surprising results generated through this investigation were those findings concerned with the score differential. Previous research, the bulk of which has utilized penalty records, has overwhelmingly concluded that aggressive acts are more prevalent in instances where large score differentials exist (Goginsky, 1989; Harrell, 1980; McGuire, 1990; Wankel, 1973). Overwhelmingly, this rather consistent finding has been speculated to be the result of the supposed frustration present during such lop-sided contests. However, this investigation was not only unable to replicate this finding, but actually observed the exact opposite trend (i.e., more aggressive acts when the score differential was small). Again, because only a small sample of games were under investigation, these results must be met with caution. Nevertheless, they may re-affirm one of the strengths associated with direct observation. It is quite possible that the explanation for this discrepancy can be directly attributed to the “unwritten rulebook”. As was mentioned earlier, several aggressive acts (e.g., cross checking, slashing) have become normalized components of the game of hockey. Overwhelmingly, these behaviours are used for strategic reasons, including knocking players down and separating players from the puck. Thus, it makes sense that they are most often used when the competitive action is at its highest, and the competitive outcome is subsequently still in question (i.e., game is close). It is also at this time that the game officials do not

want to become the deciding factor, and subsequently adhere to this unwritten rule book. Consequently, these widely used forms of aggressive behaviour for the most part are overlooked, with only those that illegally interfere with a scoring opportunity receiving a penalty. On the other hand, when the score differential between the two teams is large, it is not uncommon for game officials to take a proactive approach in order to keep control over this potentially volatile situation. Consequently, behaviours that normally would be overlooked, may now receive penalties in an attempt to deter any potential escalation in the use of aggressive behaviours. Therefore, it may be the case that previous findings are actually the result of the pressures imposed on game officials, including the unwritten rule book, the need to maintain flow, and the desire not to be the deciding factor, rather than the previously held notion of frustration. Future research comparing penalty and observational records would provide more insight into this interesting discrepancy.

The other three factors under investigation (period, position, team status) have provided equivocal results in the past. As a result, it is rather difficult to make any direct comparisons at this time. However, the current results do seem to refute one commonly held notion, that the majority of aggressive acts are the result of heightened frustration (Widmeyer & McGuire, 1997). Previous research, although unable to unequivocally demonstrate it, believed that instances of heightened frustration (i.e., third period, playing defence, and losing) dramatically increased the likelihood of an aggressive incident (Kelly & McCarthy, 1979; Russell & Drewry, 1976; Wankel, 1973; Widmeyer & Birch, 1984). Rather, the use of these potentially harmful behaviours appears to be commonplace within hockey, and used irrespective of these hypothesized catalysts. For example, our results show that players commit a relatively equal number of aggressive acts across all three periods, in both offensive and defensive positions, and when their team is winning, losing, or tied. Consequently, it appears that athletes utilize these behaviours as part of a “normal” behavioural repertoire and are only penalized for such behaviours when they are in violation of the “informal rulebook”. The widely held acceptance and adoption of these aggressive behaviours may be due in part to their perceived benefits (e.g., appearing competent, stopping a scoring opportunity) outweighing their actual costs (e.g., 2 minute penalty). Therefore, strategies aimed at reducing the amount of aggressive behaviour in hockey may be wise to focus on punishment (e.g., longer penalties, more fines) rather than rule modifications aimed at reducing the amount of frustration (e.g., no touch icing, larger nets). However, more research is necessary concerning these hypothesized facilitative factors, especially through a videotaped observation design.

Limitations of the Videotaped Observation Design

Unfortunately, there are some profound limitations associated with using a direct observation approach to study aggressive behaviour in sport. First, the approach is very time consuming and possesses a rather heavy researcher burden when compared to the widely used penalty record approach. In order to conduct observational analyses the researcher must not only be present at the sporting event, but must also take the necessary time to code the tapes thoroughly and accurately (roughly three hours of coding, for every one hour of tape). Thus, academics faced with the “publish or perish” pressure of academia, may choose the penalty record approach for its expedited properties.

Consequently, until our field begins to refuse the penalty record approach on the grounds that it is no longer a viable methodological tool, I am afraid that the field will continue in its current path.

Secondly, and somewhat tied to the above comment, is the fact that direct observation designs do not lend themselves well to large scale studies (e.g., hundreds of games, seasons). Due to wealth of penalty record information that exists, often times already in numerical format, large scale studies can be conducted quickly and longitudinally using the penalty record approach (Russell & Russell, 1984; Widmeyer & McGuire, 1997; Vokey & Russell, 1992). However, such information is not available in an archived format for those interested in direct observation. Those videotapes that do exist for hockey games are often geared towards professional leagues (thus omitting amateur hockey for the most part), are often private property (thus hard to obtain), and are shot in a way that follows the puck (thus omitting the behaviours that take place behind the play). Consequently, in order to conduct large scale and longitudinal studies using an observational approach, all games will have to be taped by the researcher and players/teams followed over time. Now, this is not to say that this can't be done, rather, that such a study is a significant undertaking (i.e., several years) and will most likely not occur while the penalty record approach enjoys such popularity.

Finally, another limitation of the direct observation approach, and one that appears to be amendable, is the presence of social desirability. Due to ethical considerations, athletes must be informed of the purpose of the research and also the method by which the data is going to be collected. Anecdotally speaking, young male athletes in such instances often react with hyper-masculinized responses and may in fact behave more aggressively in an attempt to reaffirm these attributes (Gee, 2004). As a result, it is suggested that researchers stagger the time between athlete consent and the start of data collection. Moreover, if at all possible, the athletes should not be told which games will be videotaped and record games in a seemingly random order. Hopefully, such precautions will minimize any social desirability biases.

Recommendations for Future Research

As has been shown through this investigation, the use of a videotaped observation design overcomes several of the limitations that have been impeding the study of aggressive behaviour in sport. These limitations have cast a dark cloud over previous results, and have ultimately led to our current equivocal body of literature (Kirker et al., 2000). Consequently, the next logical step in the study of aggressive behaviour is to re-evaluate several of the factors that have been hypothesized to influence aggression (e.g., playing on the road, parental/coach attitudes towards aggression) using this videotaped observation approach. Such a study will provide more accurate and conclusive results concerning the influence of these variables, and may prove valuable in the eventual removal of these behaviours from hockey.

Also, larger scale studies should be attempted using this videotaped observation design. These studies will not only provide an abundance of rich data, but will also give

us a clearer understanding of the practical ability of this methodological approach. Suggestions for such research endeavours include large research teams and quasi-longitudinal designs. By utilizing a large number of researchers several games can be assessed in a timely fashion. Moreover, by studying different age cohorts simultaneously (i.e., quasi-longitudinal design) a more comprehensive picture of how aggressive behaviours change across time may be understood. This information will be essential to the development and implementation of policies aimed at reducing aggressive behaviours.

Finally, in accordance with the suggestions outlined in Stephens (1998) methodological review, videotaped observation designs should be used to validate self-report measures. These instruments have been shown to lack construct and predictive validity, and would be greatly improved if they were tested against a valid behavioural criterion. Such a study would not only serve psychometric purposes, but would also help illuminate the complex relationship that exists between aggressive cognitions (i.e., attitudes, perceptions) and actual overt aggressive behaviours.

Overall the use of a videotaped observation design appears to be a step in the right direction. Future research using this approach will undoubtedly continue to shed light on this complex social phenomenon and hopefully aid in its eventual removal from hockey.

References

- Bredemeier, B. (1978). The assessment of reactive and instrumental aggression. In the *Proceedings of the International Symposium of Psychological Assessment in Sport* (pp. 136-145). Netanya, Israel: Wingate Institute for Physical Education and Sport.
- Bredemeier, B. (1985). Moral reasoning and the perceived legitimacy of intentionally injurious sport acts. *Journal of Sport Psychology*, 7, 110-124.
- Bredemeier, B., & Shields, D. (1984). Divergence in moral reasoning about sport and everyday life. *Sociology of Sport Journal*, 1, 304-318.
- Bredemeier, B., & Shields, D. (1986a). Athletic aggression: An issue of contextual morality. *Sociology of Sport Journal*, 3, 15-28.
- Bredemeier, B., & Shields, D. (1986b). Game reasoning and interactional morality. *Journal of Genetic Psychology*, 147, 257-275.
- Bredemeier, B., Shields, D., Weiss, M., & Cooper, B. (1987). The relationship between children's legitimacy judgements and their moral reasoning, aggression tendencies, and sport involvement. *Sociology of Sport Journal*, 4, 48-60.
- Conroy, D., Silva, J., Newcomer, R., Walker, B., & Johnson, M. (2001). Personal and participatory socializers of the perceived legitimacy of aggressive Behaviour in sport. *Aggressive Behavior*, 27, 405-418.
- Dorsch, K. D., & Widmeyer, W. N. (1993, June). *The extent and antecedents of aggression in PeeWee ice hockey*. Paper presented at the annual meeting of the North American Society for the Psychology of Sport and Physical Activity, Brainard, MN.
- Gee, C. J. (2004). *A systematic observation of hostile aggression in Junior B hockey*. Unpublished master's thesis. Brock University, St. Catharines, Ontario, Canada.
- Gee, C.J., & Sullivan, P.J. (2004a). An examination of hostile and instrumental aggression in university hockey. *Journal of Sport and Exercise Psychology*, 26, S77.
- Gee, C.J., & Sullivan, P.J. (2004b). Aggression and coaching in sport. *Coaches Report*, 10, 25-27.
- Goginsky, A.M. (1989). *Microcosmic characteristics of aggression in professional ice hockey*. Unpublished master's thesis. Pennsylvania State University, State College, PA.
- Harrell, W. A. (1980). Aggression by high school basketball players: An observational study of the effects of opponents' aggression and frustration-inducing factors. *International Journal of Sport Psychology*, 11, 290-298.

Katorji, K., & Cahoon, M. A. (1992). *The relationship between aggression and injury in Junior "B" hockey*. Unpublished manuscript, University of Waterloo, Waterloo, Ontario, Canada.

Kelly, B. R., & McCarthy, J. F. (1979). Personality dimensions of aggression and its relationship to time and place of action in ice hockey. *Human Relations, 32*, 219-225.

Kirker, B., Tennenbaum, G., & Mattson, J. (2000). An investigation of the dynamics of aggression: Direct observation in ice hockey and basketball. *Research Quarterly for Exercise and Sport, 71*, 373-386.

Le Febvre, L. M., & Passer, M. W. (1974). The effect of game location and importance on aggression in team sport. *International Journal of Sport Psychology, 12*, 102-110.

Lehman, D. R., & Reifman, A. (1987). Spectator influence on basketball officiating. *Journal of Social Psychology, 127*, 673-675.

Leith, L. M. (1989). The effect of various physical activities, outcome, and emotional arousal on subject aggression scores. *International Journal of Sport Psychology, 20*, 57-66.

Loughead, T. M., & Leith, L. M. (2001). Hockey coaches' and players' perceptions of aggression and the aggressive behaviour of players. *Journal of Sport Behavior, 24*, 394-407.

McCarthy, J. F., & Kelly, B. R. (1978). Personality dimensions of aggression: Its relationship to time and place of action in ice hockey. *Human Relations, 32*, 219- 225.

McCaw, S. T., & Walker, J. D. (1999). Winning the Stanley Cup final series is related to incurring fewer penalties for violent behaviour. *Texas Medicine, 95*, 66-69.

McGuire, E. J. (1990). *Antecedents of aggressive behaviour in professional ice hockey*. Unpublished doctoral dissertation. University of Waterloo, Waterloo, Ontario, Canada.

McMurty, W. R. (1974). *Investigation and inquiry into the violence in amateur hockey*. Report to the honourable Rene Brunelle, Ontario Ministry of Community and Social Services.

Pascall, B. (2000, May). *Violence in hockey*. Report to the honourable Ian G. Waddell, British Columbia Ministry of Small Business, Tourism, and Culture.

Pollard, R. (1986). Home advantage in soccer: A retrospective analysis. *Journal of Sport Sciences, 4*, 237-248.

- Russell, G. W., & Drewry, B. R. (1976). Crowd size and competitive aspects of aggression in ice hockey: An archival study. *Human Relations, 29*, 723-735.
- Russell, G. W., & Russell, A. M. (1984). Sports penalties: an alternative means of measuring aggression. *Social Behaviour and Personality, 12*, 69-74.
- Sheldon, J. P., & Aimar, C. M. (2001). The role aggression plays in successful and unsuccessful ice hockey behaviours. *Research Quarterly for Exercise and Sport, 72*, 304-309.
- Stephens, D. (1998). Aggression. In J. L. Duda (Ed.), *Advances in Sport and Exercise Psychology Measurement* (pp. 277-291). Morgantown, VA: Fitness Information Technology.
- Stephens, D. E., Bredemeier, B., & Shields, D. L. (1997). Construction of a measure designed to assess players' description and prescription of moral Behaviour in youth sport soccer. *International Journal of Sport Psychology, 28*, 370-390.
- Sumner, J., & Mobley, M. (1981). Are cricket umpires biased? *New Scientist, 91*, 29-13.
- Vincent, W. J. (1999). *Statistics in Kinesiology* (2nd ed.). Champaign, IL: Human Kinetics.
- Vokey, J. R., & Russell, G. W. (1992). On penalties as measures of aggression. *Social Behavior and Personality, 20*, 219-226.
- Volkamer, M. (1971). Investigation into aggressiveness in the competitive social system. *Sportwissenschaft, 1*, 33-64.
- Wankel, L. M. (1973). An examination of illegal aggression in intercollegiate hockey. *Proceedings: Fourth Canadian Psycho-Motor Learning and Sport Psychology Symposium* (pp. 531-544). University of Waterloo, Waterloo, ON, October 1973.
- Widmeyer, W. N., & Birch, J. S. (1979). The relationship between aggression and performance outcome in ice hockey. *Canadian Journal of Applied Sport Sciences, 4*, 91-94.
- Widmeyer, W. N., & Birch, J. S. (1984). Aggression in professional ice hockey: A strategy for success or reaction to failure? *Journal of Psychology, 117*, 77-84.
- Widmeyer, W. N., & McGuire, E. J. (1997). Frequency of competition and aggression in professional ice hockey. *International Journal of Sport Psychology, 28*, 57-66.
- Widmeyer, W. N., Bray, S. R., Dorsch, K. D., & McGuire, E. J. (2002). Explanations for the occurrence of aggression: Theories and research. In J. M. Silva & D. E. Stevens (Eds.), *Psychological Foundations of Sport* (pp. 352-379). Boston, MA: Allyn & Bacon.

Widmeyer, W. N., Dorsch, K. D., Bray, S. R. & McGuire, E. J. (2002). The nature, prevalence, and consequences of aggression in sport. In J. M. Silva & D. E. Stevens (Eds.), *Psychological Foundations of Sport* (pp. 328-351). Boston, MA: Allyn & Bacon.

Worrell, G. L. (1980). Aggression by high school basketball players: An observational study of the effects of opponents' aggression and frustration-inducing factors. *International Journal of Sport Psychology*, *11*, 290-298.

Worrell, G. L., & Harris, D.V. (1986). The relationship of perceived and observed aggression of ice hockey players. *International Journal of Sport Psychology*, *17*, 34-40.

Appendix A

Operational Definitions for the Fourteen Indices of Aggression

Hit from behind – when a player pushes, body checks or hits a player from behind in any manner, or if knocks a player from behind into the boards in such a way that the player is unable to protect himself.

Slashing – when a player impedes (or seeks to) a player by ‘slashing’ them with the stick.

Elbowing – when a player fouls a player by using their elbow.

Cross-checking – when a player uses the stick with both hands to block across the upper body of a player (no part of the stick is on the ground).

Fighting – two or more players engage in fisticuffs. Multiple punches must be thrown and the game officials must award those involved a major penalty. If this does not take place, count each punch independently.

Spearing – when a player uses the stick to poke or ‘spear’ a player.

Roughing – The use of excessive physical force when “taking out” an opponent.

High Sticking – when a player contacts a player with a stick carried above shoulder height.

Kneeing – when a player fouls a player by using their knee.

Boarding – when a player checks (or hits) a player in such a manner that the player is thrown into the boards violently.

Charging – when a player checks (or hits) a player with excessive force, while taking more than two steps in that player's direction.

Butt-ending – when a player pokes a player with the point (‘butt-end’) of the stick.

Instigating – awarded to a player who intentionally starts a fight. The player must make a concerted effort to entice the other player to fight (e.g., taunt, punch an unexpected player)

Head-butting – when a player intentionally smashes his head into the head of an opponent

Adapted with permission from Kiker, Tenenbaum, & Mattson, 2000