Implicit but not explicit aggressiveness predicts performance outcome in basketball players

THOMAS TEUBEL*, JENS B. ASENDORPF**, RAINER BANSE***, *and* KONRAD SCHNABEL**

(*) *Institute of Sports and Sports Sciences, Universität Heidelberg, Germany*
(**) *Institute of Psychology, Department of Personality Psychology Humboldt-Universität zu Berlin, Germany*
(***) *Institute for Psychology, Department of Social and Legal Psychology, Universität Bonn, Germany*

Current research in social cognition provides evidence that the prediction of behavior can be improved by the use of new indirect measurement procedures (e.g., the Implicit Association Test; IAT). Indirect measures, unlike direct measures, are less affected by introspective limits and response factors. The present study extends the research on aggression in sports with indirect measures, namely the IAT. German semi-professional basketball players (N = 54) completed measures of implicit and explicit aggressiveness. The IAT predicted performance outcome (court playing time and coach's judgments on game performance) over and above the direct measures. The prediction of court playing was fully mediated by the coach's judgments. The results reported here suggest that indirect measures may show good utility in other areas of sport psychology.

KEY WORDS: Explicit and implicit aggressiveness, Implicit Association Test (IAT), Performance prediction, basketball

In the last decades, social and personality psychologists have developed dual process models of cognition, attitudes and action (e.g., Fazio, 1990; Strack & Deutsch, 2004). These models postulate two types of information processing, one explicit and the other implicit. For example, referring to the Reflective-Impulsive Model by Strack and Deutsch (2004), in the Reflective System, information is processed in a conscious and controlled way and behavior is a

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For correspondence: Thomas Teubel, Institute of Sports and Sports Science, University of Heidelberg. Im Neuenheimer Feld 700, 69120 Heidelberg, Germany. (E-mail: thomas.teubel@issw.uni-heidelberg.de)

consequence of deliberate decisional processes. In contrast, in the Impulsive System, information is processed in an unconscious and automatic way and behavior is a consequence of an automatic spread of activation. In a similar vein, researchers in the field of aggression have distinguished between two types of aggression, one more controlled and thoughtful and one more automatic and impulsive (e.g., Anderson & Bushman, 2002). Thoughtful action is a consequence of reflective processes such as a premeditated means of obtaining a goal (e.g., a calculated foul to slow down the game) whereas impulsive action is a consequence of an automatic spread of activation of behavioral schemata (e.g., a fast and spontaneous move toward the ball).

The addressed distinction between these two systems of information processing on a theoretical level leads to different measurement approaches at the empirical level. Whereas direct measures (such as self-reports) tap into reflective processes, indirect measures (such as chronometric procedures) tap into impulsive processes (Gawronski & Bodenhausen, 2006). In the last years, social cognition researchers have made progress towards assessing these impulsive processes with indirect measurements tools (Greenwald & Banaji, 1995). The most widely used procedure is the Implicit Association Test (IAT; Greenwald, McGhee, & Schwartz, 1998) which has had significant impact on psychological research since its first publication (for detailed reviews see Lane, Banaji, Nosek, & Greenwald, 2007; Schnabel, Asendorpf, & Greenwald, 2008). The IAT is an attempt to measure the strength of automatically activated associations between mental representations. The underlying assumption is, that if target concepts and attribute dimensions are highly associated, this will result in faster responses than for less associated concepts. IATs have displayed satisfactory reliability and showed predictive and incremental validity over and above direct measures on a wide collection of behavioral, judgment and physiological variables (for a review see Greenwald, Poehlman, Uhlmann, & Banaji, 2009). In addition, IATs are considered to be less affected by introspective limits and response factors (e.g., social desirability or impression management) than direct questionnaires (e.g., Egloff & Schmukle, 2002), which in turn, enhances the likelihood of predicting actual behavior (e.g., Asendorpf, Banse, & Mücke, 2002).

The role of aggression in sport behavior

Aggression has been suggested as a critical factor for sporting performance. However, there remains considerable debate whether aggression in sports has positive or deleterious effects on performance outcome. Some

researchers found that the trait aggressiveness is associated with increased penalties during games (Bushmann & Wells, 1998) and greater injury rates (Samuel & Joseph, 1999). Others have linked aggression with improved sporting performance and success (McGuire, Courneya, Widmeyer, & Carron, 1992; Widmeyer, 1984). For example, Sheldon and Aimar (2001) videotaped professional ice hockey games and found that successful behavior (e.g., scoring, stealing the puck) is preceded by aggressive behavior (e.g., cross checking, pushing). These somewhat contradictory findings might be due to the fact that the term aggression is used in several ways in sports and produces positive and negative value judgments (Gill, 2000). For example, committing a hard foul is perceived as "poor" aggression whereas playing with high effort and intensity (e.g., diving after a loose ball) without breaking the rules is perceived as "good" aggression. The latter behavior is a desired behavior in competitive sports that is associated with sporting excellence (Eysenck, 1979).

Besides this theoretical consideration, most research on aggression in sports has been underpinned by direct measures. Direct measures are subject to numerous reporting biases that are expected to play a crucial role for the field of aggression. However, very little empirical research has focused on the impulsive processes of aggression. Since aggressive behavior is not always self-controlled but rather impulsive and automatic in many cases, the research of aggression would benefit from taking impulsive processes into consideration (Richetin & Richardson, 2008). That is why the application of an indirect measure of aggressiveness that aims to capture impulsive processes (not accessible via introspection) should increase the prediction of aggressive behavior. Empirical support for that assumption in the domain of sports was found by Banse and Fischer (2002). These authors accomplished an aggressiveness version of the personality self-concept IAT in a sample of 50 male ice hockey players. The aggressiveness-IAT predicted minutes in the penalty box ($r = .35$) and number of goals ($r = .27$) that were unpredicted by an aggression questionnaire.

The present study seeks to explicate and extend the research on aggression in sports with indirect measures. Referring to the Reflective-Impulsive Model by Strack and Deutsch (2004), the personality self-concept of aggressiveness is both explicitly and implicitly represented. We suggest, that a relatively broad measure of implicit aggressiveness can be related to penalties ("poor" aggression) while, at the same time, it can be a related to performance outcome ("good" aggression). One way or the other, we expect that the IAT demonstrates evidence for incremental validity for behavior on the basketball court.

Method

A total number of 54 semi-professional ('Regionalliga Nord' Germany – the third highest league in Germany) male basketball players (mean age 22.96 years, $SD = 3.26$; mean playing experience in basketball 10.57 years, $SD = 3.72$; mean frequency of training per weak 3.54, $SD = 1.00$) from 12 teams consented to participate in the study. Participants visited a web site and were asked to answer (a) demographic questions, (b) an Aggressiveness-IAT and (c) an aggressiveness questionnaire. Additionally, the head coach and the assistant coach of each team were asked to evaluate each player on their team. Game statistics (including fouls, scoring and court playing time) of the season 2006/07 were analyzed.

MEASURES

Aggressiveness-IAT. The stimuli for the Aggressiveness-IAT were taken from Banse and Fischer (2002) and are listed in Table I. The authors propose an aggressiveness interaction-IAT using words that describe aggressive activities or interactions as attribute stimuli. This interaction-IAT seems to be superior to an aggressiveness trait-IAT because it taps directly into behavioral schemata and is closely linked to spontaneous behavior (Banse & Fischer, 2002). The IAT also uses various job titles as stimuli for the 'others' category. This is done in order to prevent participants from associating this category with other aggressive people in their environment (e.g., in their team) instead of with a more neutral reference group.

The task sequence of the Aggressiveness-IAT can be taken from Table II. Since this study is interested in inter-individual differences, task sequence and stimulus order of the combined tasks were fixed to avoid confounding inter-individual variance with procedural variance.

Participants were supposed to use the key 'd' (for the left side) and the key 'k' (for the right side) of the keyboard for discrimination. Targets (in black color and capital letters) and attribute stimuli (in blue color and small letters) were assigned in the left and right upper corners of the computer screen. Stimuli were shown in the center of the screen until the partici-

TABLE I
Attribute and Target Stimuli of the Aggressiveness-IAT

Attribute		Target	
Aggressive	Peaceful	Self	Other
Threaten	Reconciliation	I	Architect
Revenge	Talk	Self	Accountant
Punch	Exchange	Me	Teacher
Hit	Compromise	Mine	Chef
Insult	Agreement	My	Farmer
Retaliate	Speak		Waiter
ht	Negotiate		Cashier
Violence	Agree		Plumber
Threat	Discussion		Dentist
Attack	Concede		Carpenter

Note. The original German items can be obtained by the first author.

TABLE II
Task Sequence of the Aggressiveness-IAT

Sequence	N of trials	Task	Response key assignment	
			Left	Right
1	40	Target discrimination	Aggressive	Peaceful
2	40	Attribute discrimination	Other	Self
3	84	Initial combined task	Other, aggressive	Self, peaceful
4	40	Reversed target discrimination	Peaceful	Aggressive
5	84	Reversed combined task	Other, peaceful	Self, aggressive

Note. Four training trials are followed by 80 test trials in the combined tasks.

pant responded. In case of an incorrect classification, the word "WRONG!" (FALSCH! in German) immediately appeared for 1,000 milliseconds (ms). Participants were instructed to respond as quickly as possible. Occasional errors, in the completion of the task, were acceptable. For participants with high implicit aggressiveness, the self-aggressive task is expected to be performed more rapidly than the self-peaceful task compared to those with low implicit aggressiveness.

IAT scores were computed using the improved scoring algorithm (D measures: IAT raw scores are individually calibrated by the standard deviation of response latencies, latencies greater than 10,000 ms are deleted, error trials are replaced by the mean latency of correct responses plus a 600 ms error penalty) described by Greenwald, Nosek, and Banaji (2003). IAT scores were calculated by subtracting the mean response latencies of the second combined task (80 trials) from the mean response latencies of the first combined task (80 trials). These intra-individual difference scores were then divided by the pooled within-participants standard deviation. Thus, positive IAT-scores reflect greater implicit aggressiveness whereas negative scores reflect greater implicit peacefulness. IAT mean raw scores were -276 ms (SD = 230.5). The mean score for the D measures was -.57 (SD = .35). The aggressiveness-IAT showed satisfactory reliability (α = .81) for the two mutually exclusive subsets of the IAT's combined-block trials. The individual incorrect response rates for the 160 analyzed trials in the two combined-block trials were M = 5.74%; SD = 4.05%. None of the participants had error rates more than 20%.

Self-reported aggressiveness. After the completion of the IAT, participants answered a German version (Herzberg, 2003) of the Aggression Questionnaire by Buss and Perry (BAPQ; 1992). The questionnaire consists of 27 items that were presented using a Likert-type scale (ratings ranged from 1 = not true at all to 5 = completely true). Eight items referred to physical aggression, five to verbal aggression, six to anger and eight to hostility. The correlations between the subscales and the total score ranged from .68 to .78 (all ps < .01). Since the subscales did not yield any different findings, only results for the total explicit aggressiveness will be reported. The Buss and Perry Aggression Questionnaire showed satisfactory internal consistency (α = .81) for the total scale score.

Criteria: Game Statistics and Coach's Judgments *on Game Performance.* The head and the assistant coach from each team were approached separately to provide independent ratings of player's a) playing skills and b) experience of playing the game of basketball on a scale ranging from 1 (not true to at all) to 5 (completely true). Inter-rater reliability between the coaches were satisfactory high for both items with an intraclass-correlation of .65 for the item 'playing skill' and = .64 for the item 'experience'. Thus, the judgments were aggregated to one total

score for each item. The total score of the items was positively correlated ($r = .65$) with satisfactory internal consistency ($\alpha = .79$). Hence, these items were collapsed to a subsequent scale called 'coach's judgment on game performance'.

The relevant game statistics for this study were publicly available on the official homepage (http://www.rln-basketball.de/) of Regionalliga Nord. In one season players played on average 19 minutes and 47 seconds per game ($SD = 8$ minutes and 52 seconds) and committed 1.30 fouls ($SD = .52$) and 4.17 scores ($SD = 1.41$) in ten minutes of active playing.

Results

We started our analysis with calculating zero-order correlation (see Table III) between the relevant main variables. First, the results showed that the direct (BPAQ) and the indirect measure (IAT) of aggressiveness were uncorrelated ($r = .07$, n.s.). Second, those players with high implicit aggressiveness had significantly more court playing time ($r = .29, p < .05$), and were judged by the coaches as having greater game performance ($r = .29, p < .05$). Third, no significant correlations were found between implicit aggressiveness (high IAT-scores) and fouls ($r = -.04$, n.s.) or scoring ($r = .14$, n.s.). The BPAQ was not significantly correlated with any of the criterion variables. In addition, the coach's judgments were positively correlated with court playing time ($r = .68, p < .01$) and scoring ($r = .27, p < .05$) and negatively correlated with fouls ($r = -.49, p < .05$).

According to our proposed incremental validation strategy, we used multiple regression analyses to investigate the unique contributions of the IAT in predicting the criteria (fouls in ten minutes, scoring in ten minutes, court playing time, coach's judgments on game performance). In the first step we entered the direct aggressiveness measure (BPAQ). In a second step we entered the indirect aggressiveness measure (IAT). All regression models were controlled for playing positions (Center, Forward and Guard).

TABLE III
Inter-Correlations Among the Main Variables

Measure	2	3	4	5	6
1. Aggressiveness-IAT[a]	.07	.29*	.29*	-.04	.14
2. B & P Aggression Questionnaire	–	-.03	.08	-.09	-.17
3. Coach's judgment		–	.68**	-.49**	.27*
4. Court Playing time			–	-.77**	.23
5. Fouls in ten minutes				–	-.08
6. Scoring in ten minutes					–

Note. $N = 54$. B & P = Buss and Perry.
[a] High IAT-scores represent more aggressiveness.
$^+p < .10$. $^*p < .05$. $^{**}p < .01$ (two-tailed).

For court playing time, the final model accounted for 5% of the variance, $R = .10$, adjusted $R^2 = .05$, $F(3,50) = 1.90$, $p < .05$ in which the IAT predicted over and above the questionnaire court playing time, R^2 change $= .08$, $F(1,50) = 4.66$, $p < .05$ (B & P questionnaire $\beta = .05$; IAT $\beta = .29$). For coach's judgments on game performance, the final model accounted for 8% of the variance, $R = .13$, adjusted $R^2 = .08$, $F(3,50) = 2.47$, $p < .05$ in which the IAT predicted over and above the questionnaire coach's judgments on game performance, R^2 change $= .08$, $F(1,50) = 4.94$, $p < .05$ (B & P questionnaire $\beta = -.01$; IAT $\beta = .29$). To analyze whether the coach's judgments mediate the relationship between the IAT and court playing time, since playing time is mostly determined by the coaches, we used a bootstrap procedure described by Preacher and Hayes (2004, for a detailed explanation of this procedure). The IAT was entered as the independent variable, court playing time was entered as the dependent variable, and the coach's judgments on game performance were entered as the proposed mediator (see Figure 1 for the mediation model). The bootstrap results, based on 1,000 resamples, indicated that the effect of the IAT on the court playing time became nonsignificant (beta = .10, n.s.) when the coach judgments were included in the model (with the 95% confidence interval ranging from .0309 to .3698). This means that the prediction of court playing time with the IAT is fully mediated by the coach's judgments on game performance.

The results for fouls and scoring indicate that neither the indirect nor the direct measure explained significant variance in the criteria frequency of fouls and scoring. The questionnaire did not explain significant variance in any of the criteria.
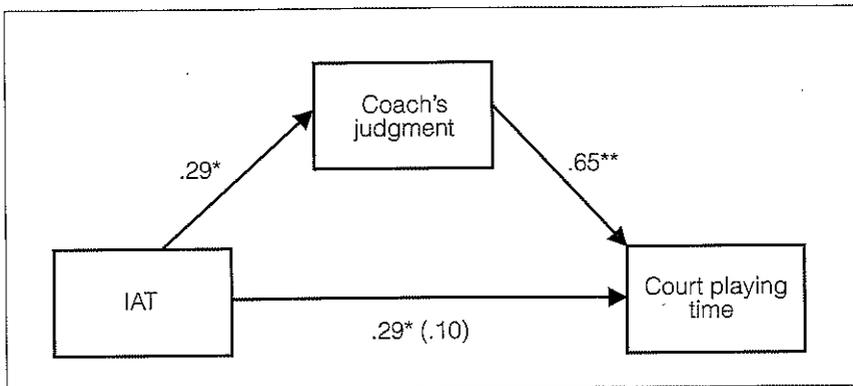

Fig. 1 - Standardized regression coefficients for the relationship between the IAT and court playing time as mediated by the coach's judgment. * p < .05. ** p < .01 (two-tailed).

Discussion

In the present study we investigated whether implicit aggressiveness is predictive for sporting behavior over and above explicit aggressiveness. In line with our incremental validity strategy, we showed that the indirect measure predicts court playing time and coach's judgments on game performance over and above the direct measure. The mediation analysis revealed that players with high implicit aggressiveness are more valued by their coaches and hence they receive more playing time. In contrast to explicit aggressiveness implicit aggressiveness seems to have some desirable sides in competitive team sports where athletes are required to play with both high intensity and effort ("good" aggression) within the boundaries of the rules. Also, basketball is a very fast and dynamic game that creates many situations in that players are forced to react quickly. In conclusion, behavior seems to be more guided by the Impulsive System than by the Reflective System (Strack & Deutsch, 2004). Thus, implicit "good" aggression is a behavior that very likely positively affects performance outcome.

Against our assumption, both indirect and direct measures failed to predict fouls. At first, standard aggressiveness measures could be criticized for their poor validity in the context of sports (e.g., Maxwell & Moores, 2007). Secondly, one could also argue that the penalty record approach is vulnerable to errors in measurement. Because of this vulnerability, distinguishing between different kinds of fouls (e.g., impulsive vs. reflective) could lead to a more fine grained analysis. In addition, those players with a greater number of fouls were judged as showing poorer game performance and received less playing time (-.49 and -.77, respectively). In conclusion, fouling might be a matter of both awkwardness and tactical alignments. In critical game situations some players are explicitly instructed to commit fouls to slow down the game or to stop an opponent from scoring.

Furthermore, the assumption that the IAT predicts scoring had to be rejected as well. However, scoring is just one factor of game performance. In future studies, rebounds, assists, steals, blocks etc. could be used for separate analysis or for an overall efficacy index.

Nevertheless, the best opportunity to understand the complex dynamics of aggression offer direct game observations such as proposed by Kirker, Tenenbaum, and Mattson (2000). Then, with respect to dual process theories (such as the Reflective-Impulsive System model by Strack and Deutsch, 2004), one could differentiate between reflective and more impulsive forms of (aggressive) behavior on the court. The effort would become much higher, but only game observations provide the best opportunities, which

aid in understanding the complex dynamics of aggression in sports (Kirker et al., 2000).

Even though the present study used a male sample that was exercising at a semi-professional level it seems reasonable that the results may be generalized also to women and other levels of professionalism. Concerning sex differences, we assume valid intrasexual differences in implicit aggressiveness to appear also in women although a study by Uhlman and Swanson (2004) showed a general sex effect for implicit aggressiveness with men reaching higher scores than women. Meta-analyses on various aggressiveness measures have consistently shown more physical aggression and dominant behavior for men than for women (e.g., Bettencourt & Miller, 1996; Knight, Fabes, & Higgins, 1996). Future studies should elucidate whether these intersexual mean differences may obscure the variability and validity of intrasexual differences in implicit aggressiveness. Concerning level of professionalism, we do not expect significant differences in implicit or explicit aggressiveness between different levels of expertise. However, players of a higher professional level may use more calculated and goal-oriented forms of aggression. This in turn may increase the predictive validity of indirect measures of aggressiveness for athletes with higher levels of practice. However, further studies are necessary in order to find empirical support for these assumptions.

Final Remark: A Pro for the Usage of indirect measures in Sport Psychology

So far, indirect measures have rarely been used in the domain of sports. This is unfortunate because indirect measures would be suitable for various purposes in this area. These measures overcome some problems of direct measures discussed earlier in this paper. Besides that, especially in game sports, many situations are indistinct and athletes are forced to react quickly rather than deliberately. Therefore, behavior should be guided by the Impulsive System rather than by the Reflective System (Strack & Deutsch, 2004). Furthermore, motor schemata are represented in the Impulsive System. Indirect measures such as IATs were developed to assess these implicit representations and reflect automatic affective reactions. For that reason, indirect measures might be well suited to predict impulsive behavior in dynamic sports situations. This could lead to a new understanding of athletes' performance in competitive sport and the prediction of behavior might be improved by indirect measures in sports.

REFERENCES

Anderson, C. A., & Bushman, B. J. (2002). Human aggression. *Annual Review of Psychology, 53*, 27-51.

Asendorpf, J. B., Banse, R., & Mücke, D. (2002). Double dissociation between implicit and explicit personality self-concept: The case of shy behavior. *Journal of Personality and Social Psychology, 83*, 380-393.

Banse, R., & Fischer, I. (2002). *Implicit and explicit aggressiveness and the prediction of aggressive behavior.* Poster presented at the 11th European Conference on Personality by the European Society for Personality Psychology, July 21-25, Jena.

Bettencourt, B. A., & Miller, N. (1996). Gender differences in aggression as a function of provocation: A meta-analysis. *Psychological Bulletin, 119*, 422-447.

Berkowitz, L. (1993). *Aggression: Its causes, consequences and control.* McGraw-Hill.

Bushmann, B. J. & Wells, G. L. (1998). Trait aggressiveness and hockey penalties: Predicting hot tempers on the ice. *Journal of Applied Psychology, 83*, 969-974.

Buss, A. H., & Perry, M. (1992). The Aggression Questionnaire. *Journal of Personality and Social Psychology, 63*, 452-459.

Egloff, B. & Schmukle, S. (2002). Predictive validity of an implicit association test for assessing anxiety. *Journal of Personality and Social Psychology, 83*, 1441-1451.

Eysenck, H. J. (1979). Personality in sport. *Medisport, 1*, 23-36.

Fazio, R. H. (1990). Multiple processes by which attitudes guide behavior: The MODE model as an integrative framework. In M. P. Zanna (Ed.), Advances in Experimental Social Psychology (Vol. 23, pp. 75-109). San Diego, CA: Academic Press.

Gawronski, B., & Bodenhausen, G. V. (2006). Associative and propositional processes in evaluation: An integrative review of implicit and explicit attitude change. *Psychological Bulletin, 132*, 692-731.

Gill, D. (2000). *Psychological dynamics of sport and exercise.* Champaign, IL: Human Kinetics.

Greenwald, A. G., & Banaji, M. R. (1995). Implicit social cognition: Attitudes, self-esteem, and stereotypes. *Psychological Review, 102*, 4-27.

Greenwald, A. G., McGhee, D. E., & Schwartz, J. L. K. (1998). Measuring individual differences in implicit cognition: The Implicit Association Test. *Journal of Personality and Social Psychology, 74*, 1464-1480.

Greenwald, A. G., Nosek, B. A., & Banaji, M. R. (2003). Understanding and using the Implicit Association Test: I. An improved scoring algorithm. *Journal of Personality and Social Psychology, 85 (2)*, 197-216.

Greenwald, A. G., Poehlman, T. A., Uhlmann, E., & Banaji, M. R. (2009). Understanding and using the Implicit Association Test: III. Meta-analysis of predictive validity. *Journal of Personality and Social Psychology, 97*, 17-41.

Herzberg, P. Y. (2003). Faktorstruktur, Gütekriterien und Konstruktvalidität der deutschen Übersetzung des Aggressionsfragebogens von Buss und Perry [Psychometric evaluation and validity of the German translation of the Aggression Questionnaire by Buss and Perry]. *Zeitschrift für Differentielle und Diagnostische Psychologie, 24 (4)*, 311-323.

Kirker, B., Tenenbaum, 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.

Knight, G. P., Fabes, R. A., & Higgins, D. A. (1996). Concerns about drawing casual infer-

ences from meta-analyses: An example in the study of gender differences in aggression. *Psychological Bulletin, 119,* 410-421.

Lane, K. A., Banaji, M. R., Nosek, B. A., & Greenwald, A. G. (2007). Understanding and using the Implicit Association Test: IV. What we know (so far). In B. Wittenbrink & N. S. Schwarz (Eds.), *Implicit measures of attitudes: Procedures and controversies* (pp. 59-102). New York: Guilford Press.

Maxwell, J. P., & Moores, E. (2007). The development of a short scale measuring aggressiveness and anger in competitive athletes. *Psychology of Sport and Exercise, 8,* 179-193.

McGuire, E. J., Courneya, K. S., Widmeyer, W. N., & Carron, A. V. (1992). Aggression as a potential mediator of the home advantage in professional ice hockey. *Journal of Sport and Exercise Psychology, 14,* 148-158.

Preacher, K. J., & Hayes, A. F. (2004). SPSS and SAS procedures for estimating indirect effects in simple mediation models. Behavior Research Methods, Instruments, & Computers, 36, 717-731.

Richetin, J., & Richardson, D. S. (2008). Automatic processes and individual differences in aggressive behavior. *Aggression and Violent Behavior, 13,* 413-422.

Samuel, R., & Joseph, D. (1999). Factors associated with significant injuries in youth ice hockey players. *Pediatric Emergency Care, 15,* 310-313.

Schnabel, K., Asendorpf, J. B., & Greenwald, A. G. (2008). Using Implicit Association Tests for the Assessment of implicit personality self-concept. In G. J. Boyle, G. Matthews, & H. Saklofske (Eds.), *Personality theory and assessment: Vol 2 Personality measurement and testing* (pp. 508-528). Thousand Oaks: Sage

Schnabel, K., Banse, R., & Asendorpf, J. B. (2006). Employing automatic approach and avoidance tendencies for the assessment of implicit personality self-concept: The Implicit Association Procedure (IAP). *Experimental Psychology, 53,* 69-76.

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.

Strack, F., & Deutsch, R. (2004). Reflective and impulsive determinants of social behavior. *Personality and Social Psychology Review, 8,* 220-247.

Uhlmann, E., & Swanson, J. (2004). Exposure to violent video games increases automatic aggressiveness. *Journal of Adolescence, 27,* 41-52.

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.