# An Investigation of The Underlying Factors of Aggressive Behaviour in Sport: The Impact of Competitiveness, Violent Video Games and General aggression.

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**A thesis submitted in partial fulfilment for the award of BA (Hons) in Psychology**

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## Abstract

Aggression and competitiveness are important aspects of any sport. However, these variables alone are not sufficient in explaining the underlying aspects of aggressive behaviour during sport. As plenty of empirical evidence exists to connect violent video games to aggression and aggressive behaviour, the current study aims to explore the ability of aggression, competitiveness and violent video gameplay to predict aggressive behaviour in sport. 60 county club level hurling and Gaelic football players participated in this study. Questionnaires were used to measure general aggression (The Buss-Perry Aggression Questionnaire), competitiveness (The Sports Orientation Questionnaire), negative mood (The State Hostility Scale) and violent video gameplay. Participants were observed during games of hurling and Gaelic football in order to measure aggressive behaviour. Results showed competitiveness and violent video gameplay to be significant predictors of aggressive behaviour in sport. Verbal aggression and anger were also found to be significant predictors of aggressive behaviour in sport. Results are discussed in light of limitations and implications for future research are included.

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## Introduction

Competitive behaviour is an extremely important feature of any sport or activity (Gill & Deeter, 1988). The presence of an element of competition has been shown to increase the likelihood of individuals (especially males) participating in dull, laboratory based tasks (Weinberg & Ragan, 1979). Individuals involved in competitive behaviour often display increased intrinsic motivation in comparison to those who are involved in non-competitive behaviour (Weinberg & Ragan, 1979). Those of who receive feedback indicating success show higher intrinsic motivation than those who receive feedback indicating failure.

In sport, competition is often accompanied by aggression. Baron & Richardson (1994) have defined aggression as any behaviour that is intended to cause harm to another individual. Aggression in sport has been defined as behaviour or actions performed with the intent to harm an opponent, either physically or psychologically (Bredemeier, 1985; Silva, 1983). Behaviours that are considered as aggressive in sport include the deliberate hitting of an opponent, the deliberate striking an opponent with sport equipment, and the psychological abuse of an opponent (Tucker & Parks, 2001).

Higher levels of aggression have been found in children who participate or show interest in high contact sport (Bredemeier et al., 1986). Silva (1983) conducted a study to investigate whether individuals that are more involved in either collision (e.g. football), contact (e.g. basketball, wrestling) or noncontact sports (e.g. swimming) are more inclined to perceive rule violating behaviours (e.g. aggressive behaviour) as acceptable. Male participants were significantly more inclined to rate rule violating behaviours in sport as acceptable in comparison to female participants. Bredemeier (1985) has reported similar results, finding male players of basketball more accepting

of aggressive acts than female players. Silva (1983) also found that males were more accepting of rule violating behaviours if they were involved in collision or contact sports rather than noncontact sports, if they had spent more years playing the sport, and if they were participating in the sport at a highly competitive level. Nixon (1997) investigated the relationship between participating in either contact or noncontact sports and the prevalence of aggressive behaviour outside of sport, finding a weak, yet significant relationship between the type of sport and the prevalence of aggressive behaviour. These results suggest that participation in contact sport may reinforce aggressive behaviour.

### *1.1 Aggression in sport*

Aggression is induced in violent and aggressive sports such as martial arts, boxing and wrestling (Kosiewicz, 2010), however, aggressive behaviour as such has also become encouraged in nonviolent sports (Stephens, 1998). For example, players can be put on the field as 'enforcers' (e.g. in ice hockey), who are expected to use intimidating and aggressive tactics. Although some light aggression in sport is tolerated and seems to be related to competitiveness - a necessary factor of any team sport - unnecessarily violent and hostile displays of aggression both on and off the field have become a rising problem (Tenenbaum et al., 1996). Countries such as Canada, the United Kingdom and Australia have appointed commissions to investigate acts of violence in sport, some of which have even led to court cases (National Committee on Violence, 1989; Pipe, 1993). Aggressive behaviour has also become prevalent in Irish, small scale, non-violent sports such hurling and Gaelic football, with two out of three players being injured at least once during a season (GAA, 2014). Frequent attention is given to violent incidents in hurling and Gaelic football in the media, with GAA manager Ken McGrath describing modern hurling as

‘‘all about aggression’’ (McNamara, 2015). This aggressive behaviour can be seen in physical fights (eg. Barry, 2015; Schiller, 2016) which have resulted in serious injury, such as unconsciousness (Neville, 2013).

Aggression in sport can be either hostile or instrumental. Hostile aggression occurs when the primary goal of the perpetrator is to inflict harm on the victim. Instrumental aggression occurs when the perpetrator causes harm in order to attain a goal other than causing harm. For example, when a player acts aggressively in order to fulfil their need to win the competition. Aggression, however, can often be confused with assertiveness, where injury or harm is not the goal of behaviour. Athletes can use assertiveness to show dominance, rather than aggression (Thierer, 1994). Some examples of assertive behaviours include tackling in rugby, checking in hockey and the hip and shoulder in American football as long as they are performed legitimately and without malicious intent.

Much research has been dedicated to the causes of aggression both in sport settings and in general. Dollard and colleagues (1939) proposed that aggression is caused by frustration. However, it has been determined that frustration heightens an individual’s liability toward aggressive or harmful behaviour, rather than actually causing such behaviour (Berkowitz, 1969). The display of aggressive behaviour depends on the individual’s perception and interpretation of the situation. Adolescence has been proposed as a period in which individuals begin the socialization process, unlearning aggressive responses and replacing them with skills of problem solving (Tremblay, 2003). However, certain individual or environmental factors have the potential to hinder this process. Individual risk factors can be either psychological (e.g. cognitive difficulties or deficits, uncontrolled anger during childhood) or physiological (e.g. high testosterone levels, low serotonin levels).

Environmental risk factors can be either social (e.g. peer rejection, association with aggressive peers) or physical (e.g. poverty and poor nutrition, exposure to toxins).

*1.2 The Element of Competition*

Competitive behaviour is extremely prevalent in any sport related activity (Gill & Deeter, 1988). As competition can result in either winning or losing, the effect of these outcomes has been extensively researched. The winner effect proposes that previous winning experience can increase the chances of future victory in aggressive encounters or activities (Hsu et al., 2006). The winner effect is a useful theory in contact sport as it involves aggressive elements. Winning in an aggressive activity or event is associated with the release of certain steroid hormones such as testosterone and progesterone (Hirschenhauser & Oliviera, 2006). This release of hormones is expanded in the 'Challenge Hypothesis', which explains the relationship between testosterone and aggression in a mating context (Wingfield et al., 1990). Post-encounter hormonal changes have been hypothesised to have an effect on an individual's ability to secure future victories. The winner effect has also been shown to be strengthened by the 'home advantage' (Carre et al., 2006) or the 'residence effect' (Kemp & Wiklund, 2004), where individuals are more inclined to win if they are participating on their own territory or grounds. The combination of home advantage and previous winning experience has the potential to activate the full winner effect, with changes in steroid hormone levels resulting from the interaction of the two variables (home advantage & prior winning experience) (Fuxjager et al., 2009). Changing levels of testosterone are also linked with aggression (Archer, Graham-Kevan & Davies, 2005) and increased competitive behaviour (Carre & McCormick, 2008).

Extremely wide individual differences are present in competitive behaviour (Gill & Deeter, 1988). While some individuals are competitively motivated to participate in competitive sports or other exercise activities, others may participate for personal benefit and take no notice of the competitive element of the activity. This array of individual difference reflects the personality of an individual as well as differences in achievement, motivation and competitiveness. Individual differences in competitiveness have also been shown to correlate with individual differences in variables such as aggression and violence (Archer & Webb, 2006; Buss & Perry, 1992; Wilson & Daly, 1985). The Competitive Reaction Time Test (Taylor, 1967) was developed to measure aggression in a competitive situation. Participants were required to complete various reaction-time based tasks and were led to believe that they were competing against another individual. The winner of each round would then administer an electric shock to the other player. The intensity of the shock was to be decided by the winning player. The level of shock intensity chosen by participants was used as a measure of aggression. More recent modifications have replaced electric shocks with a blast of noise (Ferguson & Ruenda, 2009). Although the validity of the Competitive Reaction Time Test has been widely questioned (Elson et al., 2014), it does demonstrate a potential relationship between competitive behaviour and aggression.

Competitive behaviour alone, however, does not seem to be sufficient when trying to explain the reasons behind the increased level of aggressive behaviour in sport. Bandura (1973), in his Social Learning Theory, has proposed aggression to be a learned behaviour. In his theory, Bandura explains that an individual learns to behave aggressively from the observation and the imitation of others. Exploring the underlying causes behind aggressive behaviour in sport, Goldstein & Arms (1971)

found that individuals tend to become more aggressive by simply observing aggression in sport. This result is consistent with Bandura's (1973) Social Learning Theory of Aggression. Following this interesting finding, researchers began to investigate whether being visually exposed to other means of violence would have the same effect. There are mounds of empirical evidence that violent media exposure also has the effect of increasing aggressive behaviour, aggressive cognition and desensitization to real life violence (Anderson & Bushman, 2002; Savage & Yancey, 2008; Bushman & Huesmann, 2006; Ferguson & Kilburn, 2009). Although violent media exposure usually refers to violent content in television programmes/movies, violent video games can also be put into this category.

### *1.3 The Effect of Violent Video Games*

Video games have been described as powerful and persuasive tools (Gentile & Gentile, 2008). Therefore, the impact of video games on cognition and behaviour has been widely researched. The effect of video games with violent content such as severe bodily harm, killing and sexual assault have been of particular interest to researchers. Gentile & Gentile (2008) have stated that excessive exposure to video games with violent content teaches adolescents aggressive cognition and behaviour. For example, frequent gameplay of racing video games has shown increases in dangerous and competitive driving and car accidents (Fischer et al., 2007). Violent video games are used in military organisations in order to prepare soldiers for the violence occurring in combat.

The uses and effects of video games with violent content are a cause for concern as video games have become increasingly popular in the last decade and as most video games released involve some form of violence (Loftus & Loftus, 1983). In

over half of video games, there is opportunity to inflict injury or death upon other characters (Dill, Gentile & Richter, 2001). In games such as *Tomb Raider & Doom,* for example, players are encouraged to eliminate everything and everyone that acts as a hurdle on their path to completing missions and eventually finishing the game As violent video games have been found to be the most popular genre among players (Anderson, 2004), their negative effects have been a particular focus in research. It is believed that violent video game content has a much more profound effect on an individual when compared to other violent media such as television or film as the individual becomes an active participant in the game (Sherry, 2001; Fleming & Rickwood, 2001).

Studies show that the aggressive cognition and behaviour demonstrated in games are transmitted into reality as violent video games increase aggressive thoughts and feelings in real life situations (Anderson & Bushman, 2002). Adolescents that participate in constant violent video gameplay have been found to be more hostile (Mehrabian & Wixen, 1986), more argumentative and more likely to be involved in a physical fight (Gentile et al., 2004). Individuals also have the potential to become desensitized to real-world violence by participating in violent video gameplay (Carnagey, Anderson & Bushman, 2007). Hostility, argumentativeness and likelihood of physical fights have all increased severely in contact sports such as hurling and Gaelic football. The effect of violent video games could be a contributing factor to this rising demonstration of aggression. The General Aggression Model (GAM) is the result of a combination of many mini-theories of aggression. Therefore, it provides a more parsimonious and expansive model of aggression. The GAM is a social-cognitive model that includes situational, individual and biological processes such as; social processes, cognitive processes, short and long term processes and decision

making processes. All of these various processes are used to understand aggression in the GAM. The model has received a lot of support (Anderson & Bushman, 2002; Dewall & Anderson, 2011) and can be applied to aggression outside of the laboratory, or 'real-life' aggression.

As predicted by the General Aggression Model, violent sports video games have been found to increase aggressive cognition and attitudes towards violence occurring in sports (Anderson & Carnagey, 2009). With use of the General Aggression Model, it has been suggested that the priming of aggressive thoughts has the potential to increase aggressive feelings and thoughts (Anderson et al., 2004). This suggestion for behaviour could serve to somewhat explain the aggressive nature of occurrences in sport. Maxwell (2004) has suggested that aggression in sport can also result from anger rumination, which occurs as a result of an individual's focused, and sometimes obsessive, attention to past experiences that have caused the individual to feel negative affect such as anger. Research in aggression often studies aggression in conjunction with negative moods or feelings and the theory of anger rumination further strengthens the evidence that negative moods are strongly related to aggression (Bushman, 2002; Bushman, Baumeister & Phillips, 2001).

The element of competition that is found in video games can also increase feelings of aggression and hostility that have the potential to become the underlying causes of aggressive and violent behaviours and attitudes (Anderson & Dill, 2000; Anderson & Morrow, 1995). These research findings are supported by Deutsch's (1993) theory of interpersonal dynamics in competitive situations. The theory suggests that competitive situations or events have the potential to lead to interpersonal conflict and aggression. This interpersonal conflict and aggression becomes prevalent in cognitive, affective and behavioural instances that take place

between individuals or groups. The interpersonal exchange between individuals or groups is the factor that can have an effect on aggressive behaviour and tendencies.

Anderson and Morrow (1995) conducted a study aimed at testing and expanding Deutsch's theory. In the first experiment, knowledge structures of competitive and cooperative situations were obtained from participants. Results indicated that participants associated competitive situations with more violent and aggressive content than cooperative situations. The second experiment had participants divided into two groups; competition-primed and cooperation-primed. Participants engaged in a non-violent video game session, where competition-primed participants were observed to unnecessarily kill more characters than the cooperation-primed participants. The results of Anderson and Morrow's (1995) study strengthen Deutsch's (1993) theory of interpersonal dynamics in competitive situations as they provide evidence of a strong association between competitive situations and aggressive tendencies.

Despite empirical evidence, Williams & Clippinger (2002) have argued that the findings of their research undermine Deutsch's (1993) theory. In an attempt to investigate whether individuals demonstrate more aggression when playing a video game (a virtual version of Monopoly) against a computer or against another individual. Participants showed less aggression when playing against another individual than when playing against a computer, suggesting a lack of aggressive effect from interpersonal conflict. However, these results must be interpreted with caution as no baseline scores were obtained for measures of aggression and although Monopoly is a competitively orientated game, it is considered a board game, lacking a sense of active player participation and not to mention aggressive components when compared to the choices of video games traditionally used in aggression research.

Although most of the research investigating the effects of violent video games has been carried out using self-report methods (eg. Mehrabian & Wixen, 1986) and laboratory based experimental studies (eg. Ballard & West, 1996), a longitudinal study investigating long term effects of violent video games has also been conducted (Anderson et al., 2008). This particular study found that increased violent video gameplay led to increased physical aggression even in low-violence countries like Japan, when compared to the USA.

Overall, there has been little research in relation to video games with violent content and their relation to aggressive behaviour in sport. Existing research has been conducted in a laboratory environment and mostly measures cognition, rather than behaviour (Anderson et al., 2004).

### ***1.4 Rationale***

The constant use of violent video games has been shown to result in the increased demonstration of cognitive and behavioural aggression in real life situations (Anderson & Bushman, 2002; Gentile et al., 2004). Aggression occurs constantly in sport, resulting in foul gameplay and an increased risk of injury. As suggested by the General Aggression Model, the priming of aggressive thoughts can increase aggressive thoughts and feelings (Anderson et al., 2004). As a relationship between violent video gameplay and aggression exists, these games could be said to act as a priming agent for aggressive behaviour. A positive correlation between violent video gameplay and aggression in contact sport would give validity to this theory.

The increase of aggressive behaviour in non-violent contact sport is evident from reports in the media (E.g. Barry, 2015) and in research (E.g. Tenenbaum et al., 1996). An association between violent video gameplay and aggression in sport would

give insight to the rising aggression in contact sports such as hurling and Gaelic football. As the current study will be carried out within the Irish population, hurling and Gaelic football will be used as examples of non-violent contact sport due to the high popularity of the two sport games within the population.

As previous research has suggested that aggressive tendencies and behaviour are closely linked to, and may even be induced by, competitive behaviour (Deutsch, 1993), the relationship between the two variables needs to be investigated further. In the case that a strong relationship exists between aggression and competitive behaviour, it will be necessary for the current study to investigate the relationship between violent video games and competitive behaviour in order to provide a fully comprehensive explanation of the relationship between aggression and violent video games.

Existing research has primarily focused on cognitive aspects when it comes to aggression in sport (E.g. Anderson et al., 2004), leaving a lack of research measuring actual behaviour. A lack of field studies also exists, as most research has been conducted in laboratory environments. This study will measure behaviour directly and will be conducted as a field study.

### ***1.5 Aims & Hypotheses***

The aim of the current study is to investigate the underlying factors that may predict aggressive behaviour in sport. The relationships between general aggression, competitiveness, negative mood, violent video gameplay and aggressive behaviour will be investigated. It is hypothesised that significant positive relationships will be present between general aggression and all other variables, and aggressive behaviour and all other variables. The predictive relationship of general aggression, competitiveness, negative mood and violent video gameplay on aggressive behaviour

will also be investigated. In relation to previous research, it can be hypothesised that all of these variables will be significant predictors of aggressive behaviour in sport. The difference in levels of general aggression, competitiveness, negative mood, violent video gameplay and aggressive behaviour between Gaelic football players and hurling players will also be explored. Due to the fact that hurling players are carrying a ‘weapon’ during play, it is hypothesised that aggressive behaviour will be higher in hurling players in comparison to Gaelic football players.

## Method

### ***2.1 Participants***

The sample consisted of 60 male Gaelic football players (n = 30) and hurling players (n =30). Participants were recruited from 4 different county club level teams. All participants taking part in this study belonged to Under 21's county club teams. Any team member under the age of 18 was excluded from participation in the study. Any team member who was excluded from play due to injury or any team member who did not participate in the sport for at least one half of the game was excluded from participation in the study. Goal keepers were also excluded from participation due to lack of contact with other players during the game. In total, 6 team members from all of the teams were excluded from participation for these reasons. Convenience sampling techniques were used in this study. Permission to approach participants was obtained from team managers by e-mail or phone.

### ***2.2 Materials***

Questionnaires were used to measure levels of general aggression, competitiveness, negative mood and violent video game playing habits.

#### *2.2.1 The Buss- Perry Aggression Questionnaire*

The Buss-Perry Aggression Questionnaire (1992) (see appendix A) was used to measure levels of general aggression. The questionnaire consists of a total of 28 items which are designed to measure four dimensions of aggression; *physical aggression, verbal aggression, anger and hostility*. Each item is scored on a Likert scale of 1 (*extremely uncharacteristic of me*) to 5 (extremely characteristic of me).

Physical aggression is measured in 9 items, with item 7 being scored in reverse. The physical aggression category measures if an individual is; prone to using

physical aggression, hitting others when provoked, hitting or pushing others even in play and using force to defend his beliefs.

Verbal aggression is measured by 5 items. This category measures if an individual is prone to using verbal aggression, constantly getting into arguments, constantly debating every issue, using strong language and shouting/yelling in arguments. Anger is measured in 7 items, with item 4 being scored in reverse. This category measures if an individual is easily angered and irritated, easily frustrated, easily brought to boiling point and prone to getting mad at little things. Hostility is measured by 8 items. This category measures if an individual is a trusting person, if they are open and share personal information easily, and if they allow others to borrow their things. For a score of general aggression, the scores of the four subscales must be totalled.

Internal consistency for all four dimensions and the total score of the Aggression Questionnaire was evaluated by the alpha coefficient (Buss & Perry, 1992). The alpha for the total score ($\alpha = .89$) was found to indicate considerable internal consistency. The alphas for the four individual dimensions (Physical Aggression, $\alpha = .85$; Verbal Aggression, $\alpha = .72$; Anger, $\alpha = .83$; and Hostility, $\alpha = .77$) were found to be lower but still adequate as they each consist of less than 10 items. Reliability of the questionnaire was also evaluated and adequate stability over time was found for all four dimensions of the questionnaire. The reliability for the scale regarding the sample from the current study was found to be very high ($\alpha = .91$).

*2.2.2 The State Hostility Scale*

The State Hostility Scale (Anderson, Deuser & DeNeve, 1995) (see appendix B) was used to measure negative mood state. The State Hostility Scale consists of a total of 35 items, with items 4, 6, 11,14, 18, 20, 21, 22, 28, 31 and 34 being scored in

reverse. Each item is scored on a Likert scale of 1 (*strongly disagree*) to 5 (*strongly agree*).

Anderson and Carnagey (2009) have split the scale into four subscales;

1. Feeling unsociable (α = .32): contains the items unsociable, wilful and disgusted.
2. Feeling mean (α= .95): contains the items mean, like yelling at somebody, cruel, like I'm about to explode, burned up, bitter, offended, angry, outraged, enraged, like swearing, like banging on a table, mad and disagreeable.
3. Lack of positive feelings (α = .95): contains the reverse scored items friendly, understanding, amiable, good-natured, cooperative, agreeable, kindly, polite, sympathetic and tame.
4. Aggravation (α = .86): contains the items aggravated, discontented, frustrated, irritable, vexed, furious and stormy.

The current study did not use the 'feeling unsociable' subscale as part of the scale due to low reliability in previous studies (Anderson & Carnagey, 2009). Items 4 (tender) and 35 (vexed) were also excluded due to poor item-total correlations in previous studies which have resulted from participants' misunderstanding of the words. As the current study used the scale as a whole in order to measure the overall negative mood of the participants, a total score for all subscales was obtained. The reliability for the scale regarding the sample from the current study was found to be very high (α = .91).

### *2.2.3 The Sports Orientation Questionnaire*

The Sports Orientation Questionnaire (Gill & Deeter, 1988) (see appendix C) was used to measure participants' levels of competitiveness. The questionnaire was originally developed to measure sport achievement orientation, however, as the three subscales of competitiveness, win orientation and goal orientation are closely linked,

the current study will use the questionnaire as a whole in order to obtain a total score for competitiveness.

The Sports Orientation Questionnaire contains a total of 25 items, with 13 items belonging to the Competitiveness subscale, 6 items belonging to the Win orientation subscale and 6 items belonging to the Goal orientation subscale. Each item is scored on a Likert scale of A *(strongly agree*) to E *(strongly disagree).* For the purpose of convenience during statistical analysis, an alternative method of scoring was used and the original Likert scale was changed to a scale of 1 (*strongly disagree)* to 5 *(strongly agree*).

Internal consistency of all three subscales has been examined across different samples, with all subscales obtaining high alpha coefficients (Competitiveness: $\alpha$ = .94 - .95; Win orientation: $\alpha$ = .85 - .86; Goal orientation: $\alpha$ = .79 - .82), indicating good internal consistency (Gill & Deeter, 1988). Authors also explored consistency over time, with test-retest correlations indicating good reliability over time (Competitiveness: r = .89; Win orientation: r = .82; Goal orientation: r = .73). Moderate to high positive correlations exist among the three subscales when tested on multiple samples, indicating that they are all related. The reliability for the scale regarding the sample from the current study was found to be very high ($\alpha$ = .93).

*2.2.4 Violent Video Game Exposure*

As a measure of violent video game exposure, the current study adopted a method previously used by Gentile and colleagues (2014) (see appendix D) as a measure of media violence exposure. To measure violent video game exposure, participants were asked to state their three favourite video games, then rate each of those video games on their level of violence and the frequency of playing the games. The level of violence in the game was rated on a scale of 1 (not at all violent) to 4

(very violent), while the frequency of play was rated on a scale of 1 (barely ever) to 5 (almost every day).

The violence and frequency ratings were multiplied for each game, and the obtained score was then divided by the number of games stated by the participant to generate a violent video game exposure score. This approach has successfully been used in other research and has been shown to be a valid operational measure (Gentile et al., 2004; Gentile, Coyne & Walsh, 2011) (also see Anderson & Dill, 2000). Although previously used with success, it must be taken into consideration that this is a proxy measure and that it is constructive and subjective. The reliability for the scale regarding the sample from the current study was found to be high ($\alpha = .86$).

#### *2.2.5 Aggressive Behaviour*

Aggressive behaviour was measured by the number of aggressive fouls committed by participants during a game of Gaelic football/hurling. Aggressive fouls are generalised as intentional attempts at causing harm to an opponent (Hellstedt, 1988) and are classified as instrumental and hostile. Aggressive fouls can be a) unintentional, where the player unconsciously harms an opponent b) instrumental intentional, where the player acts aggressively towards an opponent without the intention of causing harm, or c) hostile intentional, where the player intentionally causes harm to an opponent (Gümüşdağ et al., 2011). Detailed descriptions of aggressive fouls for both Gaelic football and hurling can be seen in appendix E).

### ***2.3 Procedure***

Ethical permission to conduct the current study was obtained from the ethical review board at the National College of Ireland. There were no incentives used to recruit participants. Participants were recruited by use of a signed consent form where

participants were required to sign that they are over the age of 18 and willing to participate in the study (Appendix F). The study did not contain any 'vulnerable participants'. As the study did not contain any vulnerable participants and prior informed consent was obtained, this ensured that there was no violation under the 'NCI Ethical Guidelines for Research with Human Participants' code of conduct, regarding ethical procedures.

At a training session occurring before the day of the sports game (usually 3 days before the game), participants were asked to answer the Buss-Perry questionnaire, the Sport Orientation Questionnaire and the Video Game Exposure questionnaire. Deception was used with participants as they were informed that the purpose of the study was to investigate the relationships between hostile mood and sport skill. Deception was used in order to avoid error caused by behavioural biases such as the observer effect.

On the day of the sports game, participants were asked to answer the State Hostility Scale questionnaire an hour before the start of the game. Jersey numbers for all players were obtained from the manager. Careful observation of aggressive behaviour took place throughout the game and all aggressive fouls carried out by participants were marked in a numerical fashion by the observer.

After the sports game, participants were given a debriefing session where they were informed of the true intentions and aims of the research. Participants were given the opportunity to resign from participation and were encouraged to ask questions regarding the research.

### ***2.4 Design***

The current study employed a quantitative, cross-sectional design as data was collected at a single point in time. The study qualifies as an observational field study

as aggressive behaviour among participants was observed during sports games that were not organised by the researcher. There is also a correlational aspect to the study as the relationships between variables are investigated.

In the model aimed at predicting aggressive behaviour in sport, predictor variables included competitiveness, general aggression, negative mood and violent video gameplay. In addition to the predictive model, relationships between all variables were investigated.

In order to explore differences between Gaelic football players and hurling players, the dependent variables included competitiveness, general aggression, negative mood, violent video gameplay and aggressive behaviour. The independent variable was the type of sport played.

### ***2.5 Data Analysis***

Basic descriptive statistics (mean, median, standard deviation and range) were calculated for each variable measured in the study. The data was recoded where required and preliminary analyses were conducted in order to effectively screen the data for violations of assumptions before conducting inferential analyses. As three of the variables violated the assumption of normality, the non-parametric Spearman's Rank Correlation Coefficient analysis was used to explore the relationship between the predictor and criterion variables. A standard multiple linear regression analysis was conducted in order to examine the ability of general aggression, competitiveness, negative mood and violent video gameplay to predict aggressive behaviour in sport. Another standard multiple linear regression analysis was conducted in order to examine the ability of the subscales of the Buss-Perry Aggression Scale (Physical Aggression, Verbal Aggression, Anger and Hostility) to predict aggressive behaviour.

Two independent samples T-tests (two-tailed) were conducted in order to compare levels of general aggression and negative mood between Gaelic football players and hurling players. As three of the variables were not normally distributed, three non-parametric Mann-Whitney U tests were conducted in order to compare levels of competitiveness, violent video gameplay and aggressive behaviour between Gaelic football players and hurling players. All data was analysed using SPSS version 22.

## Results

### ***3.1 Descriptive Statistics***

Mean scores for competitiveness (M = 109.17, SD = 12.48) were relatively high and mean scores for negative mood (M = 70.58, SD = 18.47) were moderate. In contrast, low mean scores were obtained for violent video game play (M = 4.25, SD = 3.53) and aggressive behaviour (M = 2.72, SD = 2.09). For general aggression (M = 74.44, SD = 18.89), mean scores indicated a moderate response amongst participants. Full descriptive statistics for all continuous variables can be seen in Table 1.

***Table 1***

*Descriptive statistics for all continuous variables*

| | Mean | Std. Error Mean | Median | SD | Range | Possible Range |
|---|---|---|---|---|---|---|
| General Aggression | 74.44 | 2.44 | 76 | 18.89 | 35-130 | 29-145 |
| Physical Aggression | 22.20 | .82 | 21 | 6.33 | 11 – 39 | 9-45 |
| Verbal Aggression | 14.42 | .56 | 14 | 4.33 | 6 – 24 | 5-25 |
| Anger | 18.83 | .77 | 19 | 5.99 | 7 – 34 | 7-35 |
| Hostility | 18.90 | .73 | 19 | 5.64 | 9 - 35 | 8-40 |
| Competitiveness | 109.17 | 1.61 | 111 | 12.48 | 79-125 | 25-125 |
| Negative Mood | 70.58 | 2.38 | 73.5 | 18.47 | 39-106 | 30-150 |
| Violent VG | 4.25 | .46 | 4 | 3.53 | 0-13 | 0-20 |
| Aggressive Behaviour | 2.72 | .27 | 2.5 | 2.09 | 0-8 | 0-8 |

## ***3.2 Inferential Statistics***

### *3.2.1 Correlational Analyses*

The relationships between all continuous variables were assessed using Spearman's Rho correlation coefficient. Preliminary analyses were performed to ensure no violation of the assumptions of normality, linearity and homoscedasticity. The non-parametric Spearman's Rho correlation coefficient test was chosen due to the violation of the assumption of normality in the competitiveness variable, the violent video gameplay variable and the aggressive behaviour variable.

There was a moderate-to-high positive correlation ($r = .54$, $n = 60$, $p = .00$) between general aggression and negative mood, indicating that higher levels of general aggression are associated with higher levels of negative mood.

There was a moderate negative correlation ($r = -.36$, $n = 60$, $p = .005$) between competitiveness and violent video gameplay, indicating that higher levels of competitiveness are associated with lower levels of violent video gameplay.

There was a moderate positive correlation ($r = .37$, $n = 60$, $p = .003$) between competitiveness and aggressive behaviour, indicating that higher levels of competitiveness are associated with higher levels of aggressive behaviour. The correlation matrix for all variables can be seen in Table 2.

***Table 2***

*Correlations between all continuous variables*

| **Variables** | GA | C | NM | VVG | AB |
|---|---|---|---|---|---|
| 1. General Aggression (GA) | 1 | | | | |
| 2. Competitiveness (C) | .02 | 1 | | | |
| 3. Negative Mood (NM) | .54*** | .10 | 1 | | |
| 4. Violent VG (VVG) | .10 | -.36** | -.00 | 1 | |
| 5. Aggressive Behaviour (AB) | .19 | .37** | -.00 | .10 | 1 |

Note. Statistical significance: *$p < .05$; **$p < .01$; ***$p < .001$

The relationship between the subscales of the Buss Perry Aggression Questionnaire (physical aggression, verbal aggression, anger & hostility) were assessed using Pearson Product Moment Correlation Coefficient. Preliminary analyses were performed to ensure no violation of the assumptions of normality, linearity and homoscedasticity. The correlation matrix for these variables can be seen in Table 3.

***Table 3***

*Correlations between subscales of the Buss Perry Aggression Questionnaire*

| **Variables** | PA | VA | A | H |
|---|---|---|---|---|
| 1. Physical Aggression (PA) | 1 | | | |
| 2. Verbal Aggression (VA) | .55*** | 1 | | |
| 3. Anger (A) | .68*** | .55*** | 1 | |
| 5. Hostility (H) | .70*** | ..52*** | .67*** | 1 |

Note. Statistical significance: *$p < .05$; **$p < .01$; ***$p < .001$

*3.2.2 Regression Analyses*

Multiple regression was performed to investigate the ability of general aggression, competitiveness, violent video gameplay and negative mood to predict aggressive behaviour during sport. Preliminary analyses were conducted to examine whether data violated the assumptions of normality, linearity and homoscedasticity. The competitiveness variable, the violent video gameplay variable and the aggressive behaviour variable were not normally distributed. Additionally, the collinearity statistics for the predictor variables included in the study were examined. Data indicated that multicollinearity was not a concern (General Aggression, Tolerance = .66, VIF = 1.51; Competitiveness, Tolerance = .89, VIF = 1.12; Violent Video Gameplay, Tolerance = .87, VIF = 1.13; Negative Mood, Tolerance = .66, VIF = 1.50). All predictor variables were suitably correlated with the dependent variable for examination through multiple linear regression to be reliably undertaken.

Since no *a priori* hypotheses had been made to determine the order of entry of the predictor variables, a direct method was used for the multiple linear regression analysis. The four independent variables explained 19% of variance in criminal behaviour (F (4, 55) = 4.46, p = .003).

In the final model, competitiveness (β = .46, p = .001) and violent video gameplay (β = .27, p = .03) were the only significant predictors of aggressive behaviour. This result indicates that increased levels of competitiveness and violent video gameplay predict higher levels of aggressive behaviour during sport. A full report of results obtained from the regression analysis can be seen in table 4.

**Table 4**

*Multiple regression model predicting aggressive behaviour scores*

| | $R^2$ | $\beta$ | *B* | *SE* | CI 95% (B) |
|---|---|---|---|---|---|
| **Model** | .19** | | | | |
| General Aggression | | .23 | .03 | .02 | -.01 / .06 |
| Competitiveness | | .46*** | .08 | .02 | .04 / .12 |
| Violent VG | | .28* | .16 | .07 | .02 / .31 |
| Negative Mood | | -.10 | -.01 | .01 | -.04 / .02 |

*Note.* N = 60; Statistical significance: *$p < .05$; **$p < .01$; ***$p < .001$

As general aggression was not a predictor of aggressive behaviour in the previous regression analysis, another regression analysis was performed to investigate the ability of the subscales of the Buss Perry Aggression Questionnaire (Physical Aggression, Verbal Aggression, Anger and Hostility) to predict aggressive behaviour

during sport. Preliminary analyses were conducted to ensure no violation of the assumptions of normality, linearity and homoscedasticity. Additionally, the collinearity statistics for the predictor variables were examined. Data indicated that multicollinearity was not a concern (Physical Aggression, Tolerance = .42, VIF = 2.40; Verbal Aggression, Tolerance = .63, VIF = 1.60; Anger, Tolerance = .44, VIF = 2.28; Hostility, Tolerance = .47, VIF = 2.30). All predictor variables were suitably correlated with the dependent variable for examination through multiple linear regression to be reliably undertaken.

Since no *a priori* hypotheses had been made to determine the order of entry of the predictor variables, a direct method was used for the multiple linear regression analysis. The four independent variables explained 11.5% of variance in criminal behaviour ($F(4, 55) = 2.00$, $p = .029$).

In the final model, verbal aggression ($\beta = -.37$, $p = .02$) and anger ($\beta = .40$, $p = .035$) were the only significant predictors of aggressive behaviour during sport. This result indicates that increased verbal aggression and increased anger predict levels of aggressive behaviour during sport. A full report of the results obtained from the regression analysis can be seen in table 5.

**Table 5**

*Multiple regression model predicting aggressive behaviour scores*

| | $R^2$ | $\beta$ | $B$ | $SE$ | CI 95% (B) |
|---|---|---|---|---|---|
| **Model** | .115* | | | | |
| Physical Aggression | | .21 | .07 | .06 | -.06 / .19 |
| Verbal Aggression | | -.37* | -.18 | .08 | -.33 / -.03 |
| Anger | | .40* | .14 | .06 | .01 / .27 |
| Hostility | | -.08 | -.03 | .07 | -.17 / .11 |

*Note.* N = 60; Statistical significance: *$p < .05$

*3.2.3 T-tests & Mann-Whitney U Tests*

Two independent samples t-tests were conducted to compare the general aggression scores and the negative mood scores between Gaelic football players and hurling players.

When comparing general aggression scores, results indicated no significant difference in scores between the two sports (t (58) = -.75, p = .21).

When comparing negative mood scores, results indicated no significant difference in scores between the two sports (t (58) = .91, p = .10).

As the data for the competitiveness variable, the violent video gameplay variable and the aggressive behaviour variable was not normally distributed, the most appropriate statistical test was Mann-Whitney U.

Three Mann-Whitney U tests were conducted to compare the competitiveness scores, the violent video gameplay scores and the aggressive behaviour scores between Gaelic football players and hurling players.

When comparing competitiveness scores, results indicated no significant difference in scores between the two sports ($U = 445.00$, $Z = -.08$, $p = .94$).

When comparing violent video gameplay scores, results indicated no significant difference in scores between the two sports ($U = 448.50$, $Z = -.02$, $p = .98$).

When comparing aggressive behaviour scores, results indicated no significant difference in scores between the two sports ($U = 412.00$, $Z = -.57$, $p = .57$).

## Discussion

The aim of the current study was to investigate the underlying factors that may predict aggressive behaviour in sport such as Gaelic football and hurling. The relationships between general aggression, competitiveness, negative mood, violent video gameplay and aggressive behaviour were explored and it was hypothesised that all other variables would be positively correlated with general aggression and aggressive behaviour. The ability of general aggression, competitiveness, negative mood and violent video gameplay to predict aggressive behaviour during sport was investigated and it was hypothesised that all of the predictor variables will be able to significantly predict aggressive behaviour. The difference in levels of general aggression, competitiveness, negative mood, violent video gameplay and aggressive behaviour between players of Gaelic football and players of hurling were assessed. It was hypothesised that players of hurling would have higher levels of aggressive behaviour.

Results of the current study were not as consistent with previous research as expected and provided some interesting information about the underlying factors that influence aggressive behaviour in sport. It was found that higher levels of negative mood are related to higher levels of general aggression, that higher levels of competitiveness are related to higher levels of aggressive behaviour and that lower levels of violent video gameplay are related to higher levels of competitiveness. Increased competitiveness and increased violent video gameplay predicted aggressive behaviour in sport, however, general aggression and negative mood did not show significant ability of prediction. Increased verbal aggression and increased anger were also significant predictors of aggressive behaviour in sport, while physical aggression and hostility were not. There was no difference in general aggression,

competitiveness, negative mood, violent video gameplay or aggressive behaviour between Gaelic football player and hurling players.

### *4.1 The Relationships Between All Variables*

The results of the correlational analyses were somewhat unexpected as it was hypothesised that general aggression and aggressive behaviour would have significant relationships with all other variables as well as each other.

There was a relatively strong relationship between general aggression and negative mood, suggesting that higher levels of general aggression are related to higher levels of negative mood. This relationship has been widely demonstrated in previous research and has been identified as an outcome of prolonging feelings of anger and aggression, or anger rumination (Bushman, 2002; Bushman, Baumeister & Phillips, 2001). Although the relationship between general aggression and negative mood is not surprising, it was very unexpected that general aggression and negative mood were not related to the aggressive behaviour variable. This result may be a consequence of the self-reported, lower end of the scale results obtained from participants for the general aggression variable. Participants may have simply understated their levels of general aggression, potentially resulting in a Type II error, otherwise known as a false negative result. There is a chance, however, that the unexpected result may be present due to players having a high sense of self-control, therefore being able to suppress aggression, resulting in a lack of connection between general aggression and aggressive behaviour during sport (Sofia & Cruz, 2015). Although highly unlikely, this theory may account for some of the participants in the current study.

A moderate relationship between competitiveness and aggressive behaviour was present within the current sample. The relationship between these two variables has been widely documented in both, sport psychology research and research in other areas of psychology (E.g. Russell, 2008; Ferguson & Ruenda, 2009), with Wilson & Daly suggesting that competitiveness is strongly related to aggression and violence. Archer & Webb (2006) have even found competitiveness to be related to the Buss Perry Aggression Questionnaire (Buss & Perry, 1992) specifically. Hence, it was very unexpected for the current study to find no relationship between competitiveness and general aggression. As mentioned previously, however, the negative result could have been a consequence of the self-report aggression scale, resulting in a Type II error.

The current study found competitiveness to be negatively correlated to violent video gameplay, suggesting that higher levels of violent video gameplay are related to lower levels of competitiveness. Previous research has implied that video games are appealing to players due to the element of competition (Vorderer, Hartmann & Klimmt, 2003), however, the direct relationship between the two variables has not been investigated. As the violent video gameplay scores were low across the current sample, future research in the area should use an experimental design involving controlled video gameplay in order to investigate this relationship further.

There was no correlation present between violent video gameplay and general aggression, negative mood or aggressive behaviour. These findings contradict research on a major scale as there is are endless amounts of evidence to show that a relationship exists between violent video games and aggression. For example, the use of violent video games has been shown to increase aggressive cognition (Anderson & Bushman, 2002) and an individual's likelihood of getting into a physical fight (Gentile et al., 2004).

The non-existent association between violent video games and aggressive variables in the current study could be a result of the level of violent video gameplay reported by the participants as the descriptive statistics showed the mean scores of the violent video gameplay variable to be very low. The low mean scores of the violent video game variable would indicate that participants did not engage in a lot of violent video game play. As aggression has been identified as a learned behaviour (Bandura, 1973), the lack of aggressive influence (in this case violent video games) would have the potential to impact the level of aggression possessed by an individual. This view has been strengthened by Gentile & Gentile (2008) who have suggested that aggressive cognition and behaviour is learned in the process of playing violent video games. The current study also focused specifically on violent video games and did not account for other means of media violence such as television and film which have also been closely linked to aggression (Anderson & Bushman, 2002; Savage & Yancey, 2008; Bushman & Huesmann, 2006; Ferguson & Kilburn, 2009).

### *4.2 A Model Predicting Aggressive Behaviour During Sport*

It was hypothesised that competitiveness, violent video gameplay, general aggression and negative mood would be significant predictors of aggressive behaviour during sport. The model was found to predict 19% of variance between two significant predictors; competitiveness and violent video gameplay. As general aggression and negative mood were not significant predictors of aggressive behaviour, it can be said that the results do not fully agree with the hypothesis. The model indicates that levels of competitiveness and levels of violent video gameplay can predict levels of aggressive behaviour during sport.

It was expected that competitiveness would be a significant predictor of aggressive behaviour as a relationship between the two variables had already been identified. The result agrees with Deutch's (1993) theory of interpersonal dynamics in competitive situations. The theory suggests that interpersonal conflict and aggression can arise from a competitive situation or event and can become prevalent in cognition or behaviour when individuals are placed into groups. In relation to the current study, Deutch's theory would suggest that when athletes of high competitiveness are placed into a competitive situation, the interpersonal exchange between the individuals on opposing teams can influence aggressive behaviour, resulting in an increased number of aggressive fouls committed by the individuals that are affected. Anderson & Morrow (1995) conducted two experiments in order to strengthen Deutch's (1993) theory. Results of the first experiment indicated that individuals are more likely to associate violence and aggression with competitive situations rather than cooperative situations. This finding can be applied to the results of the current study as participants were found to be highly competitive, therefore increasing the chances of their association of competitive situations with aggression. The association of competitive situations and aggression may act as a priming agent for aggressive thoughts. Priming of aggressive thoughts, as suggested by the General Aggression Model, has the potential to increase aggression, therefore increasing the likelihood of aggressive behaviour (Anderson et al., 2004). Anderson & Morrow (1995) also showed the effect of priming with the result of their second experiment, where competition-primed participants were more likely to unnecessarily kill video game characters when compared to cooperation-primed participants.

The 'winner effect' proposes another suggestion as to why competitiveness can predict aggressive behaviour (Hsu et al., 2006). The theory proposes that previous

winning experience can increase the chances of future winnings. Winning in an aggressive event (E.g. A hurling/Gaelic football game) releases steroid hormones such as testosterone and progesterone (Hirschenhauser & Oliviera, 2006). As changing levels of testosterone are associated with aggression (Archer, Graham-Kevan & Davies, 2005) and an increase in competitive behaviour (Carre & McCormick, 2008), it is possible that previous winning experience within the participating teams of the current study may have contributed to both the competitiveness and the aggressive behaviour of participants. Future research in the area should include a variable measuring the pattern of winnings and losses of the teams, in order to be able to further contribute to the understanding of the underlying factors associated with the relationship between competitiveness and aggressive behaviour during sport.

Along with competitiveness, violent video gameplay was also a significant predictor of aggressive behaviour during sport. This was an unexpected result considering there was no relationship between the two variables in the correlational analysis, however, it is not surprising as previous literature has suggested a well-established connection between them. Anderson & Bushman (2002) have suggested that the aggressive behaviour in violent video games has the potential to be transmitted into real life situations, providing strong evidence for the result of the current study as aggressive behaviour was measured in a real-life situation. Desensitization to real life violence as well as increased aggressive cognitions and attitudes towards violence in sport have also been identified as a consequence of violent video gameplay (Carnagey, Anderson & Bushman, 2007; Anderson & Carnagey, 2009). If athletes become desensitized to the violence and aggression displayed in sports, and begin to formulate more aggressive thoughts and attitudes about the sport, there is a high chance that aggressive behaviour will follow.

Excessive use of violent video games has been shown to increase aggressive behaviour in adolescents (Gentile & Gentile, 2008). Although this finding provides evidence for the result of the current study, it must be interpreted with slight caution as the current sample did not play excessive amounts of violent video games. In fact, as mentioned previously, the mean score of the violent video gameplay variable was relatively low.

It was not surprising that general aggression and negative mood did not predict aggressive behaviour during sport as there was no relationship found between these two variables and aggressive behaviour. For the purpose of discussing the results of the regression analysis, general aggression and negative mood will be referred to as one variable as the two variables were previously found to have a relatively strong relationship.

As previous research has suggested that playing violent video games has the potential to desensitize an individual to real life violence and that playing violent sports video games has the potential to increase aggressive thoughts and cognitions towards violent occurrences in sport (Carnagey, Anderson & Bushman, 2007; Anderson & Carnagey, 2009), the general aggression of an individual may not have an influence as to whether the individual displays aggressive behaviour during the sport.

When measuring the violent video gameplay variable, participants were asked to rate their favourite games on their level of violence regardless of the genre of the games. It is possible that since the current study was carried out on athletes, sport related video games may have been more popular within the sample than violent video games. However, participants with a high level of aggression may have rated sports video games as higher in violence due to their aggressive cognitions

(Berkowitz, 1990). Therefore, participants would have been desensitized primarily to aggression occurring in sports, cancelling out the impact of general aggression and negative mood.

Anger rumination, as suggested by Maxwell (2004), may also influence aggression in sport. Aggression due to anger rumination occurs as a result of an individual's focused attention to previous experiences of felt aggression and negative mood, and it is possible that these previous experiences may have occurred while playing sport. Aggressive behaviour as a result of anger rumination in the current sample would therefore only occur while participating in sport, meaning that general aggression and negative mood would not be the factors underlying aggressive behaviour during sport.

### *4.3 Physical & Verbal Aggression, Anger, and Hostility*

As general aggression was unable to predict aggressive behaviour during sport, a second regression analysis was performed in order to explore whether factors of general aggression could predict aggressive behaviour. The four subscales of the Buss-Perry Aggression Questionnaire were used as predictor variables; physical aggression, verbal aggression, anger and hostility. Results showed verbal aggression and anger to be significant predictors of aggressive behaviour during sport.

It was unexpected to find verbal aggression to be a significant predictor of aggressive behaviour over physical aggression as the aggressive behaviour variable was measured only in regards to physical aggression displayed by the participants. However, it is possible that participants may have scored themselves lower on physical aggression than verbal aggression. Taking into consideration that the aggressive traits of an individual may not necessarily have an influence on their aggressive behaviour during sport, it is plausible that physical aggression would not

predict this aggressive behaviour (E.g. Carnagey, Anderson & Bushman, 2007; Anderson & Carnagey, 2009; Maxwell, 2004).

Buss & Perry (1992) found a moderate correlation between verbal aggression and physical aggression, suggesting a relationship between the two variables. Aggressive behaviour in sport has been previously correlated with provocation (Maxwell, 2004). Considering the fact that aggressive behaviour in the current sample was measured by acts of physical aggression, and that the opposing team's behaviour was not assessed, it can be assumed that provocation could have been a confounding variable in the current study. Emotional states have been identified as one of the primary influences when it comes to aggressive behaviour (Berkowitz, 1989), and as provocation increases feelings of anger and irritability (Betancourt & Blair, 1992), those who are provoked may exhibit signs of verbal aggression. When continuously provoked, verbal aggression may transition into physical aggression, resulting in aggressive behaviour. This possibility is strengthened by the relatively strong relationship found between verbal and physical aggression, both by Buss & Perry (1992) and in the current study. Future research in the area should include confounding variables such as provocation, while controlling for the behaviour of the opposing team.

It was not surprising that anger was found to be a significant predictor of aggressive behaviour during sport, especially since a strong relationship was present between anger and physical aggression in the correlational analysis. This relationship suggests that higher levels of anger are related to higher levels of physical aggression. Although the physical aggression variable did not predict aggressive behaviour, its relationship with anger still must be taken into consideration when discussing the significance of anger in the model predicting aggressive behaviour. As the anger

subscale in the Buss Perry Aggression Scale is designed to identify whether an individual is easily frustrated or angered (Buss & Perry, 1992), it is logical to assume that individuals that obtained higher scores of anger would be more inclined to react aggressively to certain situations or acts of provocation during the course of a game of sport, therefore, showing more aggressive behaviour (Berkowitz, 1989; Betancourt & Blair, 1992).

As the hostility subscale was designed to measure personality traits such as openness and trust in others, it was not surprising that it held no ability to predict aggressive behaviour during sport. However, the hostility variable did have a strong relationship with physical aggression and anger, and a moderately strong relationship with verbal aggression. These relationships indicate that higher levels of hostility are related to higher levels of physical aggression, verbal aggression and anger.

### *4.4 Group Differences*

The differences in levels of competitiveness, general aggression, violent video gameplay and aggressive behaviour between players of hurling and players of Gaelic football were investigated. The results do not agree with the hypothesis as levels of aggressive behaviour did not differ between the two groups. In fact, there was no differences found between the two sports in any variable.. Previous research has suggested that individuals with weapons may act more aggressively due to the effect of the availability of a weapon (Berkowitz & LePage, 1967). The hurleys that are used to strike the ball in hurling can be viewed and potentially used as a high impact weapon. Hence, it was unexpected that no difference in aggressive behaviour was found between the two sports.

The negative result may have occurred due to the small sample size which may have undermined the power of the statistical tests. However, research regarding

the relationship between weapons and aggressive behaviour has focused on traditional weapons such as firearms and, therefore, may not be generalizable to the current study.

### *4.5 Strengths, Limitations, and Implications for Future Research*

Although the field study orientated design of the current study was extremely beneficial in regards to the context of the data collected, the results based on that data should be interpreted in light of a few limitations. As data was collected by a single researcher, the accuracy in measuring the aggressive behaviour variable must be addressed. The sports games were not recorded and all players were observed simultaneously throughout the game, potentially resulting in error of recording the data. Other variables were measured by scales of high validity, however, the fact that all scales were self-reported leaves room for error as participants may have answered untruthfully or with bias. The sample consisted of 60 participants which may have resulted in some statistical error and may have underpowered some of the statistical tests. The opposing sports teams were not under observation throughout the study, meaning that their behaviour was not taken into consideration when measuring the aggressive behaviour variable. Future research should control for the behaviour of the opposing team.

The measure for violent video game exposure became questionable when interpreting the results of the study. As the questionnaire did not specifically ask participants to base answers on violent video games, other genres of games played by participants interfered with their total score. Future research should consider using an alternative scale to measure violent video game exposure. Participants also obtained relatively low scores on this variable, indicating that an experimental design where participants are exposed to a certain violent video game for a certain amount of time

would be more suitable in order to provide results of increased reliability, however, this would compromise the field study design.

### ***4.6 Conclusion***

The underlying factors of aggressive behaviour in sport were investigated in this study. Competitiveness and violent video gameplay, as well as verbal aggression and anger were found to be significant predictors of aggressive behaviour during sport. As the element of competition is a crucial aspect in any sport, it is unlikely that it can be compromised to reduce aggressive behaviour without affecting athlete performance. Although the current sample did not play excessive amounts of violent video games, the variable was still found to have predictive ability in relation to aggressive behaviour. The rate of violent video gameplay in highly aggressive athletes could be controlled or replaced with video games of alternative genres in order to reduce aggressive behaviour. Aggressive behaviour may also be reduced across teams by controlling the rates of provocation during games and by providing short sessions of anger management as part of training.

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## Appendices

*Appendix A*

# Buss Perry Questionnaire

Using this 5 point scale, please indicate how uncharacteristic or characteristic each of the following statements is in describing you.

*1 = Extremely uncharacteristic*

*2 = Somewhat uncharacteristic*

*3 = Neither uncharacteristic nor characteristic*

*4 = Somewhat characteristic*

*5 = Extremely characteristic*

1. If somebody hits me, I hit back. 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( )
2. I have threatened people I know. 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( )
3. I flare up quickly but get over it quickly. 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( )
4. I know that 'friends' talk about me behind my back. 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( )
5. Once in a while I can't control the urge to strike another person. 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( )
6. I tell my friends openly when I disagree with them. 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( )
7. When frustrated, I let my aggression show. 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( )
8. Other people always seem to get the breaks. 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( )
9. I get into fights a little more than the average person. 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( )
10. I am suspicious of overly friendly strangers. 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( )
11. I often find myself disagreeing with people. 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( )
12. I am an even-tempered person. 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( )
13. If somebody hits me, I hit back. 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( )
14. I wonder why sometimes I feel so bitter about things. 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( )
15. I can't help getting into arguments when people disagree with me. 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( )
16. Sometimes I fly off the handle for no good reason. 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( )

17. I sometimes feel like people are laughing at me behind my back. 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( )
18. Given enough provocation, I may hit another person. 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( )
19. I sometimes feel like a powder keg, ready to explode. 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( )
20. At times I feel I have gotten a raw deal out of life. 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( )
21. If I have to resort to violence to protect my rights, I will. 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( )
22. My friends say that I'm somewhat argumentative. 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( )
23. I can think of no good reason for ever hitting a person. 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( )
24. I am sometimes eaten up with jealousy. 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( )
25. I have trouble controlling my temper. 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( )
26. There are people who pushed me so far that we came to blows. 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( )
27. When people are especially nice, I wonder what they want. 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( )
28. Some of my friends think I'm a hothead. 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( )
29. I have become so mad that I have broken things. 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( )

*Appendix B*

Please indicate the extent to which you agree or disagree with each of the following mood statements. Use the following 5 point rating scale. Write the number corresponding to your rating on the blank line in front of each statement.

| Strongly Disagree | Disagree | Neither Agree Nor Disagree | Agree | Strongly Agree |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |

____ I feel furious.

____ I feel offended.

____ I feel aggravated.

____ I feel tame.

____ I feel stormy.

____ I feel polite.

____ I feel discontented.

____ I feel like banging on a table.

____ I feel irritated.

____ I feel frustrated.

____ I feel kindly.

____ I feel sympathetic.

____ I feel outraged.

____ I feel agreeable.

____ I feel angry.

____ I feel like I'm about to explode.

____ I feel friendly.

____ I feel understanding.

____ I feel amiable.

____ I feel mad.

____ I feel mean.

____ I feel bitter.

____ I feel burned up.

____ I feel like yelling at somebody.

____ I feel cooperative.

____ I feel like swearing.

____ I feel cruel.

____ I feel good-natured.

____ I feel disagreeable.

____ I feel enraged.

*Appendix C*

## Sport Orientation Questionnaire - Form B

The following statements describe reactions to sport situations. We want to know how you *usually* feel about sports and competition. Read each statement and circle the letter that indicates how much you agree or disagree with each statement on the scale: A, B, C, D, or E. There are no right or wrong answers; simply answer as you honestly feel. Do not spend too much time on any one statement. Remember, choose the letter which describes how you *usually* feel about sports and competition.

| | Strongly agree | Slightly agree | Neither agree nor disagree | Slightly disagree | Strongly disagree |
|---|---|---|---|---|---|
| 1. I am a determined competitor. | A | B | C | D | E |
| 2. Winning is important. | A | B | C | D | E |
| 3. I am a competitive person. | A | B | C | D | E |
| 4. I set goals for myself when I compete. | A | B | C | D | E |
| 5. I try my hardest to win. | A | B | C | D | E |
| 6. Scoring more points than my opponent is very important to me. | A | B | C | D | E |
| 7. I look forward to competing. | A | B | C | D | E |
| 8. I am most competitive when I try to achieve personal goals. | A | B | C | D | E |
| 9. I enjoy competing against others. | A | B | C | D | E |
| 10. I hate to lose. | A | B | C | D | E |
| 11. I thrive on competition. | A | B | C | D | E |
| 12. I try hardest when I have a specific goal. | A | B | C | D | E |
| 13. My goal is to be the best athlete possible. | A | B | C | D | E |
| 14. The only time I am satisfied is when I win. | A | B | C | D | E |
| 15. I want to be successful in sports. | A | B | C | D | E |
| 16. Performing to the best of my ability is very important to me. | A | B | C | D | E |
| 17. I work hard to be successful in sports. | A | B | C | D | E |
| 18. Losing upsets me. | A | B | C | D | E |
| 19. The best test of my ability is competing against others. | A | B | C | D | E |
| 20. Reaching personal performance goals is very important to me. | A | B | C | D | E |
| 21. I look forward to the opportunity to test my skills in competition. | A | B | C | D | E |
| 22. I have the most fun when I win. | A | B | C | D | E |
| 23. I perform my best when I am competing against an opponent. | A | B | C | D | E |
| 24. The best way to determine my ability is to set a goal and try to reach it. | A | B | C | D | E |
| 25. I want to be the best every time I compete. | A | B | C | D | E |

*Appendix D*

**Video Game Habits Questionnaire**

Please state your three favourite video games:

1) _____

2) _____

3) _____

Please rate the level of violence in the games with 1 being ''not at all violent'' and 4 being ''very violent'':

Game one - 1( ) 2( ) 3( ) 4( )

Game two - 1( ) 2( ) 3( ) 4( )

Game three - 1( ) 2( ) 3( ) 4( )

Please rate how often you play this video game with 1 being ''barely ever'' and 5 being ''every day'':

Game one - 1( ) 2( ) 3( ) 4( ) 5( )

Game two - 1( ) 2( ) 3( ) 4( ) 5( )

Game three - 1( ) 2( ) 3( ) 4( ) 5( )

*Appendix E*

According to the GAA Referee Handbook (2016);

- *Aggressive fouls in Gaelic football include:*

  - Pushing an opponent
  - Charging the Goalkeeper in the small rectangle
  - A player in possession of the ball to charge at an opponent
  - Holding an opponent with the hand(s)
  - Using the fist on or around the body of an opponent for the purpose of dispossessing him of the ball
  - Charging an opponent to the back or front
  - Charging an opponent: (i) Who is not in possession, or (ii) Who is in the act of kicking, or (iii)
    If both players are not moving in the direction of the ball to play it.
  - Charging an opponent for the purpose of giving an advantage to a team-mate
  - Blocking or attempting to block with the boot when an opponent is kicking the ball from the hand(s)
  - Preventing or attempting to prevent an opponent from lifting or kicking the ball off the ground by striking an opponent's hand, arm, foot or leg with the boot
  - Engaging in any other form of rough play
  - Attempting to achieve an advantage by feigning a foul or injury
  - Deliberately pulling down an opponent
  - Deliberately tripping an opponent with hand(s), arm, leg or foot
  - Deliberately colliding with an opponent after he has played the ball away or for the purpose of taking him out of the movement of play
  - Remonstrating in an aggressive manner with a Match Official
  - Threatening or using abusive or provocative language or gestures to an opponent or team-mate
  - Striking or attempting to strike with arm, elbow, hand or knee
  - Kicking or attempting to kick
  - Behaving in any way which is dangerous to an opponent
  - Spitting at an opponent
  - Contributing to a melee
  - Use abusive or threatening language, threatening behaviour or physical interference with a Match Official
  - Striking or attempting to strike with the head
  - Stamping on a player
  - Inflicting an injury recklessly
  - Assaulting an opposing Team Official
  - Acting by deed, word or gesture of a racist, sectarian or anti-inclusion/diversity nature

- *Aggressive fouls in hurling include;*

  - Pushing an opponent
  - Holding an opponent's hurley or pulling it from his hands
  - Charging the Goalkeeper in the small rectangle
  - A player in possession of the ball charging an opponent
  - Using the hurley to obstruct an opponent
  - Striking an opponent's hurley unless both players are in the act of playing the ball
  - Holding an opponent with the hand(s)
  - Charging an opponent to the back or front
  - Charging an opponent unless: (i) he is in possession, or (ii) he is playing the ball, or (iii) both players are not moving in the direction of the ball to play it.
  - Charging an opponent for the purpose of giving an advantage to a team-mate
  - Pulling down an opponent
  - Tripping an opponent with hand(s), arm, leg foot or hurley
  - Threatening or using abusive or provocative language or gestures to an opponent or teammate
  - Making a "pull" with the hurley from behind and around the body of an opponent that is not consistent with an attempt to play the ball
  - Using the hurley in a careless manner
  - Throwing the hurley in a manner which constitutes a danger to another player(s)
  - Engaging in any other form of rough play
  - Attempting to achieve an advantage by feigning a foul or injury
  - Striking or attempting to strike with arm, elbow, hand, knee or hurley
  - Kicking or attempting to kick
  - Behaving in any way which is dangerous to an opponent, including pulling on or taking hold of an opponent's helmet or faceguard
  - Spitting at an opponent
  - Contributing to a melee
  - Using abusive or threatening language, threatening behaviour or physical interference with a Match Official
  - Striking or attempting to strike with the head
  - Stamping on a player
  - Inflicting an injury recklessly
  - Assaulting an opposing Team Official
  - Acting by deed, word or gesture of a racist, sectarian or anti-inclusion/diversity nature

*Appendix F*

**Consent Form**

*I have read and understood the attached Information Leaflet regarding this study. I have had the opportunity to ask questions and discuss the study with the researcher and I have received satisfactory answers to all my questions.*

*I understand that I am free to withdraw from the study at any time without giving a reason and without this affecting my training.*

I agree to take part in the study. ☐

I am over the age of 18. ☐

Participant's Signature: _____ Date: _____

Participant's Name in print: _____