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Video game use and prosocial behaviour:

An investigation into the relationship between prosocial video game use, empathy and prosocial behaviour in children and adolescents from different socio-economic groups.

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H.Dip in Psychology.

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The thesis is submitted to University College Dublin in fulfilment of the requirements for the degree of Master of Letters

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February 2016
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Abstract

1. Objectives: The main aim of this study was to determine if there was a positive relationship between prosocial video game use and prosocial behaviour in Irish children and adolescents. In addition this study had three related objectives: to determine if prosocial video game use was positively associated with empathy in children and adolescents; to determine if the relationship between prosocial video game use and prosocial behaviour remained significant after controlling for theoretically relevant variables such as sociodemographic variables and weekly game play; to determine if there was a negative relationship between violent video game use and prosocial behaviour in children and adolescents.

2. Method: This study had a cross-sectional correlational design. Data were collected from 538 9-15 year old children and adolescents between March and December 2014. Participants completed measures of empathy, prosocial behaviour and video game habits. Teachers rated the prosocial behaviour of participants. The socio-economic status of participants was also recorded.

3. Results: Multiple linear regressions were conducted on these data using two models. Prosocial video game use was positively associated with empathy and affective relationships in Models 1 and 2. This association remained significant after controlling for gender, age, violent video game use, socio-economic status and school status (disadvantaged/non-disadvantaged) in Model 1. Weekly game play was controlled for alongside the aforementioned independent variables in Model 2.

4. Conclusions: These findings provide evidence that prosocial video game use could develop empathic concern and improve affective relationships in a diverse population of youth.
Statement of original authorship:

I certify that the submitted work is my own work, was completed while registered as a candidate for the degree stated on the Title Page, and I have not obtained a degree elsewhere on the basis of the research presented in this submitted work.
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“The gentle are those who do not impose themselves. They make room for others. They do not monopolize the earth. Gentleness is not resignation but mastery of the violent impulses within us.”

Brother Alois *Being Salt of the Earth*
1. Introduction

Overview of literature review

In the first section the concept of prosocial behaviour in Social Psychology will be outlined. Firstly, a theoretical framework for analysing prosocial behaviour on a micro, meso and macro level will be outlined. Secondly, possible mediators of prosocial behaviour such as empathy, elevation and observing a prosocial model will be discussed. Thirdly, potential moderators of prosocial behaviour such as gender, age, socio-economic status and geographical location will be discussed. Finally, three concepts from evolutionary social psychology will be described: kinship, reciprocal exchange and stigmatization.

In the second section, prosocial behaviour in children will be discussed. Methodological and theoretical considerations will be outlined and empirical studies will be analysed.

In the third section a brief history of the study of empathy will be given. Early theories from the philosophical school of phenomenology and contemporary theories from social psychology will be described.

In the fourth section the positive and negative effects of media on children will be discussed. Firstly, a positive psychology approach to media use will be outlined. Secondly, a process model to explain violent media effects will be discussed.

In the fifth section research into the violent video games will be discussed. A brief history of video games as a genre will be outlined. A theoretical model for explaining violent video game effects, the General Aggression Model, will be described. Empirical evidence for violent video game effects will be discussed.

Finally, in the sixth section research into prosocial video games will be discussed. A theoretical model for explaining prosocial video game effects, the General Learning Model, will be described. Empirical evidence for prosocial video game effects will be discussed.
1.1 Prosocial behaviour within Social Psychology

1.1.1 Prosocial behaviour

Prosocial behaviour has been extensively studied within Social Psychology. Prosocial behaviour can be defined as “voluntary actions that are intended to help or benefit another individual or group of individuals” (Eisenberg & Mussen, 1989, p.3). In a review of the literature on prosocial behaviour Penner, Dovidio, Piliavin & Shroeder (2005) divide prosocial behaviour into three levels of analysis. Firstly, the “meso” level studies helper-recipient dyads by examining the context of a particular situation. Secondly, the “micro” level sets out to study the origins of prosocial tendencies and the reasons for variation in relation to these tendencies. Finally, the “macro” level studies prosocial actions in the context of groups and large organisations. The authors argue that this multilevel approach facilitates the integration and synthesis of a wide variety of research questions from disciplines such as neuroscience, social psychology and developmental psychology.

In addition to studying prosocial behaviour at various levels of analysis, various theories have been proposed in relation to mediators of prosocial behaviour. Three possible mediators of prosocial behaviour - empathic concern, elevation and observing a prosocial model - will be reviewed in the following subsection.

1.1.2 Theories regarding the mediators of prosocial behaviour

Batson’s (1991) empathy-altruism hypothesis proposes that true altruism, a form of prosocial behaviour that is other orientated is formed through empathic concern. Over 30 experiments have been carried out to test the empathy-altruism hypothesis against egoistic alternatives. These experiments mainly took place in a university setting with undergraduate students as experimental subjects. These experiments used deception to assess if participants would help an individual in distress under various conditions. The primary aim of these experiments was to test the empathy-altruism hypothesis against alternative theories.
The first alternative that was tested was aversive arousal reduction, which suggests that empathy for those suffering distress is an unpleasant feeling and therefore helping reduces this feeling (Batson, Ahmad & Lishner, 2009). Consistent with the predictions of the empathy-altruism hypothesis, individuals high in empathy offered to help regardless if escape from helping was easy or difficult (Batson, Duncan, Ackerman, Buckley & Birch, 1981; Toi & Batson, 1982).

A second alternative to the empathy-altruism hypothesis is empathy-specific punishments. Empathy-specific punishments involve an individual engaging in helping behaviour to avoid material and social punishments, as well as to avoid punishing themselves. According to this theory, individuals engage more in helping behaviour when they feel empathic concern because they believe that punishments in the form of guilt and self-criticism are a consequence of failing to help another individual for whom they feel empathy. The conclusion based on findings from three studies that tested this hypothesis was that empathic concern does not create a form of motivation focussed on the ultimate goal of eluding negative social evaluations and negative self-evaluations. This evidence discounted empathy-specific punishments in the form of self-censure or social disapproval as an alternative explanation for the empathy-altruism hypothesis (Batson, 2011).

A final egoistic alternative to the empathy-altruism hypothesis is empathy specific reward. This has been termed the negative state relief explanation of altruism (Cialdini, Schaller, Houlihan, Arps & Fultz, 1987). This alternative explanation proposes that helping behaviours bring mood enhancing self-rewards. Results from experiments testing this explanation suggested that an empathy-helping relationship was created even when it was possible to get negative state relief through manipulating anticipated mood enhancement with the participants (Batson et al, 1989). The implication of these findings is that the link between empathic concern and altruistic motivation is robust and is not diminished by the possibility of receiving mood-enhancing self-rewards.

A crucial facet of Batson’s (1991) definition of empathy is that it is “an other oriented emotional response” (Batson et al., 2009, p. 418). This implies that the perspective of the other is taken and the focus is not on the self. A number of experiments have tested this hypothesis. One of these experiments found that participants imagining
how the other felt produced empathy while participants imagining how they themselves would feel produced empathy and personal distress (Batson et al, 1997). Other experiments which have examined this self-other distinction have reported similar findings (Batson et al, 2003). Therefore perspective taking plays a central role in the relationship between empathy and altruism.

Another possible mediator of prosocial behaviour that has received less attention from researchers is the construct of elevation. Haidt (2003) defines the construct of elevation as “an emotion triggered by people behaving in a virtuous, pure, or superhuman way” (Haidt, 2003, p.281). An experiment designed to induce elevation in participants involved three conditions. In the ‘elevation’ condition participants viewed a 10 minute video clip on the life of Mother Teresa, in the ‘neutral’ condition participants viewed a 10 minute video clip of an emotionally neutral documentary and in the ‘happiness’ condition the participants viewed a comedy. After viewing these video clips participants in the elevation condition reported experiencing different feelings on both an emotional and physiological level to participants in both the happiness and control conditions. The researcher concluded on the basis of this study and a related study that happiness promoted energy and the pursuit of self-interest while elevation appeared to direct the participant’s attention outward and make them other oriented (Haidt, 2003). Therefore elevation, which promotes focus on the other, alongside empathy is another possible mediator of prosocial behaviour.

According to Haidt (2000) because elevation increases an individual's motivation to engage in prosocial behaviour, it illustrates Fredrickson’s (2001) Broaden and Build Theory of Positive Emotion. The Broaden and Build Theory of Positive Emotion (Friedrickson, 2001) hypothesises that positive emotion broadens thought-action repertoires in the actual moment. This phenomenon in turn has the effect of building lasting personal resources in physical, intellectual, social and psychological domains (Friedrickson, 2001). Crucially Friedrickson (2001) notes that positive emotions are not merely a signal of human flourishing, they actively produce human flourishing.
Other studies concerning prosocial behaviour have focussed on observing a model of prosocial behaviour in order to increase the likelihood of prosocial responding. Therefore observing a prosocial model is a third possible mediator of prosocial behaviour.

Bryan and Test (1967) concluded that a helping role model brought about significant increases in helping behaviour in an experimental study. In this study a woman in distress stood beside a car with a flat tyre at the side of a busy road. This experiment had three conditions. In the 'standard' condition a female undergraduate stood beside a car with a flat tyre. In the 'model' condition another car was stationed a ¼ mile from the control car with a female standing and a male changing a flat tyre. In the 'no model' condition, the model was absent and the only the control car was visible to passing traffic. A significant difference was observed between the three conditions with more motorists stopping to offer help in the 'model' condition. This led the authors to conclude that helping behaviour increases through the observation of others helping. However, the authors acknowledge that alternative explanations such as sympathy arousal and traffic slowdown due to observing the helping model weaken the strength of this hypothesis. Another study found that the likelihood of adults donating blood increased when participants observed another adult donating blood (Rushton & Campbell, 1977).

In this subsection three possible mediators of prosocial behaviour have been reviewed. Experiencing empathic concern for another individual, experiencing the emotion of elevation or observing a prosocial model could all mediate prosocial behaviour.

1.1.3 Potential moderators of prosocial behaviour

Potential moderators of prosocial behaviour that have received attention from researchers include socioeconomic status, gender, age and geographical location.

Socioeconomic status (SES) is one potential moderator of prosocial behaviour that has been extensively studied (Berkowitz & Friedman, 1967). Recent experimental research found that subtle cues that reveal the social status of an individual
moderated the level of prosocial orientation. Participants who were experimentally manipulated into having a lower social status exhibited more prosocial behaviour than participants who were experimentally manipulated into having a higher social status (Guinote, Cotzia, Sandhu & Siwa, 2015).

Gender is another moderator of prosocial behaviour. Sex differences in prosocial behaviour have been found to be consistent with gender role beliefs and therefore dependent on whether the prosocial actions involve communion or agency (Wood & Eagley, 2010). According to this theory the female gender role predicts that females care for others, mainly in close relationships. Whereas this theory predicts that the agentic behaviour of males will involve prosocial acts that are either physically challenging or chivalrous. A meta-analysis examining gender differences in prosocial behaviour divided studies into two categories. The first category involved studies in which participants unexpectedly encountered someone in need (e.g. encountering an individual who is ill or in danger). The second category involved studies in which participants were directly asked for help (e.g. asked to donate money to a charity). Based on these results it can be concluded that men were significantly more helpful than women when they encountered a person in need and therefore had to take initiative to offer help. These results are consistent with the agentic theory of male gender role models (Eagly & Crowley, 1986).

A further potential moderator of prosocial behaviour is age. While prosocial behaviour in children and adolescents has been extensively researched (Eisenberg & Mussen, 1989) there are less data on the development of prosocial behaviour in adulthood and old age (Bierhoff, 2002). However cross-sectional data suggest that prosocial behaviour could increase with age (Midlarsky, 1991, as cited in Bierhoff, 2002). In a study conducted by Midlarsky (1991) donations to a charity increased from 60-91% across three age groups: 25-34 year olds; 35-44 year olds and 45-64 year olds. While there is a lack of longitudinal evidence in this area this data suggests that prosocial behaviour may increase throughout the lifespan.

A study conducted in US cities found that helping behaviour decreased with degree of crowding (Levine et al, 1994). Levine (2003) conducted an international study to ascertain if all cities follow this pattern of helping. A field study conducted in 23 cities in 23 different countries used three tasks to measure helping: an individual’s
willingness to help another individual who has dropped a pen; an individual's willingness to help another individual with an injured leg; an individual's willingness to help a blind person. The researcher concluded that Rio de Janeiro in Brazil was the most helpful city as measured by the abovementioned tasks. While Kuala Lumpur in Malaysia was the least helpful city as measured by these tasks. The researcher notes that it is unlikely that these results are a reflection of the variation in helping between each country but are dependent on where an individual is at a particular time. In addition this research found that Gross Domestic Product (GDP), after being corrected for purchasing power, explained some of the variance in helping behaviour with countries with lower GDP having higher levels of helping.

Recent research suggests that altruistic behaviours such as helping may not be homogenous with an individual varying in their degree of prosocial responding across three broad areas: sharing goods, sharing information and sharing services (Warneken & Tomasello, 2009). The abovementioned study of helping behaviour used three tasks which could come under the category sharing services. This makes the inference of a prosocial disposition problematic as tasks that measured sharing of information or goods may have yielded different results in the same participants.

The review of potential moderators of prosocial behaviour in this subsection indicates that an individual's level of prosocial behaviour could be influenced by such variables as SES, age, gender and geographical location.

1.1.4 Evolutionary social psychology and prosocial behaviour

From the perspective of evolutionary social psychology three main predictors of prosocial behaviour have been proposed. The first of these possible predictors is kinship (Neuberg, Kenrick & Schaller, 2010). Evidence of nepotistic altruism has been found in studies of animals (Holmes & Sherman, 1983). In humans monozygotic twins displayed more co-operative behaviour than dizygotic twins in mixed–motive games (Segal & Hershberger, 1999). The second possible predictor of prosocial behaviour is reciprocal exchange. In purely economic terms prosocial behaviour towards an unrelated individual should only occur when reciprocation is certain. However evolutionary social psychologists have attempted to explain this
phenomenon by focussing on social cognition. It is possible that in deciding how to behave that heuristic cues, such as familiarity, play the same role as rational assessments in attempting to determine if reciprocity is possible (Neuberg et al, 2010). A final possible predictor of prosocial behaviour is stigmatization (Neuberg et al, 2010). This could take the form of the altruistic punishment of a member of a community who intentionally breaks norms related to social exchange (Cosmides & Tooby, 2005, as cited in Neuberg et al, 2010). This perspective views stigmatization and social exclusion as forms of prosocial policing and punishment (Neuberg et al., 2010).

In this section studies of prosocial behaviour with adult samples have been reviewed. In the following section the study of prosocial behaviour in children and adolescents will be discussed.

1.2 Prosocial behaviour in children and adolescents

1.2.1 Methodological and theoretical considerations

In relation to the development of prosocial behaviour in children and adolescents there are three principal theoretical explanations for the development of a prosocial orientation: psychoanalytic theory, social learning theory and cognitive developmental theory. According to Eisenberg & Mussen (1989) the importance of psychoanalytic theories in relation to prosocial behaviour is that firstly these theories highlight the potentially enduring effects of training and secondly these theories emphasise the role of identification. One of the core facets of Bandura’s (1977) social learning theory is observational learning. There are four types of processes involved in observational learning: attention, retention, motor production and motivation. Therefore “individuals imitate only if they attend to a model, store in their minds what they have observed, are able to physically enact the observed behaviour, and are motivated to do so” (Eisenberg & Mussen, 1989, p.28). Cognitive developmental theorists such as Piaget (1932, 1965) and Kohlberg (1981) focus on the manner in which moral judgements, role-taking ability and reasoning exert an influence on prosocial behaviour. According to Eisenberg & Mussen (1989), social learning theory
by focussing on overt behaviours is the most useful theory for generating hypotheses about prosocial behaviour.

One issue that has arisen in this area of research is the prevalence of different operational definitions of prosocial behaviour which in turn prompts questions about the stability, consistency and generality of measures used to assess prosocial behaviour. In a review of studies into the relationship between empathy and prosocial behaviour in both adults and children, Eisenberg and Miller (1987) point out “because someone frequently cannot determine people’s motives for their prosocial actions, it is often impossible to distinguish altruistic from non-altruistic prosocial behaviours” (Eisenberg & Miller, 1987, p.92). For this reason in their review the authors use prosocial behaviour to refer to both altruistic and non-altruistic prosocial behaviours.

Researchers in this area are interested in persisting social orientations and recurring emotional states in order to measure prosocial behaviours that are both durable and generalizable. There are five main methods of assessing prosocial behaviour: naturalistic observations, situational tests, ratings, sociometric questionnaires and questionnaire measures of prosocial responding in different social situations (Eisenberg & Mussen, 1989).

1.2.2 Empirical evidence

As discussed in the previous section, empathy and its relationship to prosocial behaviour has been the focus of much research. Correlational studies have been used to measure the relationship between empathy and prosocial behaviour in children. Barnett and Thompson (1985) took a sample of 116 children aged 9 to 11 years and measured their levels of empathy using the Bryant Index (1982). Prosocial behaviour was measured through teacher ratings of the helpfulness of a child both when a peer was obviously in need of help and when a peer had a subtle need. A low significant correlation was found between empathy and a peer having a subtle need.

Eisenberg, Pasternak and Lennon (1984) used the Bryant Index (Bryant, 1982) and two experimental conditions (assisting an adult to pick up toys and donating money to children in need) across two groups. The first group comprised 14 girls and boys
aged 7 to 8 years while the second group comprised 34 girls aged 9 to 10 years. A low positive correlation was found between empathy and helping an adult pick up toys in both groups, with the correlation being slightly higher for the older children. In terms of donating money to children in need, a moderate correlation between empathy was found in the younger group, whereas a low correlation was found in the older group (Eisenberg, Pasternak & Lennon, 1984, as cited in Eisenberg & Miller, 1987). As has been mentioned in the previous section recent research suggests that altruism is not a homogenous trait, therefore while a child may be highly altruistic in relation to sharing services, the child’s altruism in relation to sharing goods such as money may be low (Warneken & Tomasello, 2009). The findings of this study also challenge the suggestion that there is a positive linear development of altruism in children (Underwood & Moore, 1982).

In this section the study of prosocial behaviour in children and adolescents has been discussed. Empathy has been proposed as a key mediator of prosocial behaviour. The following section will examine the concept of empathy within social psychology.

1.3 Empathy within Social Psychology

1.3.1 A short history of the concept of empathy

Empathy has been described as “the “glue” of the social world” (Baron-Cohen & Wheelwright, 2004, p. 163). Baron-Cohen and Wheelwright (2004) wonder how a concept which seems to be an essential part of the development of home sapiens only came into existence as a construct at the end of the 19th century. Although the term empathy was first coined by Vischer (1873) as a technical term in aesthetics, Lipps (1903) developed the modern understanding of the term empathy (Vischer (1873) and Lipps (1903) as cited in Coplan & Goldie, 2011). Lipps (1903) used the word German word Einfühlung, translated into English as ‘empathy’, which literally means “feeling into”, to describe how individuals have an experience of aesthetic objects or gain knowledge of another individual’s mental state. Therefore according to Lipps (1903) empathy was “a process of inner imitation or inner resonance that is based on a natural instinct and causes us to imitate the movement and expressions we perceive in physical and social objects. We experience the other’s feelings as our
own because we project our own feelings onto the other” (Lipps (1903) as cited in Coplan & Goldie, 2011, p.xii). Although Lipp’s (1903) definition has been criticised it has been highly influential in philosophy and psychology. Freud acknowledged the influence of Lipps (1903) on his work (Coplan & Goldie, 2011).

One of the principal difficulties in relation to measuring the construct of empathy relates to arriving at an accurate definition of empathy. Empathy has been defined as “(A) Feeling what someone else feels; (B) caring about someone else; (C) being emotionally affected by someone else’s emotions and experiences, though not necessarily experiencing the same emotions; (D) imagining oneself in another’s situation; (E) imagining being another in another’s situation; (F) making inferences about another’s mental states; some combination of the processes described in (A)-(F)” (Coplan & Goldie, 2011, p.4). Nevertheless many researchers divide empathy into two broad categories: affective empathy and cognitive empathy. (See Figure 1).

An approach to defining affective empathy focuses on the emotional response of the observer to the affective state of another individual. This could involve the observer and the individual observed sharing the same feelings (Eisenberg & Miller 1987; Hoffman, 1984 as cited in Baron-Cohen & Wheelwright, 2004). It could also involve a situation where the observer’s feelings do not match the feelings of the individual observed but are in some way appropriate. For example, feeling pity when observing another individual in a state of sadness (Stotland, 1969, as cited in Baron-Cohen & Wheelwright, 2004). Finally, there is a type of empathy which involves expressing concern and compassion after witnessing an individual in distress (Batson, 1991).

The cognitive component of empathy has been described as “theory of mind” (Austingon, Harris & Olson, 1988 as cited in Baron-Cohen & Wheelwright, 2004) or “mind-reading” (Baron-Cohen, 1995). Baron-Cohen & Wheelwright (2004) point to computers as a useful analogy for cognitive empathy. A user can switch from one window, which is analogous to their representation of the world to another window which is analogous to another individual’s representation of the world.

On comparing the affective and cognitive components of empathy it can be concluded that empathy contains both components (Davis, 1996) as both distinct entities and merging categories (Baron-Cohen & Wheelwright, 2004). Therefore the
mixed component of empathy (See Figure 1) refers to a mixture of cognitive and affective empathy.

![Diagram of empathy components]

Figure 1 A simple model showing the two overlapping components of empathy and how sympathy is a special case of the affective component of empathy. From S. Baron-Cohen & S. Wheelwright (2004). The Empathy Quotient: An investigation of adults with Asperger Syndrome or high functioning autism, and normal sex differences. *Journal of Autism and Developmental Disorders, 34*(2), 163-175.

1.3.2 Phenomenology and the study of empathy

One of the earliest works on empathy is by the phenomenologist¹ Edith Stein. In her work, On the *Problem of Empathy*, Stein (1917, 1989) begins by outlining difficulties with Lipp’s (1903) definition of empathy: “All controversy over empathy is based on

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¹ Encyclopaedia Britannica defines phenomenology as “a philosophical movement originating in the 20th century, the primary objective of which is the direct investigation and description of phenomena as consciously experienced, without theories about their causal explanation and as free as possible from unexamined preconceptions and presuppositions.” (http://www.britannica.com/topic/phenomenology)
the implied assumption that foreign subjects and their experience are given to us.” (Stein, 1917, 1989, p. 3). Stein (1917 as cited in Moran, 2000) gives examples of situations in which empathy is possible. For example, when an individual sees someone blush they know that the other person feels ashamed. Another example is when a friend speaks of the loss of their brother the individual listening can experience their pain. However Stein (1917 as cited in Moran, 2000) argues that an individual cannot experience all of another individual’s pain directly in the same manner that an individual cannot perceive all of an object due to part of the object being obscured due to its orientation to the viewer. Crucially Stein (1917 as cited in Moran, 2000) believes that an individual can experience part of another individual’s experience intuitively, through empathy, however an individual cannot fully experience the original experience of the other (Moran, 2000).

Recent studies in the field of neuroscience may initially appear to challenge this understanding of empathy. Decety, Michalska and Akitsuki (2008) used fMRI to scan 17 typically developing children with an age range of 7-12 years who watched a short video clip showing painful and non-painful situations. Increased hemodynamic activity was found in neural circuits such as the insula and the anterior midcingulate cortex in children who observed another individual in pain. These neural circuits are also involved in processing pain first-hand. Therefore children who watch another person in pain experience shared representations with the person in pain at a neural level and this has important implications for the development of empathy in children.

However closer examination of the abovementioned study appears to re-enforce Stein’s (1917, 1989) understanding of empathy. While experiencing pain first hand and observing another person in pain share common neural circuitry, the qualitative experience of these two states differs (Decety & Grezes, 2006). The inability to fully experience the thoughts and feelings of ‘the other’ as in Stein’s (1917, 1989) interpretation of empathy, is not often highlighted. Therefore the phenomenological interpretation of empathy could have important implications for the study of video game effects. The literature on video game effects in relation to both violent and prosocial video game use will be reviewed in sections 1.5 and 1.6.

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2 The term ‘Video games’ is used throughout this thesis to refer to games played on a variety of devices including Personal Computers, Game Consoles and Mobile Phones. The term ‘Video games’ is also used to include the term computer games.
1.3.3 Empathy and Social Psychology

Two of the most prominent theories of empathy in Social Psychology are Batson’s (1991) empathy-altruism hypothesis, which was described in the previous section, and Davis’s (1996) organizational model of empathy. Both of the authors acknowledge the variety of definitions of empathy cited in the literature.

Batson (2011) uses empathy as a shorthand for empathic concern which he defines as an “other-oriented emotion elicited by and congruent with the perceived welfare of someone in need” (Batson, 2011, p. 11). The author acknowledges that empathic concern does not cover one emotion but includes feelings such as sympathy, compassion, tenderness and grief.

Davis (1996) also recognises the multi-dimensional nature of empathy. The author points out that a narrow focus on either cognitive or affective empathy could mean that one component of empathy is excluded in psychological research. Davis (1996) uses four constructs which each relate one individual’s response to the experiences of another individual. Firstly, there are the antecedents, which encompass the characteristics of the observer, the individual being observed or the situation. Secondly, the processes encompass the mechanisms that create an empathic response. Thirdly, the intrapersonal outcomes encompass cognitive and affective responses which the observer experiences but are not expressed explicitly in behaviour directed at the individual being observed. Finally, interpersonal outcomes encompass the observer’s explicit behavioural responses towards the individual being observed.

In this section the concept of empathy within social psychology has been discussed. In the following section the positive and negative effects of media on children will be considered.
1.4 Positive and negative effects of media on children

1.4.1 Research into positive aspects of children’s exposure to media

A positive psychology approach to researching children’s media use focusses on media as a tool to build resilience (Gregory, 2013). Gregory (2013) describes an experience as a clinical psychologist working with a traumatised Somalian refugee child:

*My attempts to engage Roger in discussion were met with no response week after week. I was eager to work with him but became increasingly frustrated….During the sixth week, as Roger carefully cut paper into small pieces over a trash bin, he said to me “You are an American”. Roger had a passion for American television and films and noticed that I spoke with the same accent. The remark opened the door to my being able to connect with Roger and support him in living a healthier life.*

*(Gregory, 2013, p.172)*

In the passage above the author outlines the link between use of media and engagement with a client in a therapeutic setting. Within the context of positive psychology media can therefore be seen as a tool to promote well-being.

Research in positive psychology has found that a happy person in contemporary Western society has the following characteristics: a positive temperament, a facility to look on the positive more than the negative, a tendency not to focus on negative life circumstances, a circle of friends and an ability to make progress in relation to attaining his or her goals (Diener, Suh. Lucas & Smith, 1999). Creators of children’s television programmes are using this research to guide television programme development (Gregory, 2013). Other applications of positive psychology to media include the modelling of constructive coping strategies in television programmes (Gregory, 2013).

Another psychological construct associated with positive psychology is flow. Flow is a psychological state that occurs when a high level of challenge and a high level of skills coincide in an activity. After experiencing flow, individuals report both feeling stronger and having higher levels of vitality (Csikszentmihalyi, 2008). In relation to
video games Gregory (2013) notes that “much of the appeal of video games is that it does provide flow states for the user in which the skills the user develops are placed against an equal challenge” (Gregory, 2013, p177). Therefore prosocial media including prosocial video games could be sources of flow.

Calvert & Kottler’s (2003) study of the Children’s Television Act found that programmes with pro-social messages such as Lassie could have the effect of making children more altruistic (Calvert & Kottler, 2003). The researchers give the example of a sixth grade girl who was asked to watch a programme called Anatole about a mouse that tried hard but could not sing well but nonetheless persevered. The girl who watched this cartoon reflected that this “is the lesson I will keep in mind when I get frustrated with something I am not good at” (Calvert & Kottler, 2003, p.316). In this instance the television programme delivered a positive prosocial message and could possibly model positive coping strategies.

The children’s television programme Sesame Street had by 1999 become the television series that had attracted the highest level of research in the history of television (Shalom, Fisch, Truglio & Cole, 1999). One of the main aims behind creating Sesame Street was the intellectual and cultural development of preschool children (Cooney, 1966, as cited in Shalom et al, 1999). A study by Zill, Davies & Daly (1994) surveyed the parents of approximately 10,000 children (Zill et al, 1994, as cited in Shalom et al, 1999). A positive correlation was found between pre-schoolers who watched Sesame Street and the ability of these pre-schoolers to recognise letters of the alphabet and to create stories during reading activities (Shalom et al, 1999). The research evidence cited here indicates a positive outcome to children’s exposure to the media, in this case television.

Finally, the producers of Sesame Street are using this programme to educate children about Autism Spectrum Disorder (ASD). Sesame Street introduced a new character with ASD in 2015. This character, Julia, interacts with other Sesame Street characters in an attempt to educate young children about peers with ASD (http://autism.sesamestreet.org/).
1.4.2 Research into negative aspects of children's exposure to media

According to Huesmann, Dubow and Yang (2013) children living in the modern digital age are being socialized by electronic media to the same degree as they are being socialized by parents/guardians and peers. The authors conclude that over 50 years of research into violent media effects demonstrates two cause-effect relationships in relation to ‘media socialization’. Firstly short-term exposures of any individual to violent scenes or participating in violent video game use increases the probability of an individual behaving aggressively immediately afterwards. Secondly, being exposed to violent scenes or participating in violent video game use can change the developing brain structures of children. This developmental change causes an increase in the probability of behaving aggressively many years later in adulthood. Huesmann et al., (2013) have developed a process model in order to understand the short and long term processes that explain media violence effects.

Short-term processes include priming, mimicry and excitation transfer. According to priming theory the human memory is an “associative network of scripts/ideas representing semantically related thoughts, feelings and behavioral tendencies” (Huesmann et al, 2013, p.161). Violent media content could activate aggressive scripts and therefore increase the likelihood of a hostile response. Mimicry can be seen when the aggressive actions of media heroes are immediately mimicked by young children. According to Bandura (1977) when the media character is perceived as being similar to themselves and when the behaviour (e.g. aggressive actions) is seen to be positively re-enforced, mimicry has a greater effect (Bandura, 1977). The final short-term process is excitation transfer. This is based on the theory that physiological arousal slowly decreases. Therefore if there are two arousing events and a short separation in the amount of time between them, the arousal from the first event will transfer to the second event (Zillman, 1983; 1988 as cited in Huesmann et al.,2013). In the context of violent media, the physiological arousal brought about by playing a violent video game or observing a violent film could transfer into another situation causing arousal such as an interpersonal conflict.

In relation to long-term processes, observational learning of aggressive scripts, schemas and beliefs as well as emotional desensitisation are the psychological processes involved in violent media effects. A script can be defined as “a guide for
behaviour by laying out the sequence of events that one believes is likely to happen and the behaviours that one believes are possible or appropriate for a particular situation” (Huesmann, 1998, p.80, as cited in Huesmann et al., 2013). An individual’s perception of a script as both possible and socially acceptable exerts an influence over whether that script is subsequently acted upon. Through the observational learning and enactment of aggressive schemas, scripts and beliefs children and adolescents can both learn particular aggressive behaviours and internalise values, beliefs and attitudes relevant to the process and context of learning according to this theory. For example playing a violent video game such as *Street Fighter* habitually in childhood and adolescence could develop particular schemas, scripts and beliefs in an individual in relation to resolving interpersonal conflicts. Involvement in an interpersonal conflict could result in aggressive schemas, beliefs and scripts being enacted which in turn could result in aggressive behaviour. Emotional desensitization refers to an increase in emotional tolerance in relation to viewing violent content (Huesmann et al, 2013) alongside a decrease in unpleasant physiological responses associated with viewing violence (Krahe et al., 2011).

According to researchers priming, excitation transfer and desensitization are all natural and unconscious processes whose enduring effects are the development of aggressive attitudes and behaviours. Crucially these behaviours develop outside of an individual’s awareness according to this theory (Huesmann et al, 2013).

Experimental studies have found evidence for short-term media violence affects as described at the beginning of this subsection. Boyatis, Matillo & Nesbitt (1995) examined the influence of the television programme *Mighty Morphin Power Rangers* on five to seven year olds. This research found that the boys who watched this programme were seven times more aggressive in the short-term than the boys who didn’t watch the programme. Although girls also took part in this study they did not appear to identify as strongly with the characters as the boys did, therefore there was very little difference in levels of aggression among girls in the experimental and control groups (Boyatis et al, 1995).

In addition, longitudinal studies have found evidence of long-term media violence effects. Huesmann, Moise-Titus, Podolski & Eron (2003) undertook a longitudinal study examining the effects of exposure to media violence during childhood and its
subsequent effect on aggressive behaviour in young adulthood. This longitudinal study took place between 1977 and 1992. It looked at the relationship between the participants viewing violent television between the ages of six and 10 years and the participants’ aggressive behaviour in adulthood 15 years later. Violent television viewing in childhood was found to be a significant predictor of aggression in adulthood after controlling for SES, intellectual ability and parenting factors (Huesmann et al, 2003).

Huesmann et al (2003) argue that the psychological processes that have been linked to violent media effects (observational learning, habituation/desensitization, priming and excitation transfer) are immutable and universal. According to this argument media violence can have an effect on “any child from any family” (Huesmann et al, 2003, p218). The research on violent video game effects is rooted in the research on violent media effects. Research into violent video games will reviewed in the following section.

1.5 Research into violent video games

1.5.1 A short history of video games

In the United States 91% of children aged 2 to 17 years play video games (NPD Group, 2011, as cited in Granic, Lobel & Engels, 2014.). In an Irish context, data from the study Growing up in Ireland: The Lives of 9-Year-Olds indicate that 30% of the boys and 12% of the girls in the sample spent one or more hours playing video games each day according to maternal report (Irish Department of Health & Children, 2009). Computer and video game sales in the US have risen from 7 billion dollars in 2003 to 15.4 billion dollars in 2014 (Entertainment Software Association, 2015). (See Figure 2). A computer game is a game using software played on a PC or laptop. A video game can have the same content as a PC game but is played on a console (e.g. Xbox, Sony Playstation) connected to a television. Since 2010 the emergence of new formats such as playing games on mobile apps or playing games on social networking sites such as Facebook has expanded the reach of this genre.
The advent of video games as a medium can be traced back to the early 1960s. In May 1962 the computer game *Space War* was launched at the MIT Open House. This game had been designed on the PDP-1, one of the most technologically advanced computers at that time (Levy, 2001). According to Levy (2001) “The sight of it (Space War)...was so much on the verge of fantasy that no one dared to predict that an entire genre of entertainment would eventually be spawned from it” (Levy, 2001, p.65).

Video games as home entertainment first emerged in the 1970s. In the 1990s the issue of video game violence began to emerge (Anderson, Gentile & Buckley, 2007).
Content analysis of 33 best-selling video games from this time found that 79% of these games had some form of violent content (Dietz, 1998).

The following example illustrates the relationship between violent content and video game sales in the 1990s. During the late 1980s games such as Mortal Kombat and Double Dragon became bestsellers. Nintendo was the market leader in terms of selling gaming consoles in the late 1980s and early 1990s. However the decision of Nintendo to reduce the violent content of the game Mortal Kombat resulted in decreased sales. Sega also created a version of the game for the Sega Genesis system. Sega's decision not to reduce the violent game content in their version of Mortal Kombat meant that they outsold the Nintendo version by a ratio of three to one (Anderson et al., 2007).

In 1992 a major innovation in video game technology emerged. The game Wolfenstein 3D was one of the most popular early first person shooter games. In this type of game the player sees the game world through the eyes of the avatar as opposed to looking at characters on a screen from a third person perspective. The effect of this innovation was that the player now experienced the game as if he/she was actually in the game, travelling through a virtual world (Anderson et al., 2007).

In the world of contemporary video gaming there are a broad variety of genres. In terms of gameplay there are Sandbox games such as the Sims in which a player interacts with other characters in virtual situations such as a university. This game differs from a traditional platformer such as Super Mario Bros in which a player must overcome obstacles such as enemy creatures and cliff edges in order to progress through the game. In addition, with the advent of the internet, gaming has changed from a solo activity to an activity that can be played online with other players. This has created genres such as the Massive Multiplayer Online Role-playing Game (MMORPG). In MMORPG games such as World of Warcraft as many as 12 million people play this game online in which they can customise their online character and collaborate with other players to complete missions (Granic, Lobel & Engels, 2014) (See Figure 3)
Figure 3. Conceptual map of the main genres of video games (with examples) organized according to two important dimensions: Level of complexity and the extent of social interaction required. From I. Granic, A. Lobel, R.C.M.E. Engels (2014). The benefits of playing video games. *American Psychologist, 69*(1), 66-78.

Bisell (2011) succinctly describes the unique characteristics of this new genre of entertainment: “But for those television programs, films and novels febrile with self-consciousness, entertainment pretends it is unaware of me, and I allow it to. Playing video games is not quite like this. The surrender is always partial. You get control and are controlled. Games are patently aware of you and have a physical dimension unlike any other form of popular entertainment” (Bisell, 2011, p. 39).

1.5.2 Theoretical model of violent video game effects

Gentile (2011) argues that there are five dimensions on which video game effects can operate on players: the amount of play, the content of play, the game context, the structure of the game and the mechanics of gameplay. According to Gentile (2011) the amount of game play is generally related to activity displacement such as
academic underperformance. Content of play appears to relate to the scripts of a
game. Therefore a game in which the script involved solving mathematical problems
would have mathematical content, whereas a game in which the script requires the
player to help others would have prosocial content. The game context refers to
conditions such as the social context. For example, the context of a MMPORG game
such as World of Warcraft could moderate video game effects. Game structure refers
to how players get information from a screen and may be related to improvements in
visual attention skills. Finally the mechanics of game play refer to the manner in
which the player uses a controller such as a joystick or a keyboard. This dimension
appears to be related to enhanced eye-hand coordination.

While educational video games can teach important academic and life skills violent
video games can work through the same process to teach aggression (Buckley &
Anderson, 2006). Researchers have found that violent video games reduce the
stress that individuals experience when observing or participating in anti-social
behaviour and increase aggressive behaviours in the real-world (Bavelier et al.,
2011).

Anderson and Warburton (2012) note that the common sense view that many
parents hold in relation to the negative impact of violent video games is supported by
scientific findings. Anderson and Warburton (2012) also list a number of features of
violent video game play that are particularly relevant to the manner in which children
learn. These processes include imitation, identification, repetition, interactivity and
associative learning. A further important feature of violent video game play
discussed by the authors is the acquisition of aggressive knowledge structures (or
schemata), attitudes and scripts for behaviour. A model that attempts to explain the
effects of violent video game play, including the acquisition of aggressive schemata,
is the General Aggression Model (GAM) (Anderson & Bushman, 2001; Buckley &
Anderson, 2006).

The GAM integrates elements of five different social cognitive theories in an attempt
to explain violent video game effects. These five theories are Cognitive Neo-
Associative Theory (Berkowitz, 1984, 1993 as cited in Bartlett & Anderson, 2013),
Excitation Transfer Theory (Zillman, 1971, as cited in Bartlett & Anderson, 2013),
Social Learning Theory (Bandura, 1977), Script Theory (Huesmann, 1986, as cited in
Bartlett & Anderson, 2013) and Social Information Processing (Crick & Dodge, 1994, as cited in Bartlett & Anderson, 2013). Each of these five theories will now be described.

According to Cognitive Neo-Associative Theory (Berkowitz, 1984, 1993) various particular emotional states and memories are represented in the form of nodes in semantic memory. Berkowitz (1984, 1993) proposes that when a node becomes activated after a provocation other connected nodes are also activated in a process known as spreading activation. After activation of these routes the individual engages in higher order processing. In the case of a provocation a behaviour related to either an aggression-related tendencies network or an escape-related tendencies network will then be completed.

Excitation Transfer Theory (Zillman, 1971) proposes that aggressive behaviour can be the result of arousal created by exposure to stimuli such as the media. Physiological arousal caused by playing a violent video game may not dissipate immediately. Therefore if an individual experiences physiological arousal while completing a task after playing a violent video game, this level of arousal may be a combination of the residual arousal from playing a video game and the physiological arousal that is a result of completing the task.

Social Learning Theory proposes (Bandura, 1977) that aggressive behaviours are the result of both observational learning and reinforcement of behaviours. In relation to media violence and aggressive behaviour, Bandura (1977) argues that children are taught aggressive modes of reacting to situations. In addition the media creates particular images and fosters certain beliefs about reality while also desensitizing and changing an individual's levels of restraint over behaviours.

Script Theory (Huesmann, 1986) proposes that aggressive behaviour in individuals is due to behavioural programs known as aggressive scripts being stored in an individual's memory. When a particular behavioural script is retrieved in an individual's memory in a particular social situation an evaluative process occurs in relation to the level of social acceptability of the behaviour and the motivation of the individual in relation to particular goals. If the behavioural script is evaluated as
containing appropriate behaviour, this behaviour is then enacted. Behavioural scripts can be learned from the mass media and the social acceptability of these scripts can be shaped by the mass media according to this theory.

Social Information Processing (Crick & Dodge, 1994) predicts that individuals begin an interaction in a new social situation with a database which contains memories, schemata, knowledge regarding other social situations and social norms in relation to acceptable behaviour. In a given social situation an appropriate response is accessed from an individual's memory, frequently relying on behavioural scripts that have been stored.

The GAM incorporates variables and processes that operate in the current situation as well as variables and processes that exert an influence on an individual in the long term in order to understand aggression. Short-term effects include the activation of aggressive cognitions and the increase of aggressive affect. These short-term effects could become chronic through regular exposure to video games and therefore have an effect on aggressive behaviour through the emergence of aggressive perceptual schemata and aggressive expectation schemata. Aggressive perceptual schemata relate to a tendency to interpret the behaviour of other individuals as having aggressive intent. Aggressive expectation schemata involve individuals overestimating the probability that others will exhibit aggressive behaviour (Krahe, 2013).

1.5.3 Empirical evidence

Dill and Dill (1998) conducted the first major narrative review of the violent video game literature and found evidence for violent video game effects. Anderson and Bushman's (2001) meta-analytic review found that exposure to violent video games causes increases in physiological arousal as well as thoughts and feelings relating to aggression. In addition this meta-analysis found that playing violent video games causes decreases in prosocial behaviour. Anderson et al's (2010) meta-analysis of violent video game effects found that exposure to violent video games is a risk factor for increases in aggressive behaviour, cognition and affect as well as decreases in
empathy and prosocial behaviour. Experimental research has demonstrated gender differences in relation to male and female responses to aggressive video game content (Bartholow & Anderson, 2002) with males displaying greater levels of aggression after playing violent video games.

According to Anderson et al. (2007) longitudinal effect sizes for the relationship between video game violence and aggression are 0.30 thus accounting for 8.8% of the variance. Comparing these data to data from the US Department of Health on risk factors for aggressive and violent behaviour in youth, only gang membership with an effect size of .31 is a stronger predictor of aggressive behaviour. Substance use has an effect size of .06 in these data (US Department of Health and Human Services, 2001).

A meta-analysis conducted by Anderson et al (2010) found a smaller effect size of 0.24 for the relationship between violent video game play and aggressive behaviour. In relation to the abovementioned meta-analysis, Anderson and Warburton (2012) note that exposure to video game violence is a risk factor that can be controlled more easily than other risk factors for aggression such as gang membership. Therefore the authors emphasise that action can be taken in relation to this issue both in the family home and at governmental level.

Ferguson (2014) criticises the links between video game violence and mass shootings that have been proposed by other researchers (Anderson & Bushmann, 2001). The researcher believes that focussing more on the video game player’s personality and motivations rather than the violent content of video games would be a better approach. Ferguson (2014) argues that playing violent video games for up to 18 hours a day in isolation may be indicative of a problem that will not be remedied my simply reducing violent video game exposure. However this argument appears to ignore research evidence that has found short and long-term video game violence effects as described in the GAM (Anderson et al, 2010).

In addition, Ferguson’s (2014) argument ignores Gentile and Bushmann’s (2012) risks and resilience framework developed to understand media violence effects. According to this risks and resilience framework media violence (including violent video games) is not the single cause of aggression behaviour. Gentile and Bushmann (2012) measured various factors that cause or protect against aggression
in a sample of 7-11 year olds at two time points over a six month period. These factors included media violence exposure, hostile attribution bias and parental monitoring. The researchers concluded that exposure to media violence operates in a similar manner to other risk factors for aggression. Therefore within a risks and resilience framework violent video game use can be seen as one of many possible risk factors for aggressive behaviour instead of the single cause of aggression.

A recent longitudinal study investigating mediators and moderators of violent video games on aggressive behaviour surveyed 3,034 8-17 year old youth annually at three time intervals. Based on the results of this study, the researchers concluded that the effects of violent video games are principally mediated by aggressive cognitions such as normative beliefs about aggression and hostile attribution bias (Gentile et al., 2014).

Finally, the American Psychological Association (APA) Task Force on Violent Media recently conducted a comprehensive review of the research literature on violent video game effects that was published between 2005 and 2013. The authors of the report concluded that “The research demonstrates a consistent relation between violent video game use and heightened aggressive behavior, aggressive cognitions and aggressive affect, and reduced prosocial behavior, empathy and sensitivity to aggression” (APA, 2015, p.18).

In this section a theoretical model and empirical evidence in relation to violent video game effects has been discussed. Recent research has focussed on prosocial video game effects. The following section will review the literature on prosocial video game effects.

1.6 Research into prosocial video games

1.6.1 Theoretical model of prosocial video game effects

Some researchers have suggested that video games could be used as teaching resources in schools as these games are based on learning principles that allow players to be producers rather than consumers (Gee, 2003). Anderson and Bushman
(2001) ask if it is possible to create engaging video games “to teach and reinforce nonviolent solutions to social conflicts” (Anderson & Bushman, 2001, p.359). In this context the use of video games in both educational and clinical settings has received attention recently from researchers (Granic et al, 2014).

According to researchers in this area, a prosocial video game is a game in which the player must help and co-operate in order to succeed in the game. Examples of games with these characteristics that have been used in previous research are Animal Crossing, Super Mario Sunshine, Zoo Vet and Lemmings (Gentile et al, 2009; Greitemeyer & Osswald, 2010). While pro-social television programmes such as Sesame Street have been heavily researched (Shalom et al, 1999), prosocial video games have received less attention (Hogan & Strasburger, 2008; Greitemeyer & Osswald, 2010). Numerous studies have highlighted the benefits of video games on learning and cognitive development (Gee, 2003; Gopher, Weil & Bareket, 1994; Green, Pouget & Bavelier, 2010). However there has been less research on the effects of prosocial video games on prosocial behaviour (Gentile et al, 2009).

A model based on the GAM, the General Learning Model (GLM) (Gentile et al, 2009), has been developed to attempt to understand the relationship between video games (both violent and non-violent) and behaviour. Therefore while the GAM and GLM share similarities, only the GLM can make predictions about prosocial video game use and prosocial behaviour (Bartlett and Anderson, 2013). The GLM suggests that short term learning experiences have both affective, arousal and cognitive effects (See Figure 4). Therefore the GLM proposes that each experience an individual has is a learning trial which temporarily alters cognitions, emotions and levels of physiological arousal. Repeated practice of video games could produce certain long-term effects such as changes to precognitive and cognitive constructs, cognitive-emotional constructs and emotional constructs. (See Figure 5).

This model when applied to video-gaming implies that a game which requires the player to use prosocial behaviours to succeed will create an increase in prosocial behaviours in the player immediately following completion of the game. The GLM proposes that two short-term processes explain prosocial video game effects. Firstly, the cognitive effect of priming scripts predicts that games with prosocial content will result in prosocial behavioural scripts being primed and rehearsed. Secondly,
changes in cognitions, feelings and levels of physiological arousal while playing a prosocial game are reciprocally reinforced through both classical and operant conditioning. The repeated practice producing these short-term effects should in turn create long-term effects in the individual playing video games. Conversely the amount of time spent playing violent video games could result in long-term aggressive behaviour according to the learning mechanism described in this model (Gentile et al, 2009).


1.6.2 Empirical evidence

A recent meta-analysis has provided additional evidence that video games have social outcomes (Greitemeyer & Mugge, 2014). This meta-analysis and other recent studies have concluded that violent video game play leads to desensitisation and aggression, while prosocial video game play increases empathy and therefore
prosocial behaviour (Greitemeyer & Mugge, 2014; Gentile et al, 2014; Prot et al, 2014). While experimental studies investigating the benefits of prosocial gaming have been carried out with adult samples (Saleem, Anderson & Gentile, 2012; Greitmeyer & Osswald, 2010) there has been a lack of experimental studies investigating the causal relations between prosocial gaming and prosocial behaviour in children and adolescents.

Nevertheless correlational and longitudinal studies have investigated the relationship between prosocial video game use and prosocial behaviour in children and adolescents. A correlational study investigated the relationship between prosocial video game exposure and prosocial behaviour in a sample of 727 Singaporean adolescents. This study found that prosocial video game exposure was positively associated with helping behaviour, cooperation and sharing as well as empathy. This association remained significant after controlling for gender, age, weekly game play and violent video game exposure (Gentile et al., 2009).

A recent longitudinal study surveyed 3,034 8-17 year old youth annually at three time intervals (Prot et al., 2014). This study used data from the same sample as the longitudinal study into the relationship between violent video game use and aggressive behaviour mentioned in the previous section (Gentile et al., 2014). However in this instance video game habits, empathy and prosocial behaviour were measured annually at three time points. Prosocial video game use was found to be a significant predictor of prosocial behaviour and this change was found to be mediated by empathy (Prot et al., 2014).

In this section a theoretical model of prosocial video game effects has been described. In addition, empirical evidence in relation to prosocial video game effects has been reviewed. In the following chapter the research rationale and goals of the present study will be outlined.
2. Research Rationale and Goals

2.1 Overview

As has already been discussed in the literature review in Chapter 1, the study of prosocial behaviour in children and adolescents has investigated the conditions under which children and adolescents behave prosocially. In this context televised models have been used to encourage prosocial behaviour in children and adolescents (Eisenberg & Mussen, 1989). Recent research has extended investigations into prosocial media effects to include prosocial video games (Gentile et al, 2009; Prot et al, 2014).

Previous research has investigated the relationship between prosocial video game use and prosocial behaviour in normative community based samples (Gentile et al, 2009; Prot et al., 2014). In addition previous research has measured prosocial behaviours such as helping behaviour as well as cooperation and sharing. Previous research into prosocial video game effects has not measured the tendency to comply with social norms or the tendency to maintain friendly, sympathetic and affective relationships. The present study seeks to confirm findings from previous studies with a broader population from both disadvantaged and non-disadvantaged schools. In addition the present study seeks to investigate new hypotheses regarding the relationship between prosocial video game use and affective relationships as well the relationship between prosocial video game use and normative behaviour. Finally the present study seeks to investigate relationships between violent video game use and the abovementioned variables. The overarching aim and three related objectives described below are an attempt both to replicate and extend previous research on prosocial video game effects.

On the basis of this literature review one overarching aim has been derived. The present study primarily aims to determine if there is a positive relationship between prosocial video game use and prosocial behaviour in children and adolescents.
In addition three related objectives have been derived. These objectives relate to theoretically relevant variables that have been identified based on the literature review. Each of these objectives will now be described in the context of prosocial video game effects.

2.2 Objective 1: to determine if prosocial video game use is positively associated with empathy

Previous correlational research into prosocial video game effects in children and adolescents has found a significant positive association between prosocial video game use and empathy (Gentile et al., 2009). Another correlational study with an adult population from different cultures found that the relationship between prosocial media use was positively associated with empathy. This relationship remained significant for populations in Western European, Eastern European and East Asian countries (Prot et al., 2014). Finally, a recent longitudinal study found that prosocial video game use was positively associated with empathy (Prot et al., 2014). Therefore in the context of previous research it is reasonable to expect that prosocial video game use should be positively associated with empathy.

2.3 Objective 2: to determine if the relationship between prosocial video game use and prosocial behaviour remains significant after controlling for theoretically relevant independent variables such as sociodemographic variables and weekly game play.

Research has found that when controlling for long-term causal factors for aggressive behaviour, such as personality and environmental factors, violent video game effects can disappear (Ferguson et al., 2012). Therefore in the case of prosocial video game effects it is theoretically possible that when controlling for personality traits and environmental factors, prosocial video game effects could disappear. Previous studies have found relationships between prosocial video game use and prosocial behaviour while controlling for such variables as age, gender and weekly game play (Gentile et al., 2009; Prot et al., 2014). Previous studies have not controlled for SES or school status. This study seeks to replicate and extend previous research by including participants with different levels of SES from both disadvantaged and non-disadvantaged schools.
The following independent variables could theoretically explain part of the variance in the dependent variables measuring prosocial behaviour: age, gender, socio-economic status, school status and weekly gameplay.

The relationship between age and prosocial behaviour has been extensively studied ranging from the impact of adverse childhood experiences on prosocial behaviour (Caprara & Pastorelli, 1993) to factors influencing the development of prosocial behaviours in childhood and adolescence (Eisenberg & Mussen, 1989). Studies on gender differences in prosocial behaviour have focussed on differences in the levels of prosocial behaviour in male and female children (Calvo, Gonzalez & Martorell, 2001). Clinical and developmental psychologists have noted the difficulty that parents in socially disadvantaged communities have in reinforcing prosocial behaviours in their children (Kazdin, 1987). A study examining the effect of family, school and classroom ecologies on children’s social and emotional development found that first grade children who attended schools in disadvantaged communities had lower levels of prosocial behaviour (Hoglund & Leadbetter, 2004). Finally a systematic review into the relationship between sedentary behaviour and health indicators in school aged youth found that watching television for more than two hours a day was negatively associated with prosocial behaviour (Tremblay et al, 2011). Screen time in the form of weekly game play has also been found to be negatively associated with prosocial behaviour (Gentile et al, 2009). Therefore weekly game play could also explain some of the variance in the dependent variables measuring prosocial behaviour.

If the relationship between prosocial video game use and prosocial behaviour remains significant after controlling for theoretically relevant independent variables it could be argued that this provides stronger evidence for a prosocial video game effect (Prot & Anderson, 2013).
2.4 Objective 3: to determine if there is a negative relationship between violent video game use and prosocial behaviour in children and adolescents.

Numerous studies have identified relationships between violent video game use and aggressive behaviour (Anderson et al., 2010; Gentile et al., 2014). There have also been a number of studies which have found that violent video game use is associated with decreases in prosocial behaviour (Anderson et al., 2010; Gentile et al., 2009).

Therefore, based on previous research it is reasonable to expect that there will be a negative relationship between violent video game use and prosocial behaviour in children and adolescents.
3. Method

3.1 Introduction
The main aim of this study was to test the hypotheses that relate to prosocial video game use, prosocial behaviour, empathy, socio-demographic factors and violent video game use as stated in Chapter 2. Various questionnaires were used to measure these variables. The methodology that was used to test these hypotheses is presented in this chapter. This chapter is divided into the following four sections: 3.2 Selections of Participants, 3.3 Instrumentation, 3.4 Data collection, and 3.5 Data analysis.

3.2 Selection of Participants

3.2.1 Population
The population under study were 9-15 year old primary and secondary school students from 10 schools. Four of these schools were located in Galway city while the remaining six schools were located in Dublin.

3.2.2 Sample design
Snowballing or chain referral was used to access this sample. Five of these schools could be described as socio-economically disadvantaged, based on either a formal DEIS\(^3\) rating (four) or in one case, based on the analysis of professionals working with the school. Snowball sampling is a technique widely used to reach populations that are generally difficult to access (Biernacki & Waldorf, 1981). Therefore in order to ensure a diverse sample drawn from a wide variety of educational contexts, personal contacts were used to access this sample.

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\(^3\) DEIS is an acronym for Delivering Equality of Opportunity in Schools. DEIS schools are schools in the Republic of Ireland that are designated disadvantaged and therefore allocated additional resources. The DEIS initiative began in 2005 and was guided by the following definition of educational disadvantage from the Education Act (1998): "...the impediments to education arising from social or economic disadvantage which prevent students from deriving appropriate benefit from the education in schools". The identification process for including primary schools in the DEIS initiative focussed on the following socio-economic variables: unemployment; local authority accommodation; lone parenthood; membership of the Irish Travelling community (an indigenous minority); large families (5 or more children) and number of children in a family eligible for free books. The identification process for including post-primary schools in the DEIS initiative involved accessing centrally held data such as State examination results and retention rates for State examinations (Irish Department of Education & Skills, 2011).
Previous studies into violent and prosocial video game effects have generally accessed normative community based samples (Anderson et al, 2007; Gentile et al, 2009). Boxer, Huesmann, Bushman, O’Brien and Moceri (2008) sought to address this deficit in relation to violent media effects by including a sample of juvenile delinquents in a study into the relationship between violent media use and involvement in violent acts. In addition, studies have investigated the video game use of specific clinical populations such as individuals with Attention Deficit Hyperactivity Disorder (Durkin, 2010) and Autism Spectrum Disorder (Mazurek & Engelhardt, 2013). A recent study investigated the role of low educational ability as a risk factor for playing violent video games (Bijvank, Konijn & Bushman, 2012). Prot et al (2014) note that in two studies investigating prosocial video game effects (a correlational study with an adult sample and a longitudinal study with an adolescent sample) that socioeconomic status (SES) and parental education were measured. However, neither of these variables were controlled for in the statistical analysis.

It is important to control for SES and school status in a study of prosocial video game effects due to psychological processes that could explain media effects. Researchers have previously noted that nobody is immune from video game violence effects (Anderson & Warburton, 2012). As has been noted in Chapter 1 in relation to the broader domain of media violence effects, researchers have noted that media violence can have an effect on “any child from any family” (Huesmann et al, 2003, p218). It could equally be argued that the processes that are involved in prosocial video game effects such as the priming of prosocial behavioural scripts are immutable and universal (Anderson & Warburton, 2012).

This argument implies that prosocial video game effects could effect “any child from any family” in the same manner that a healthy diet will benefit youth from a diverse population. Researchers have used a food metaphor to describe the benefits and risks derived from a ‘media diet’ (Anderson & Warburton, 2012). In order to investigate the hypothesis that a ‘prosocial media diet’ could confer mental health benefits on a diverse population of young people, young people from different socioeconomic groups need to be included in studies of these effects. The inclusion of a diverse range of socioeconomic groups has been thus far neglected in the prosocial video game literature.
Previous studies have controlled for theoretically relevant variables outlined in Chapter 2 such as gender and weekly game play (Gentile et al., 2009). Literature searches were conducted on the following databases: PsycInfo, Google Scholar, Scopus. However none of these literature searches located previous correlational studies into prosocial video game effects that controlled for both SES and school status. Therefore to the researcher’s knowledge this is the first correlational study into prosocial video game effects to statistically control for both SES and the education related variable school status.

3.2.3 The final sample

The final sample for the current research was drawn from 10 schools.

a) Gender: Participants were both male, $n=315$ (59%), and female, $n=223$ (41%).

b) Age: Participants ranged in age from 9 to 15 years, $M=11.6$ years, $SD=1.44$

c) Characteristics of schools in this sample: In addition to five socio-economically disadvantaged schools (two primary, three post-primary), a private primary school, two Gaelscoileanna, an Educate Together primary school and a mainstream post-primary school were included in this sample. The five socio-economically disadvantaged schools were coded as 1 and the five non-disadvantaged schools were coded as 2 in the data set. Participants from socio-economically disadvantaged schools comprised 40.5% of the final sample.

d) Information on parents/guardian’s occupations

Parents and guardians occupations were coded for socio-economic status (SES) using an Irish census based social class scale (O’Hare, Whelan & Cummins, 1991).

On the information sheet/consent form that was sent to all participants,

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4. A large number of the primary and post-primary schools in the Republic of Ireland are under the patronage of the Catholic Church and are funded by the Department of Education and Skills. The main language of instruction is English. A Gaelscoil is a school in which all the instruction is carried out through the Irish language (Irish Gaelic). An Educate Together school is a multi-denominational school. The Department of Education and Skills pays the salaries to teachers in Gaelscoileanna and Educate Together Schools. A private school in the Republic of Ireland is self-funded and does not receive funding from the Department of Education and Skills (Irish Department of Education & Skills, 2014).
parents/guardians were given the option of giving information in relation to their occupational status. This information was coded on the following ordinal scale:

“Social Class 1: Higher professional and higher managerial; proprietors and farmers owning 200 or more acres; Social Class 2: Lower professional and lower managerial; proprietors and farmers owning 100-199 acres; Social Class 3: Other non-manual and farmers owning 30-49 acres; Social Class 4: Skilled manual and farmers owning 30-49 acres; Social Class 5: Semi-skilled manual and farmers owning less than 30 acres; Social class 6: Unskilled manual” (O’Hare et al., 1991, p.142). Each Social Class was coded with a corresponding number, e.g. Social Class 1=7, Social Class 2=6. Participants who were unemployed were coded as 1.

Figure 6 below gives details of the socio-economic status of participants. Where two parents/guardians gave their occupations, the occupation in the higher social class was used to code SES. It should be noted that due to missing data the total number of participants coded for SES was 405. Details regarding strategies for dealing with missing data in relation to SES are given in Chapter 4.
Figure 7 below gives further details of the socio-economic status of participants in the final sample. In this instance participants in each social class are compared in terms of attendance at disadvantaged and non-disadvantaged schools. As can be observed in Figure 7, 32 out of the 143 participants whose parents/guardians had professions classified as lower professional (Social class 2) attended disadvantaged schools. In contrast, 111 participants from non-disadvantaged schools had parents/guardians who reported professions classified as lower professional. Therefore 22% of participants whose level of SES corresponded to Social Class 2 attended disadvantaged schools, while the remaining 78% attended non-disadvantaged schools.

In relation to Social Class 1, four out of the 80 participants in the final sample whose parents/guardians reported professions classified as higher professional (Social
Class 1) attended disadvantaged schools. Therefore 5% of participants whose level of SES corresponded to Social Class 1 attended non-disadvantaged schools while the remaining 95% attended non-disadvantaged schools. These data are consistent with demographic data on the population of disadvantaged schools in the Republic of Ireland (Irish Department of Education and Skills, 2011).

![Figure 7 Socioeconomic status of participants from disadvantaged and non-disadvantaged schools in the final sample](image)

3.3 Instrumentation

3.3.1 Student’s questionnaires (See Appendix A).

3.3.1.1 The Children’s Empathic Attitudes Questionnaire

Children’s Empathic Attitudes Questionnaire (CEAQ) (empathy) (Funk, Fox, Chan & Curtiss, 2008). This is a 16 item measure with statements relating to empathy. Funk
et al (2008) note that scholars have studied both the affective and cognitive components of empathy. In reviewing self-report measures of empathy, the authors note that what is being measured generally in these scales is the cognitive component of empathy. They continue to propose that this component is more clearly conceptualised as 'empathic attitudes'. The CEAQ is designed to measure attitudes and likely behaviour in children in relation to empathic responding.

Scoring: An example of an item in this questionnaire is Item 10 "I feel sorry for kids who can't find anyone to hang out with". Participants were given three options (yes, maybe and no) which were coded as 2, 1 and 0. Higher scores indicated higher empathic attitudes.

Reliability: Cronbach’s alpha of .74 was obtained as a measure of internal reliability. According to Tavakol and Dennick (2011) Cronbach’s alpha values that lie between 0.7 and 0.9 demonstrate an acceptable level of internal reliability. Values lower than 0.7 are problematic and could be due to a low number of questions, the measurement of heterogeneous constructs or a lack of interrelatedness between questionnaire items (Tavakol & Dennick, 2011). Therefore the Cronbach’s alpha value obtained for the CEAQ indicates an acceptable level of internal reliability. Previous measurement of the internal consistency of this instrument yielded similar levels of internal reliability (Funk et al., 2008).

3.3.1.2 Prosocial Orientation Questionnaire (POQ)

Pro-social Orientation Questionnaire (subscales for a) helping behaviour and b) co-operation and sharing c) affective relationships d) normative behaviour ) (Cheung, Ma & Shek, 1998). This is a 40-item questionnaire.

The original scale was adapted to an Irish context after consultation with professionals working with participants from the current sample. This questionnaire was originally written in Chinese and subsequently translated into English in order to be used in a study which took place in Singapore. Therefore some phrases in this English questionnaire may not have been easily comprehensible or appropriate for an Irish population. The following phrases were changed:
Item 14: “I always think of helping people who are handicapped” was changed to “I always think of helping people who have disabilities”

Item 23: “I would not give up my seat on the MRT or bus to someone in need” was changed to “I would not give up my seat on the train or bus to someone in need”.

In addition a glossary was given to participants in order to aid comprehension with other potentially difficult words or phrases (See Appendix B).

Scoring: The participants were given a choice of four responses in relation to a series of 40 statements. An example of an item from this questionnaire is Item 5: “I would discourage my friends from fighting or arguing.”

The researcher read the following set of instructions to the participants before administering the questionnaire: “This is not a test. There are no right or wrong answers. We are interested in how you feel about the following issues. Please circle one answer for each of the following questions according to the following keys: SA-Strongly Agree (I feel like this most of the time); A-Agree (I feel like this sometimes); D-Disagree (I do not feel like this most of the time); SD-Strongly Disagree (I do not feel like this at all)”. Response were coded on a scale from 4 (Strongly Agree) to 1 (Strongly Disagree). Higher scores indicated higher levels of prosocial orientation. The following items in the questionnaire were reverse coded: Items 8, 12, 13, 16, 17, 19, 20, 22, 23, 26, 29, 30, 36, 37, and 39.

Reliability: Cronbach’s alpha of .85 was obtained as a measure of internal reliability. Therefore this instrument has an acceptable level of internal reliability. Previous measurement of the internal consistency of this instrument yielded similar levels of internal reliability (Cheung et al., 1998).

The POQ has four subscales: Helping Behaviour, Cooperation and Sharing, Affective Relationships and Normative Behaviour. The characteristics of each of these subscales will be described in the following sections.
3.3.1.2.1 Helping behaviour

Description of subscale: This subscale consists of 11 items measuring helping behaviour. An example of an item in this subscale is Item 3: “I would spend time and money to help those in need.”

Reliability: Cronbach’s Alpha of 0.63 was obtained as a measure of internal reliability. This value is below the acceptable level of internal reliability of 0.7. Previous measurement of the internal consistency of this instrument yielded a higher level of internal reliability with a value of 0.72 (Gentile et al, 2009).

3.3.1.2.2 Co-operation and sharing

Description of subscale: This subscale consists of seven items measuring level of co-operation and sharing. An example of an item in this subscale is Item 20: “I feel jealous when my friends win an award or prize.”

Reliability: Cronbach’s alpha of 0.5 was obtained as a measure of internal reliability. This value is below the acceptable level of internal reliability of 0.7. However previous measurements of the internal reliability of the scale yielded similar values (Gentile et al, 2009). The low level of internal reliability of this subscale could be due to the low number of items in this subscale (Tavakol & Dennick, 2011).

3.3.1.2.3 Affective relationships

Description of subscale: This subscale consists of 11 items measuring the tendency to maintain friendly, affective and sympathetic relationships with family and peers (Cheung et al, 1998). An example of an item in this subscale is Item 16: “I always argue with my family.”

Reliability: Cronbach’s alpha of .66 was obtained as a measure of internal reliability. This value is below the acceptable level of internal reliability of 0.7. Previous
measurement of the internal consistency of this instrument yielded similar levels of internal reliability (Cheung et al., 1998).

3.3.1.2.4 Normative behaviour

Description of subscale: This subscale consists of 11 items measuring the tendency to comply with social norms. An example of an item in this subscale is Item 32: “I am always on time.”

Reliability: Cronbach’s alpha of .63 was obtained as a measure of internal reliability. This value is below the acceptable level of internal reliability of 0.70. Previous measurement of the internal consistency of this instrument yielded similar levels of internal reliability (Cheung et al., 1998).

See Table 1 below for a comparison of measurements of the internal reliability of the POQ with previous studies.

Table 1 Measurements of the internal reliability of the POQ in different studies

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Helping behaviour</td>
<td>0.63</td>
<td>0.72</td>
<td>0.67</td>
</tr>
<tr>
<td>Cooperation and sharing</td>
<td>0.50</td>
<td>0.57</td>
<td>0.55</td>
</tr>
<tr>
<td>Affective relationships</td>
<td>0.66</td>
<td>Not measured</td>
<td>0.69</td>
</tr>
<tr>
<td>Normative behaviour</td>
<td>0.63</td>
<td>Not measured</td>
<td>0.68</td>
</tr>
<tr>
<td>N</td>
<td>538</td>
<td>727</td>
<td>673</td>
</tr>
</tbody>
</table>
As can be seen in Table 1 above, the measures of internal reliability of the subscales of the POQ in different studies are generally below the accepted level of internal reliability. Although Gentile at al. (2009) found a measure of internal reliability of 0.72 for helping behaviour, this finding could be explained by the larger sample size used in this study. Therefore this issue with low internal reliability is a general problem in relation to correlational studies that have used the POQ to measure prosocial behaviour.

3.3.1.2.5 Internal structure of the POQ

The original authors of the POQ note that the item-total correlations in relation to all the items were reasonably high. In addition the authors note that Cronbach’s alpha values obtained were acceptable (Cheung et al., 1998). However, as the majority of the values in Table 1 above are below the accepted level of 0.7, it is possible that a different factor structure to the one represented by the four subscales of the POQ exists.

Previous research into measures of empathy have identified different factor structures to the structures originally proposed by the authors of the measure. Bryant’s Empathy Index (Bryant, 1982) was developed as a unidimensional measure of the affective component of empathy in children and adolescents. An exploratory factor analysis carried out by DeWied et al (2007) found evidence that this measure was multidimensional. An Empathic Sadness scale and Empathic Attitude scale were found in this factor analysis. Therefore, a Principal Components Analysis was carried out on the POQ in order to examine its factorial structure and investigate if the underlying dimensions in the questionnaire were represented by the four subscales described by Cheung et al. (1998).

3.3.1.3 The Computer/Video Game Habits Questionnaire

Computer/Video Game Habits were measured by the Video Game Habits Questionnaire (Prot et al, 2014). This version of the questionnaire was used in a longitudinal study investigating Computer/Video Game Habits that took place in Singapore (Prot et al, 2014). As the questionnaire was not published with the research findings, one of the researchers from this project Dr. Kam Ming Lim was
contacted. Dr. Lim sent the researcher a copy of the questionnaire and also answered questions about scoring the questionnaire. The questionnaire is a version of the Video Game Habits questionnaire developed by Anderson and Dill (2000). This is a 51 item questionnaire. It is divided into five sections. Section A contains four items measuring weekly hours spent playing computer/video games and demographic questions concerning computer/video game habits (For example Item 3: What age did you start playing computer/video games?). Section B contains eight items relating to information about computer/video game habits. Section C, D and E contain the same items. In each of these sections the participant was asked to name a game. These games are in named in order of frequency of play (most, second most, third most). For each named game the participant was asked to pick one day during the week and one day over the weekend. The participant then stated how many hours they played this game for the weekday and the weekend day. Options ranged from none to more than 10 hours. Seven of the items did not give an exact number of hours (e.g. 4 to 5 hours). If the participant chose one of these options the higher number was inputted into the data set. If the participant chose “more than 10 hours”, 12 hours was inputted into data set. Participants were also asked for information in relation to the individuals they played games with. Finally students were asked to rate the content of the game. Although there are nine items used to rate content, four of these items were used for the purposes of data analysis. These items measured prosocial and violent video game use. More information regarding the measurement, scoring and reliability of these variables will be given in sections 3.3.1.3.1 to 3.3.1.3.5.

3.3.1.3.1 Prosocial video game use (6 items)

In order to measure prosocial video game use the following procedure was adopted. Participants named the three games that they played most frequently. Participants chose one day during the week and one day at the weekend (Example: Pick one day during the week: (Monday, Tuesday, Wednesday, Thursday or

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5 Previous studies have used prosocial video games such as *Lemmings* (Greitemeyer & Osswald, 2010) in which there is no violence and the player performs prosocial acts such as protecting a lemming from harm. However, content analysis of 33 best-selling video games found that 79% of these games had some form of violent content (Dietz, 1998). Therefore as games with only prosocial content are less common, the present study uses the variable ‘prosocial video game use’ to refer to prosocial behaviour within a game and ‘violent video game use’ to refer to violent behaviour within a game. For example, in the game *Minecraft* it is possible to cooperate with other players and construct buildings, however it also possible to fight creatures.
Participants were given a choice of times from None to More than 10 hours.

Participants completed two items that rated each game on a four point Likert scale from Never to Almost Always. (Example: “How often do you help others in this game?”). Responses were coded from 0 (Never) to 3 (Almost Always).

Scoring: Participant’s reports of hours gaming during the week were multiplied by five while reports of weekend gaming were multiplied by two in order to calculate total hours playing a particular game. Total hours were then multiplied by the video game ratings to compute a score for weekly prosocial video game use. Prosocial video game scores were then divided by three to obtain an average prosocial video game score. This average score was then used as the variable ‘prosocial video game use’ in data analysis.⁶

### 3.3.1.3.2 Violent video game use (6 items)

In order to measure violent video game use the following procedure was adopted. Participants named the three games that they played most frequently. Participants chose one day during the week and one day at the weekend (Example: Pick one day during the week: (Monday, Tuesday, Wednesday, Thursday or Friday) ______________. How many hours do you play this game on that day?). Participants were given a choice of times from None to More than 10 hours.

Participants completed two items that rated each game on a four point Likert scale from Never to Almost Always (Example: “How often do you shoot or kill creatures in this game?”). Responses were coded from 0 (Never) to 3 (Almost Always).

Scoring: Participant’s reports of hours gaming during the week were multiplied by five while reports of weekend gaming were multiplied by two in order to calculate total

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⁶ A Cronbach’s Alpha of 0.78 was obtained as a measure of internal reliability of prosocial video game use. While this is an acceptable level of internal reliability, 141 cases were excluded from analysis. As some children only listed one game in Section C, sections D and E of some questionnaires were not completed (See Appendix A). Therefore due to incomplete data interpretation of the internal reliability of this scale is problematic. A Cronbach’s Alpha of 0.75 was obtained for violent video game use. 141 cases were also excluded in this instance.
hours playing a particular game. Total hours were then multiplied by the video game ratings to compute a score for violent video game use.

3.3.1.3.3 Weekly game play (6 items)

Weekly game play was initially measured by asking participants to complete two items in section A relating to the number of hours spent playing computer video games on a week day and on a weekend day. The number of hours for the week day was multiplied by five and the number of hours for the weekend day were multiplied by two in order to calculate total hours of weekly game play. However this method yielded a range of values from 0 hours to 168 hours. This maximum value of 168 hours would imply that at least one player in the sample played games for 24 hours each day. A review of research into children’s self-report of physical activity levels concluded that children have a tendency to overestimate their levels of physical activity (Welk, Corbin & Dale, 2000). This tendency for children to overestimate the time spent on physical activities could also be applied to other activities such as video gaming.

Therefore the hours reported for playing each of the three computer video games in Sections C, D and E were used as an alternative measure of weekly game play. The weekly hours spent playing each game were divided by three to obtain a measure of average game time. This method yielded a range of values from 0 hours to 84 hours. A paired samples t-test was carried out to compare total hours gaming and an average of the time spent playing each of the three named games. A significant difference between these two estimations of gameplay was observed (see Appendix C). In addition researchers of gaming habits have noted the tendency of gamers to play one game such as World of Warcraft or Minecraft continuously rather than playing a variety of games in a given week (Wi Jong, 2009). Therefore it could be argued that the items measuring time spent playing the game named by the participant as being most frequently played are a more accurate estimation of weekly game time. Furthermore by averaging the time spent playing three games, the possibility that the time participants reported playing one game is an overestimation has also been reduced. Finally, when mean scores for weekly gameplay were compared to international studies this second method of calculating weekly gameplay produced mean scores that are more consistent with international evidence (Rideout,
Foehr & Roberts, 2010). This second method was therefore used as a measure of weekly gameplay.

Reliability: Cronbach’s alpha of .93 was obtained as a measure of internal reliability. According to Tavakol and Dennick (2011) Cronbach’s alpha values higher than .90 could be indicative of redundancies. In this situation the authors advise reducing the number of items in the measure (Tavakol & Dennick, 2011). Previous measurement of the internal consistency of this instrument yielded marginally lower levels of internal reliability (Prot et al, 2014).

3.3.1.3.4 Information about computer/video game habits (8 items)

This subscale measured information about participant’s computer/video game habits. There are 8 items in this subscale. This information varied from attitudes to games (example: “It is important to be powerful in games”) to information about online behaviour (example: “I have many online friends”).

Scoring: For each statement participant’s circled a response on a four point Likert scale. These responses were coded from 0 (Strongly disagree) to 3 (Strongly agree).

Reliability: Cronbach’s alpha of .55 was obtained as a measure of internal reliability. This value is below the acceptable level of .70.

3.3.1.3.5 Descriptive information about video game play

Pan European Game Information (PEGI) is the principal method of rating video games in Europe. The following description of the video game rating system is given on the PEGI website: “The rating on a game confirms that it is suitable for players over a certain age. Accordingly, a PEGI 7 game is only suitable for those aged seven and above and a PEGI 18 game is only suitable for adults aged eighteen and above. The PEGI rating considers the age suitability of a game, not the level of difficulty. PEGI is used and recognised throughout Europe and has the enthusiastic support of the European Commission. It is considered to be a model of European harmonisation in the field of the protection of children.” (“About PEGI? What are ratings”, 2015)
In Table 2 below the ten most frequently mentioned games in the sample are listed. In addition the PEGI rating for each game is given.

Table 2 Most frequently mentioned games in the sample.

<table>
<thead>
<tr>
<th>Game Title</th>
<th>Frequency mentioned</th>
<th>% of total games</th>
<th>PEGI rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minecraft</td>
<td>187</td>
<td>14.1%</td>
<td>7: The content of this game is suitable for persons aged 7 years and over only</td>
</tr>
<tr>
<td>Fifa 14</td>
<td>68</td>
<td>5.1%</td>
<td>3: The content of this game is suitable for all persons.</td>
</tr>
<tr>
<td>Fifa 15</td>
<td>67</td>
<td>5.1%</td>
<td>3: The content of this game is suitable for all persons.</td>
</tr>
<tr>
<td>Grand Theft Auto 5</td>
<td>54</td>
<td>4.1%</td>
<td>18: The content of this game is suitable for persons aged 18 years and over only</td>
</tr>
<tr>
<td>Fifa (version not specified)</td>
<td>40</td>
<td>3%</td>
<td>3: The content of this game is suitable for all persons.</td>
</tr>
<tr>
<td>Call of Duty (version not specified)</td>
<td>29</td>
<td>2.2%</td>
<td>16: The content of this game is suitable for persons aged 16 years and over only</td>
</tr>
<tr>
<td>Call of Duty Ghosts</td>
<td>25</td>
<td>1.9%</td>
<td>16: The content of this game is suitable for persons aged 16 years and over only</td>
</tr>
<tr>
<td>Subway Surfers</td>
<td>21</td>
<td>1.6%</td>
<td>3: The content of this game is suitable for all persons.</td>
</tr>
<tr>
<td>Flappy Bird</td>
<td>16</td>
<td>1.2%</td>
<td>3: The content of this game is suitable for all persons.</td>
</tr>
<tr>
<td>Candy Crush</td>
<td>15</td>
<td>1.1%</td>
<td>3: The content of this game is suitable for all persons.</td>
</tr>
</tbody>
</table>

The primary focus of the present study is on prosocial video game use. It is interesting to note that the three most popular games in Table 2 contain little or no violence. *Minecraft* and *Fifa* can also be played cooperatively. However, given that
the age range of participants in this sample was 9 to 15 years, it also of concern that games given PEGI ratings of 16 and 18 such as *Grand Theft Auto V* and *Call of Duty* are also listed in the top ten most mentioned games in the sample.

In the third question in section A of the Computer/Video Game Habits Questionnaire participants were asked the following question: “What age did you start playing computer/video games?” The number of participants who completed this item was 498, therefore there were 40 missing items. As these missing items were not being used for inferential statistics, missing data was given a value of -.999 and excluded from the descriptive statistics that were generated in SPSS 20. The age participants started playing video games ranged from 4 to 13 years (\(M=6.86\) years; \(SD=1.94\) years). Figure 8 below gives information in relation to the age participants started playing computer/video games.

![Figure 8](image_url)

*Figure 8 The age participants started playing video games*
3.3.1.4 Prosocial behaviour (teacher evaluation)

The Strengths and Difficulties Questionnaire (SDQ) (Teacher version, Prosocial Behaviour Subscale) (Goodman, 1997). This is a 5 item measure with statements relating to prosocial behaviour. The class teacher completed one questionnaire for each participant.

Scoring: Teachers were given the following instructions: Please put a tick in the box which most accurately describes your student. An example of an item from this questionnaire is Item 3: Helpful if someone is hurt, upset or feeling ill. Teachers were given a choice of three responses: Not True, Somewhat True, Certainly True. These responses were coded 0, 1 and 2 respectively.

Reliability: Cronbach’s alpha of .89 was obtained as a measure of internal reliability. This is an acceptable level of internal reliability above 0.70.

3.4 Data Collection

3.4.1 Ethics

Ethical approval for this project was received on 14th November 2013 from the University College Dublin Human Research Ethics Committee (See Appendix D). Parents/guardians were required to give written consent before their child could participate in the study. Participants were also asked to give their assent by signing an assent form on the day of data collection.

The following procedure was also put in place to deal with any participant who might become distressed as a result of taking part in this study. The participants were informed that they could withdraw before submitting the questions on each task. If a participant became distressed the class teacher would be informed. The participants were given an opportunity to ask the researcher questions about the tasks they had completed during a debriefing session. The risk involved in participating in this study was assessed to be no greater than what is addressed in the Irish curriculum based on inspection of the Social, Personal and Health Education Teacher Guidelines (Government of Ireland, 1999).
3.4.2 Pilot study

Data were piloted with nine children and adolescents aged 8-15 years in March 2014. Participants completed the questionnaires in 20-30 minutes depending on age. A glossary of potentially difficult phrases in questionnaires was developed as a result of this piloting process.

3.4.3 Target sample

A list of 16 possible schools was created in November 2013. 12 schools were prioritised on this list. Letters were sent to school principals in January 2014 requesting participation in the study. Data collection took place in one school in March 2014, while data collection took place in a second school in May 2014. Reminder letters were sent to eight school principals in June and September 2014. Data collection took place in the remaining eight schools from October to December 2014. (See Appendix D)

3.4.4 Response rates

Response rates were calculated for participants in each of the ten schools. For schools, response rates were based on the percentage of students whose parents/guardians were contacted and then subsequently completed the questionnaire.

As can be seen in Table 3 a total of 1,042 information sheets with consent forms for parents/guardians were sent to the ten participating schools between March and November 2014. There were 538 participants in the final sample, therefore the response rate was 52%. The highest response rate was from School 7 with a response rate of 83% and the lowest response rate was from School 10 with a response rate of 17%. Although the school with the lowest response rate was a (designated) disadvantaged school, there was very little difference in response rates between disadvantaged and non-disadvantaged schools in the final sample (See Table 4).
Table 3 Response rates for participants in each school

<table>
<thead>
<tr>
<th>School number 1</th>
<th>Total number of information sheets</th>
<th>Total number of participants</th>
<th>Participation rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>School number 2</td>
<td>50</td>
<td>17</td>
<td>34</td>
</tr>
<tr>
<td>School number 3</td>
<td>138</td>
<td>106</td>
<td>77</td>
</tr>
<tr>
<td>School number 4</td>
<td>139</td>
<td>81</td>
<td>58</td>
</tr>
<tr>
<td>School number 5</td>
<td>81</td>
<td>65</td>
<td>80</td>
</tr>
<tr>
<td>School number 6</td>
<td>60</td>
<td>32</td>
<td>53</td>
</tr>
<tr>
<td>School number 7</td>
<td>58</td>
<td>48</td>
<td>83</td>
</tr>
<tr>
<td>School number 8</td>
<td>130</td>
<td>58</td>
<td>45</td>
</tr>
<tr>
<td>School number 9</td>
<td>115</td>
<td>33</td>
<td>29</td>
</tr>
<tr>
<td>School number 10</td>
<td>82</td>
<td>14</td>
<td>17</td>
</tr>
<tr>
<td>Overall sample</td>
<td>1,042</td>
<td>538</td>
<td>52</td>
</tr>
</tbody>
</table>

7 Schools in italics are disadvantaged schools.
Table 4 Response rates for participants in disadvantaged and non-disadvantaged schools

<table>
<thead>
<tr>
<th>School type</th>
<th>Total number of information sheets</th>
<th>Total number of participants</th>
<th>Participation rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disadvantaged</td>
<td>443</td>
<td>218</td>
<td>49</td>
</tr>
<tr>
<td>Non-disadvantaged</td>
<td>599</td>
<td>320</td>
<td>53</td>
</tr>
</tbody>
</table>

The response rates for the prosocial behaviour questionnaires completed by teachers was 97%. This response rate was based on the amount of teachers who completed a set of questionnaires after being given a copy by the researcher.

In the case of primary schools questionnaires were distributed to class teachers on the day of data collection. In relation to post-primary schools a set of questionnaires was given to the school principal who subsequently asked head teachers to complete questionnaires in relation to students in each participating class. Each questionnaire contained a cover sheet with the following instructions: “Please complete the following information: Student’s name:________________________ The student will be given a unique identification number which will be recorded on the next page. This page will then be destroyed to ensure confidentiality.” (See Appendix A) After collecting these questionnaires the researcher recorded each participant’s identification number on the page containing the teachers’ ratings of prosocial behaviour and then destroyed the cover page with the participant’s name.

Finally, the response rate for the measure of SES was based on the number of parents/guardians of participants who recorded their occupation, or occupations, on the information sheet provided (See Appendix D). The response rate for the measure of SES was 75%.

3.5 Data Analysis

Data were analysed on SPSS 20. Descriptive and inferential statistical analyses were carried out. The following statistical tests were used: Pearson Product Moment Correlations, multiple linear regression and factor analysis.
4. Results

4.1 Data management

The data analysed for this study were scores on four different measures. The measures were The Empathic Attitudes Questionnaire (EAQ) (Funk, Fox, Chan & Curtiss, 2008), The Prosocial Orientation Questionnaire (POQ) (Cheung, Ma & Shek, 1998), The Computer/Video Game Habits Questionnaire (Prot et al, 2014) and The Strengths and Difficulties Questionnaire (SDQ) (Teacher version) (Prosocial Subscale) (Goodman, 1997). In addition the socio-economic status (SES) of participants was measured by gathering data on the occupational status of parents/guardians. SES was calculated on a scale of 1-7 using an Irish census based social class scale (O'Hare, Whelan & Cummins, 1991).

Data were entered manually and totalled using the compute variable function in SPSS 20. In relation to missing data three separate strategies were used.

Firstly, in relation to the EAQ and POQ missing values were left blank. After all the data were entered the multiple imputation function was used in SPSS 20 to impute missing values. There were 538 participants in the present study. In relation to the EAQ there were missing values for 37 cases, while in relation to the POQ, there were missing values for 162 cases. The POQ contains 40 items. Therefore the 538 participants were asked to complete a total of 21,520 items. 323 of these items were missing, therefore 1.5% of the items were missing. As these items were spread over 162 cases, listwise deletion would have excluded 162 cases in the multiple linear regression. The EAQ contains 16 items. Therefore the 538 participants were asked to complete a total of 8,608 items. 66 of these items were missing, therefore 0.77% of the data were missing. As these items were spread over 37 cases, listwise deletion would have excluded these 37 cases in the multiple linear regression.

Multiple value imputation was used for these missing cases as the missing values from these cases were “Missing at Random” (MAR). This generated five additional versions of the dataset in which missing values were replaced by imputed values. These five versions of the dataset were labelled Imputations 1 to 5 by SPSS 20. Imputation 1 was then used in data analysis.
Secondly, a different strategy was used in relation to missing data in the Computer/Video Game Habits Questionnaire (Prot et al., 2014). The majority of the missing values in this questionnaire were not MAR. This was due to two factors. Participants who did not play video games were instructed to leave the entire questionnaire blank. In addition, participants were asked to name and rate the three video games they played most often in order of frequency. A number of participants listed one or two games, therefore leaving sections of the questionnaire blank. Missing values in this instance had been conferred with particular meanings, that is either ‘no video game play’ or ‘participant listed one or two games instead of the requested three games’. Therefore values that were left blank were given a value of 0 if they related to the number of hours played and a value of -.999 if they related to information about video games.

However, there were a small number of missing values in the Computer/Game Habits Questionnaire (Prot et al., 2014) that were MAR. In relation to prosocial video game use there were 15 missing cases due to missing values, while in relation to violent video game use there were 21 missing cases due to missing values that met this criteria. These missing values related to participants who played video games but had omitted an item rating the game’s content.

These values were inputted by the researcher using knowledge of the game’s content. ‘Prior knowledge’ is a strategy used to input missing data in situations in which a researcher has sufficient knowledge to input missing values (Tabachnick & Fidell, 2014). For example, one participant listed Minecraft and omitted item 3 (“How often do you shoot or kill creatures in this game?”). Firstly, the researcher examined the other item measuring violent game play and then the two prosocial items. If the participant rated item 4 (“How often do you shoot or kill other players in this game?”) as ‘Often’ or ‘Always’, it could be inferred that the participant was playing the game in ‘survival mode’ (“Survival”, 2015). Violent behaviour occurs in this ‘mode’ of Minecraft. Therefore a similar rating to item 4 could be inputted for the missing item 3. Alongside this strategy, other cases in which the same game was rated were examined. In addition video clips of gameplay were watched by the researcher. By using knowledge of the game’s content the ratings for missing items were inferred.
There were two cases which did not match these criteria. In one case the participant did not give any prosocial ratings for two of the three named games. Therefore it was difficult to infer possible responses. In another case the participant had written “don’t know” beside the blank response. Missing items were not replaced with inferred values in these two cases.

Finally missing values for the SES variable were inputted using mean substitution. A mean of 5.25 was inputted into the data set. This corresponded approximately to Social Class 3, which was coded as 5. These values were not MAR as it was difficult to ascertain if parents/guardians did not see this item on the information sheet or decided not to disclose this information. A total of 133 parents/guardians out of the 538 participants did not disclose or omitted to disclose their occupations on the information sheet, which meant that 24.7% of the SES data was missing. Some authors caution against the use of mean substitution when there are a large percentage of missing cases (Tabacknick & Fidell, 2014). However for the purposes of multiple linear regression listwise deletion would have reduced the number of cases substantially.

Regarding the SDQ, there were missing items for 17 participants. These 17 cases were excluded from data analysis. The majority of the missing cases were due to teachers omitting to complete the questionnaire in relation to particular students, while a small number of cases were excluded due to the teacher submitting an incomplete questionnaire. In addition, the variable Prosocial behaviour (teacher evaluation) was primarily used in this study to validate participants’ self-reports of prosocial behaviour. As this variable was not being used in the multiple linear regression it was not necessary to increase the number of cases.

4.2 Descriptive statistics

Data were inspected for normality to decide if it was possible to use parametric statistics. Table 5 below indicates the skewness and kurtosis of each distribution.

In a completely normal distribution skewness and kurtosis values would be 0. When skewness values are positive, this indicates that scores are grouped to the left of the distribution at the low values and there is positive skew. Conversely, when skewness values are negative, this indicates that scores are grouped to the right of the
distribution at the high values and there is negative skew. Positive kurtosis occurs when the distribution has a high peak in the centre. Whereas kurtosis values below 0 in a distribution signify a flat distribution with a large number of extreme cases (Tabachnick & Fidell, 2014).

However, according to Tabachnick and Fidell (2014) once samples size are reasonably large skewness will not “make a substantive difference in the analysis” (Tabachnick and Fidell, 2014, p.114). In addition the authors note that while kurtosis can cause the variance to be underestimated, large samples above 200 result in lessening the risk of this occurring. In the present study, the total sample size is 538, therefore this risk has been reduced (Tabachnick & Fidell, 2014).

Table 5 Skewness and kurtosis values of the main continuous variables of interest

<table>
<thead>
<tr>
<th>Variable</th>
<th>Skewness</th>
<th>Standard error (Skewness)</th>
<th>Kurtosis</th>
<th>Standard error (Kurtosis)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>.649</td>
<td>.105</td>
<td>-.186</td>
<td>.210</td>
</tr>
<tr>
<td>SES</td>
<td>-1.211</td>
<td>.105</td>
<td>1.723</td>
<td>.210</td>
</tr>
<tr>
<td>Prosocial video game use</td>
<td>4.278</td>
<td>.106</td>
<td>27.204</td>
<td>.211</td>
</tr>
<tr>
<td>Violent video game use</td>
<td>4.696</td>
<td>.106</td>
<td>32.907</td>
<td>.211</td>
</tr>
<tr>
<td>Weekly game play</td>
<td>2.778</td>
<td>.105</td>
<td>9.915</td>
<td>.210</td>
</tr>
<tr>
<td>Empathy</td>
<td>-.694</td>
<td>.105</td>
<td>.816</td>
<td>.210</td>
</tr>
<tr>
<td>Helping behaviour</td>
<td>-.694</td>
<td>.106</td>
<td>1.323</td>
<td>.212</td>
</tr>
<tr>
<td>Cooperation and Sharing</td>
<td>-.430</td>
<td>.105</td>
<td>.340</td>
<td>.210</td>
</tr>
<tr>
<td>Affective relationships</td>
<td>-.782</td>
<td>.105</td>
<td>.675</td>
<td>.210</td>
</tr>
<tr>
<td>Normative behaviour</td>
<td>-.378</td>
<td>.105</td>
<td>-.351</td>
<td>.210</td>
</tr>
<tr>
<td>Prosocial behaviour (teacher evaluation)</td>
<td>-1.126</td>
<td>.107</td>
<td>.418</td>
<td>.214</td>
</tr>
</tbody>
</table>
(See appendix E for histograms illustrating skewness and kurtosis.)

Table 6 displays mean scores and standard deviations for the main scales of interest. The majority of the mean scores for the variables measuring empathy and prosocial behaviour did not approach the maximum value, therefore avoiding the possibility of ceiling effects. For example the maximum possible score for the CEAQ was 32 whereas the mean score was 21.75. The only exception was the teacher measure of prosocial behaviour (The SDQ (Teacher version, Prosocial subscale)). In this case the maximum possible score was 10 and the mean score in the current sample was 8.23. In normative data on the SDQ (Teacher version, Prosocial subscale) from a sample of 910 7-17 year old Australian youth the mean score for the same measure was 7.8. Therefore the scores on the SDQ from the sample in the present study are consistent with norms from another country (Mellor, 2005). It should also be noted that the mean score for weekly game play is consistent with international research which found that the average amount of weekly game play for 8-18 year olds in the United States was 10.5 hours (Rideout, Foehr & Roberts, 2010).
Table 6 Mean scores and standard deviations for main scales of interest

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Socio-economic status</td>
<td>538</td>
<td>5.25</td>
<td>1.33</td>
</tr>
<tr>
<td>Prosocial video game use</td>
<td>532</td>
<td>28.99</td>
<td>48.08</td>
</tr>
<tr>
<td>Violent video game use</td>
<td>532</td>
<td>23.18</td>
<td>45.96</td>
</tr>
<tr>
<td>Weekly game play</td>
<td>538</td>
<td>9.13</td>
<td>11.06</td>
</tr>
<tr>
<td>Empathy</td>
<td>537</td>
<td>21.75</td>
<td>5.08</td>
</tr>
<tr>
<td>Helping behaviour</td>
<td>530</td>
<td>34.55</td>
<td>3.66</td>
</tr>
<tr>
<td>Co-operation and sharing</td>
<td>537</td>
<td>23.15</td>
<td>2.55</td>
</tr>
<tr>
<td>Affective relationships</td>
<td>537</td>
<td>38.77</td>
<td>3.55</td>
</tr>
<tr>
<td>Normative behaviour</td>
<td>537</td>
<td>35.79</td>
<td>3.92</td>
</tr>
<tr>
<td>Prosocial behaviour (Teacher evaluation)</td>
<td>521</td>
<td>8.23</td>
<td>2.24</td>
</tr>
</tbody>
</table>

4.3 Bivariate correlations between main variables of interest

Pearson’s Product Moment correlations revealed that prosocial video game use was positively associated with violent video game use ($r=.75$, $p<.001$) and weekly game play ($r=.85$, $p<.001$). Pearson’s Product Moment correlations revealed that violent video game use was positively correlated with weekly game play ($r=.85$, $p<.001$) (See Table 7). Using Cohen’s (1988) guidelines for assessing effect size these correlations can be described as large. Multicollinearity is a problem that occurs within a correlation matrix when the correlation between two variables is too high. This would imply that the highly correlated variables that become predictors in a multiple linear regression are highly inter-related. In this case the individual predictors become redundant as the different inter-related predictors are measuring the same...
construct (Tabacnick & Fidell, 2014). Tests for multicollinearity in relation to each of the prosocial variables will be performed in section 4.4.

**Table 7** Bivariate correlations between variables measuring video game use

<table>
<thead>
<tr>
<th>Variable</th>
<th>1.</th>
<th>2.</th>
<th>3.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Prosocial video game use</td>
<td>-</td>
<td>.75**</td>
<td>.85**</td>
</tr>
<tr>
<td>2. Violent video game use</td>
<td>-</td>
<td>.85**</td>
<td></td>
</tr>
<tr>
<td>3. Weekly game play</td>
<td>-</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**p<.001**

(See Appendix F for Scatterplots in relation to Tables 7 and 8)

Pearson’s Product Moment correlations revealed that prosocial video game use was negatively associated with helping behaviour \( r=-.11, \ p<.05 \), normative behaviour \( r=-.12, \ p<.001 \), empathy \( r=-.10, \ p<.05 \) and teacher evaluations of prosocial behaviour \( r=-.11, \ p<.05 \). Using Cohen’s (1988) guidelines for assessing effect size these correlations can be described as small (See Table 8). These negative correlations between prosocial video game use and prosocial behaviours appear to contradict the predictions of the General Learning Model (GLM) (Gentile et al., 2009) which predicts a positive association between prosocial video game use and prosocial behaviour.

However as can be seen in Tables 16, 19, 20, 21 and 22, prosocial video game use emerged as a significant predictor of tendency to cooperate and share (Model 2), tendency to maintain positive affective relationships and empathy (Models 1 and 2) in a multiple linear regression. It is possible that this is a suppression effect (Tzelgov & Henik, 1991). The issue of suppression will discussed in Chapter 5.

Pearson’s Product Moment correlations revealed that violent video game use was negatively associated with helping behaviour \( r=-.16, \ p<.001 \), cooperation and sharing \( r=-.16, \ p<.001 \), affective relationships \( r=-.16, \ p<.001 \), normative behaviour \( r=-.21, \ p<.001 \), empathy \( r=-.22, \ p<.001 \) and teacher evaluations of prosocial behaviour \( r=-.16, \ p<.001 \) (See Table 8). Using Cohen’s (1988) guidelines for assessing effect size these correlations can be described as small.
Pearson’s Product Moment correlations revealed that weekly gameplay was negatively associated with helping behaviour ($r=-.17, p<.001$), cooperation and sharing ($r=-.14, p<.001$), affective relationships ($r=-.14, p<.001$), normative behaviour ($r=-.17, p<.001$), empathy ($r=-.21, p<.001$) and teacher evaluations of prosocial behaviour ($r=-.14, p<.001$).

Table 8 Bivariate correlations between video game use and prosocial behaviours

<table>
<thead>
<tr>
<th>Variable</th>
<th>Helping behaviour</th>
<th>Cooperation and sharing</th>
<th>Affective relationships</th>
<th>Normative behaviour</th>
<th>Empathy</th>
<th>Prosocial Behaviour (teacher)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prosocial video game use</td>
<td>-.11*</td>
<td>-.07</td>
<td>-.05</td>
<td>-.12**</td>
<td>-.10*</td>
<td>-.11*</td>
</tr>
<tr>
<td>Violent video game use</td>
<td>-.16**</td>
<td>-.16**</td>
<td>-.16**</td>
<td>-.21**</td>
<td>-.22**</td>
<td>-.16**</td>
</tr>
<tr>
<td>Weekly gameplay</td>
<td>-.17**</td>
<td>-.14**</td>
<td>-.14**</td>
<td>-.17**</td>
<td>-.21**</td>
<td>-.14**</td>
</tr>
</tbody>
</table>

** $p<.001$  * $p<.05$

Pearson Product Moment correlations revealed that prosocial video game use was negatively associated with age ($r=-.14, p<.001$), gender ($r=-.22, p<.001$), school type ($r=-.29, p<.001$) and SES ($r=-.21, p<.001$). Pearson Product Moment correlations revealed that violent video game use was negatively associated with age ($r=-.13, p<.001$), gender ($r=-.23, p<.001$), school type ($r=-.28, p<.001$) and SES ($r=-.23, p<.001$). Pearson Product Moment correlations revealed that weekly gameplay was negatively associated with age ($r=-.14, p<.001$), gender ($r=-.25, p<.001$), school type ($r=-.32, p<.001$) and SES ($r=-.27, p<.001$). Using Cohen’s (1988) guidelines for assessing effect size these correlations can be described as small (See Table 9).
Table 9 Bivariate correlations between video game use and sociodemographic variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Age</th>
<th>Gender</th>
<th>School</th>
<th>SES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prosocial video game use</td>
<td>-.14**</td>
<td>-.22**</td>
<td>-.29**</td>
<td>-.21**</td>
</tr>
<tr>
<td>Violent video game use</td>
<td>-.13**</td>
<td>-.23**</td>
<td>-.28**</td>
<td>-.23**</td>
</tr>
<tr>
<td>Weekly game play</td>
<td>-.14**</td>
<td>-.25**</td>
<td>-.32**</td>
<td>-.27**</td>
</tr>
</tbody>
</table>

** p<.001

Pearson’s Product Moment Correlations revealed that the teachers’ evaluation of prosocial behaviour was positively correlated with the participants’ self-report of helping behaviour (r=.20, p<.001), cooperation and sharing (r=.21, p<.001), affective relationships (r=.15, p<.001) and normative behaviour (r=.25, p<.001). Using Cohen’s (1988) guidelines for assessing effect size these correlations can be described as small (See Table 10).

Table 10 Bivariate correlations between participants’ self-report of prosocial behaviour and teachers’ evaluation of prosocial behaviour

<table>
<thead>
<tr>
<th>Variable</th>
<th>Prosocial behaviour (teacher evaluation)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Helping behaviour</td>
<td>.20**</td>
</tr>
<tr>
<td>Cooperation and sharing</td>
<td>.21**</td>
</tr>
<tr>
<td>Affective relationships</td>
<td>.15**</td>
</tr>
<tr>
<td>Normative behaviour</td>
<td>.25**</td>
</tr>
</tbody>
</table>

** p<.001

4.4 Analysis of the relationship between prosocial video game use and prosocial behaviours

In the following section the results of two regression models with different sets of theoretically relevant independent variables will be described in relation to five dependent variables measuring prosocial behaviours. In Model 1 prosocial video
game use will be regressed onto the following dependent variables: helping behaviour, co-operation and sharing, affective relationships, normative behaviour and empathy. The following socio-demographic independent variables will be controlled for in Model 1: age, gender, school status and SES. In addition violent video game use will be controlled for in Model 1. Therefore if a significant association emerges between prosocial video game use and a prosocial behaviour such as helping after controlling for other variables that could also explain some of the variance in helping, this finding would strengthen the generalizability of a prosocial video game effect. In Model 2 prosocial video game use will be regressed onto the same dependent variables as in Model 1. Weekly game play will controlled for alongside the independent variables from Model 1.

Therefore if prosocial video game use is significantly associated with any of the dependent variables in Model 2, this would further strengthen the generalizability of a prosocial video game effect, having controlling for another theoretically relevant independent variable.\(^8\) Tables 11 and 12 give details of the dependent and independent variables for each Model and information regarding the percentage of variance that the independent variables explain for each prosocial dependent variable.

Multicollinearity diagnostics were also carried out. Tolerance gives information regarding the amount of variability of each of the independent variables that is accounted for by other independent variables in the model. Very small values (e.g. less than .10) mean that there is a high multiple correlation with the other variables in the model. Another indicator of multicollinearity is the Variance Inflation Factor (VIF). In this case values above 10 are an indicator of multicollinearity (Tabachnick & Fidell, 1989).

---

\(^8\) The Familywise Error Rate (FWE) is the probability of making Type 1 errors when performing multiple hypothesis tests (Hochberg & Tamhane, 1987). According to the Bonferroni procedure the rate of significance should be divided by the number of tests in order to correct for the FWE. In the present study this would mean that if \(p<.05\) is the level of significance for one test, that \(p<.005\) would be the level of significance for ten tests. However, in conducting a number of multiple regressions to test a theory possible alternative explanations of the relationship between the dependent and predictor variable are already being controlled for by including other independent variables in the model. It could be argued that lowering the level of significance from \(p<.05\) to \(p<.005\) would be an unfair imposition in this context. Therefore in the present study the level of significance is set at \(p<.05\).
The Tolerance and VIF values in Tables 13-22 indicate that the assumption of multicollinearity has not been violated.

Table 11 Model summary of multiple linear regressions for prosocial behaviours (Model 1)

<table>
<thead>
<tr>
<th>Dependent variable</th>
<th>( R )</th>
<th>( R^2 )</th>
<th>Adjusted ( R^2 )</th>
<th>Std. error of the estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Helping</td>
<td>.283</td>
<td>.080</td>
<td>.069</td>
<td>3.529</td>
</tr>
<tr>
<td>Cooperation and sharing</td>
<td>.288</td>
<td>.083</td>
<td>.072</td>
<td>2.458</td>
</tr>
<tr>
<td>Normative behaviour</td>
<td>.269</td>
<td>.073</td>
<td>.062</td>
<td>3.794</td>
</tr>
<tr>
<td>Affective relationships</td>
<td>.303</td>
<td>.092</td>
<td>.082</td>
<td>3.400</td>
</tr>
<tr>
<td>Empathy</td>
<td>.413</td>
<td>.170</td>
<td>.161</td>
<td>4.658</td>
</tr>
</tbody>
</table>

Independent variables: Gender, age, school type, SES, violent video game use, prosocial video game use

Table 12 Model summary for multiple linear regressions for prosocial behaviours (Model 2)

<table>
<thead>
<tr>
<th>Dependent variable</th>
<th>( R )</th>
<th>( R^2 )</th>
<th>Adjusted ( R^2 )</th>
<th>Std. error of the estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Helping</td>
<td>.292</td>
<td>.085</td>
<td>.073</td>
<td>3.524</td>
</tr>
<tr>
<td>Cooperation and sharing</td>
<td>.294</td>
<td>.086</td>
<td>.074</td>
<td>2.456</td>
</tr>
<tr>
<td>Normative behaviour</td>
<td>.269</td>
<td>.073</td>
<td>.060</td>
<td>3.797</td>
</tr>
<tr>
<td>Affective relationships</td>
<td>.309</td>
<td>.096</td>
<td>.084</td>
<td>3.397</td>
</tr>
<tr>
<td>Empathy</td>
<td>.421</td>
<td>.177</td>
<td>.166</td>
<td>4.643</td>
</tr>
</tbody>
</table>

Independent variables: Gender, age, school type, SES, violent video game use, prosocial video game use, weekly game play
4.4.1 The relationship between prosocial video game use and helping behaviour

Regression Model 1:

The following independent variables were entered into a standard multiple linear regression: gender, age, school type (disadvantaged/non-disadvantaged), SES, violent video game use and prosocial video game use. The dependent variable was helping behaviour. Significant positive associations between the independent variables and the dependent variable would indicate more helping behaviour is associated with females, older children, non-disadvantaged schools, higher SES, higher levels of prosocial video game use and lower levels of violent video game use.

This regression model was significant ($F(6,518) = 7.506; p<.001; R^2=.08$). The value of $R^2$ indicates that approximately 8% of the variance in the dependent variable helping behaviour, can be attributed to the variance of the independent variables.

As can be seen from Table 13 gender ($\beta=.217, p<.001$) emerged as a significant positive predictor of helping behaviour in this model. Violent video game use ($\beta=-.153, p<.017$) emerged as a significant negative predictor of helping behaviour.
Table 13 Regression coefficients: Helping Behaviour (Model 1)

<table>
<thead>
<tr>
<th>Variable</th>
<th>β</th>
<th>t</th>
<th>p</th>
<th>Tolerance</th>
<th>VIF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>.217</td>
<td>4.926</td>
<td>.001</td>
<td>.918</td>
<td>1.090</td>
</tr>
<tr>
<td>Age</td>
<td>.053</td>
<td>1.220</td>
<td>.223</td>
<td>.953</td>
<td>1.050</td>
</tr>
<tr>
<td>School type</td>
<td>-.043</td>
<td>-.906</td>
<td>.365</td>
<td>.772</td>
<td>1.296</td>
</tr>
<tr>
<td>SES</td>
<td>.050</td>
<td>1.093</td>
<td>.275</td>
<td>.841</td>
<td>1.189</td>
</tr>
<tr>
<td>Violent video game use</td>
<td>-.153</td>
<td>-2.391</td>
<td>.017</td>
<td>.432</td>
<td>2.315</td>
</tr>
<tr>
<td>Prosocial video game use</td>
<td>.058</td>
<td>.910</td>
<td>.363</td>
<td>.430</td>
<td>2.327</td>
</tr>
</tbody>
</table>

Regression Model 2:

The following independent variables were entered into a standard multiple linear regression: gender, age, school type (disadvantaged/non-disadvantaged), SES, weekly game play, violent video game use and prosocial video game use. The dependent variable was helping behaviour. This regression model was significant ($F(7, 517) = 6.872; p < .001; R^2 = .085$). The value of $R^2$ indicates that approximately 8.5% of the variance in the dependent variable helping behaviour, can be attributed to the variance of the independent variables.

As can be seen from Table 14 gender ($\beta = .210, p < .001$) emerged as a significant positive predictor of helping behaviour in this model.

9 Gender (1=male; 2=female)
10 School type (1=disadvantaged; 2=non-disadvantaged)
11 SES(1=unemployed; 2=social class 6; 3=social class 5; 4=social class 4; 5=social class 3; 6=social class 2; 7=social class 1).
Table 14 Regression coefficients: Helping Behaviour (Model 2)

<table>
<thead>
<tr>
<th>Variable</th>
<th>$\beta$</th>
<th>$t$</th>
<th>$p$</th>
<th>Tolerance</th>
<th>VIF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>.210</td>
<td>4.766</td>
<td>.001</td>
<td>.910</td>
<td>1.098</td>
</tr>
<tr>
<td>Age</td>
<td>.051</td>
<td>1.181</td>
<td>.238</td>
<td>.951</td>
<td>1.050</td>
</tr>
<tr>
<td>School Type</td>
<td>-.051</td>
<td>-1.054</td>
<td>.292</td>
<td>.766</td>
<td>1.306</td>
</tr>
<tr>
<td>SES</td>
<td>.043</td>
<td>.926</td>
<td>.355</td>
<td>.834</td>
<td>1.200</td>
</tr>
<tr>
<td>Weekly game play</td>
<td>-.174</td>
<td>-1.705</td>
<td>.089</td>
<td>.169</td>
<td>5.918</td>
</tr>
<tr>
<td>Violent video game use</td>
<td>-.068</td>
<td>-.843</td>
<td>.400</td>
<td>.269</td>
<td>3.719</td>
</tr>
<tr>
<td>Prosocial video game use</td>
<td>.137</td>
<td>1.736</td>
<td>.083</td>
<td>.283</td>
<td>3.538</td>
</tr>
</tbody>
</table>

Multicollinearity

4.4.2 The relationship between prosocial video game use and cooperation and sharing

Regression Model 1

The following independent variables were entered into a standard multiple linear regression: gender, age, school type (disadvantaged/non-disadvantaged), SES, violent video game use and prosocial video game use. The dependent variable was cooperation and sharing. This regression model was significant ($F(6,524)=7.892$; $p<.001$; $R^2=.083$). The value of $R^2$ indicates that approximately 8.3% of the variance in the dependent variable cooperation and sharing, can be attributed to the variance of the independent variables.

As can be seen from Table 15 gender ($\beta=.196$, $p<.001$) emerged as a significant positive predictor of cooperation and sharing in this model. Age ($\beta=-.147$, $p<.001$) and violent video game use ($\beta=-.227$, $p<.001$) emerged as significant negative
predictors of co-operation and sharing. The association between prosocial video game use and cooperation and sharing approached significance ($\beta=.124$, $p<.052$).

*Table 15 Regression coefficients: Cooperation and sharing (Model 1)*

<table>
<thead>
<tr>
<th>Variable</th>
<th>$\beta$</th>
<th>$t$</th>
<th>$p$</th>
<th>Tolerance</th>
<th>VIF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>.196</td>
<td>4.486</td>
<td>.001</td>
<td>.918</td>
<td>1.090</td>
</tr>
<tr>
<td>Age</td>
<td>-.147</td>
<td>-3.420</td>
<td>.001</td>
<td>.953</td>
<td>1.050</td>
</tr>
<tr>
<td>School type</td>
<td>-.013</td>
<td>-.283</td>
<td>.777</td>
<td>.772</td>
<td>1.296</td>
</tr>
<tr>
<td>SES</td>
<td>.031</td>
<td>.688</td>
<td>.491</td>
<td>.841</td>
<td>1.189</td>
</tr>
<tr>
<td>Violent video game use</td>
<td>-.227</td>
<td>-3.567</td>
<td>.001</td>
<td>.432</td>
<td>2.315</td>
</tr>
<tr>
<td>Prosocial video game use</td>
<td>.124</td>
<td>1.950</td>
<td>.052</td>
<td>.430</td>
<td>2.327</td>
</tr>
</tbody>
</table>

Regression model 2

The following independent variables were entered into a standard multiple linear regression: gender, age, school type (disadvantaged/non-disadvantaged), SES, weekly game play, violent video game use and prosocial video game use. The dependent variable was cooperation and sharing. This regression model was significant ($F(7,523)=7.068; p<.001; R^2=.086$). The value of $R^2$ indicates that approximately 8.6% of the variance in the dependent variable cooperation and sharing, can be attributed to the variance of the independent variables.

As can be seen from Table 16 gender ($\beta=.190$, $p<.001$) and prosocial video game use ($\beta=.190$, $p<.016$) emerged as a significant positive predictor of cooperation and sharing in this model. Age ($\beta=-.148$, $p<.001$) emerged as a significant negative predictor of cooperation and sharing. The association between violent video game use ($\beta=-.157$, $p<.053$) and cooperation and sharing approached significance.
Table 16 Regression coefficients: Cooperation and sharing (Model 2)

<table>
<thead>
<tr>
<th>Variable</th>
<th>β</th>
<th>t</th>
<th>p</th>
<th>Tolerance</th>
<th>VIF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>.190</td>
<td>4.348</td>
<td>.001</td>
<td>.910</td>
<td>1.098</td>
</tr>
<tr>
<td>Age</td>
<td>-.148</td>
<td>-3.456</td>
<td>.001</td>
<td>.952</td>
<td>1.050</td>
</tr>
<tr>
<td>School Type</td>
<td>-.019</td>
<td>-.407</td>
<td>.684</td>
<td>.766</td>
<td>1.306</td>
</tr>
<tr>
<td>SES</td>
<td>.025</td>
<td>.549</td>
<td>.583</td>
<td>.834</td>
<td>1.200</td>
</tr>
<tr>
<td>Weekly game play</td>
<td>-.145</td>
<td>-1.424</td>
<td>.155</td>
<td>.169</td>
<td>5.918</td>
</tr>
<tr>
<td>Violent video game use</td>
<td>-.157</td>
<td>-1.942</td>
<td>.053</td>
<td>.269</td>
<td>3.719</td>
</tr>
<tr>
<td>Prosocial video game use</td>
<td>.190</td>
<td>2.416</td>
<td>.016</td>
<td>.283</td>
<td>3.538</td>
</tr>
</tbody>
</table>

4.4.3 The relationship between video game use and normative behaviour

Regression Model 1

The following independent variables were entered into a standard multiple linear regression: gender, age, school type (disadvantaged/non-disadvantaged), SES, violent video game use and prosocial video game use. The dependent variable was normative behaviour. This regression model was significant ($F(6,524)=6.883; p<.001; R^2=.073$). The value of $R^2$ indicates that approximately 7.3% of the variance in the dependent variable, can be attributed to the variance of the independent variables. As can be seen from Table 17 gender ($β=.149, p<.001$) emerged as a significant positive predictor of normative behaviour in this model. Violent video game use ($β=-.242, p<.001$) emerged as a significant negative predictor of normative behaviour.
Table 17 Regression coefficients: Normative behaviour (Model 1)

<table>
<thead>
<tr>
<th>Variable</th>
<th>( \beta )</th>
<th>( t )</th>
<th>( p )</th>
<th>Tolerance</th>
<th>VIF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>.149</td>
<td>3.402</td>
<td>.001</td>
<td>.918</td>
<td>1.090</td>
</tr>
<tr>
<td>Age</td>
<td>-.060</td>
<td>-1.387</td>
<td>.166</td>
<td>.953</td>
<td>1.050</td>
</tr>
<tr>
<td>School type</td>
<td>-.019</td>
<td>-.401</td>
<td>.688</td>
<td>.772</td>
<td>1.296</td>
</tr>
<tr>
<td>SES</td>
<td>.078</td>
<td>1.696</td>
<td>.090</td>
<td>.841</td>
<td>1.189</td>
</tr>
<tr>
<td>Violent video game use</td>
<td>-.242</td>
<td>-3.777</td>
<td>.001</td>
<td>.432</td>
<td>2.315</td>
</tr>
<tr>
<td>Prosocial video game use</td>
<td>.091</td>
<td>1.425</td>
<td>.155</td>
<td>.430</td>
<td>2.327</td>
</tr>
</tbody>
</table>

Regression Model 2

The following independent variables were entered into a standard multiple linear regression: gender, age, school type (disadvantaged/non-disadvantaged), SES, weekly game play, violent video game use and prosocial video game use. The dependent variable was normative behaviour. This regression model was significant \((F(7,523)=5.846; p<.001; R^2=.073)\). The value of \(R^2\) indicates that approximately 7.3% of the variance in the dependent variable normative behaviour, can be attributed to the variance of the independent variables.

As can be seen from Table 18 gender (\( \beta = .150, p<.001 \)) emerged as a significant positive predictor of normative behaviour in this model. While violent video game use (\( \beta = -.242, p<.001 \)) emerged as a significant negative predictor of normative behaviour.
Table 18 Regression coefficients: Normative behaviour (Model 2)

<table>
<thead>
<tr>
<th>Variable</th>
<th>β</th>
<th>t</th>
<th>p</th>
<th>Tolerance</th>
<th>VIF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>.150</td>
<td>3.388</td>
<td>.001</td>
<td>.910</td>
<td>1.098</td>
</tr>
<tr>
<td>Age</td>
<td>-.060</td>
<td>-1.384</td>
<td>.167</td>
<td>.952</td>
<td>1.050</td>
</tr>
<tr>
<td>School Type</td>
<td>-.019</td>
<td>-.397</td>
<td>.692</td>
<td>.766</td>
<td>1.306</td>
</tr>
<tr>
<td>SES</td>
<td>.078</td>
<td>1.690</td>
<td>.092</td>
<td>.834</td>
<td>1.200</td>
</tr>
<tr>
<td>Weekly game play</td>
<td>.003</td>
<td>.029</td>
<td>.977</td>
<td>.169</td>
<td>5.918</td>
</tr>
<tr>
<td>Violent video game use</td>
<td>-.243</td>
<td>-2.995</td>
<td>.003</td>
<td>.269</td>
<td>3.719</td>
</tr>
<tr>
<td>Prosocial video game use</td>
<td>.090</td>
<td>1.138</td>
<td>.256</td>
<td>.283</td>
<td>3.538</td>
</tr>
</tbody>
</table>

4.4.4 The relationship between video game use and affective relationships

Regression Model 1

The following independent variables were entered into a standard multiple linear regression: gender, age, school type (disadvantaged/non-disadvantaged), SES, violent video game use and prosocial video game use. The dependent variable was affective relationships. This regression model was significant ($F(6,524)=8.850; p<.001; R^2=.092$). The value of $R^2$ indicates that approximately 9.2% of the variance in the dependent variable affective relationships, can be attributed to the variance of the independent variables.

As can be seen from Table 19 gender ($β=.132, p<.002$), SES ($β=.146, p<.001$) and prosocial video game use ($β=.156, p<.014$) emerged as significant positive predictors of the tendency to maintain positive affective relationships in this model. While age
(β=-.166, p<.001) and violent video game use (β=-.261, p<.001) emerged as significant negative predictors of tendency to maintain positive affective relationships.

Table 19 Regression coefficients: Affective relationships (Model 1)

<table>
<thead>
<tr>
<th>Variable</th>
<th>β</th>
<th>t</th>
<th>p</th>
<th>Tolerance</th>
<th>VIF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>.132</td>
<td>3.047</td>
<td>.002</td>
<td>.918</td>
<td>1.090</td>
</tr>
<tr>
<td>Age</td>
<td>-.166</td>
<td>-3.885</td>
<td>.001</td>
<td>.953</td>
<td>1.050</td>
</tr>
<tr>
<td>School type</td>
<td>-.063</td>
<td>-1.330</td>
<td>.184</td>
<td>.772</td>
<td>1.296</td>
</tr>
<tr>
<td>SES</td>
<td>.146</td>
<td>3.224</td>
<td>.001</td>
<td>.841</td>
<td>1.189</td>
</tr>
<tr>
<td>Violent video game use</td>
<td>-.261</td>
<td>-4.120</td>
<td>.001</td>
<td>.432</td>
<td>2.315</td>
</tr>
<tr>
<td>Prosocial video game use</td>
<td>.156</td>
<td>2.458</td>
<td>.014</td>
<td>.430</td>
<td>2.327</td>
</tr>
</tbody>
</table>

Regression Model 2

The following independent variables were entered into a standard multiple linear regression: gender, age, school type (disadvantaged/non-disadvantaged), SES, weekly game play, violent video game use and prosocial video game use. The dependent variable was affective relationships. This regression model was significant (F(7,523)=7.902; p<.001; R²=.096). The value of R² indicates that approximately 9.6% of the variance in the dependent variable affective relationships, can be attributed to the variance of the independent variables.

As can be seen from Table 20 gender (β=.127, p<.004), SES (β=.140, p<.002) and prosocial video game use (β=.222, p<.005) emerged as significant positive predictors of affective relationships in this model. While age (β=-.127, p<.001) and violent video game use (β=-.189, p<.019) emerged as significant negative predictors of affective relationships.
Table 20 Regression coefficients: affective relationships (Model 2)

<table>
<thead>
<tr>
<th>Variable</th>
<th>β</th>
<th>t</th>
<th>p</th>
<th>Tolerance</th>
<th>VIF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>.127</td>
<td>2.911</td>
<td>.004</td>
<td>.910</td>
<td>1.098</td>
</tr>
<tr>
<td>Age</td>
<td>-.167</td>
<td>-3.923</td>
<td>.001</td>
<td>.952</td>
<td>1.050</td>
</tr>
<tr>
<td>School Type</td>
<td>-.069</td>
<td>-1.454</td>
<td>.147</td>
<td>.766</td>
<td>1.306</td>
</tr>
<tr>
<td>SES</td>
<td>.140</td>
<td>3.073</td>
<td>.002</td>
<td>.834</td>
<td>1.200</td>
</tr>
<tr>
<td>Weekly game play</td>
<td>-.147</td>
<td>-1.451</td>
<td>.147</td>
<td>.169</td>
<td>5.918</td>
</tr>
<tr>
<td>Violent video game use</td>
<td>-.189</td>
<td>-2.363</td>
<td>.019</td>
<td>.269</td>
<td>3.719</td>
</tr>
<tr>
<td>Prosocial video game use</td>
<td>.222</td>
<td>2.845</td>
<td>.005</td>
<td>.283</td>
<td>3.538</td>
</tr>
</tbody>
</table>

4.4.5 The relationship between video game use and empathy

Regression Model 1

The following independent variables were entered into a standard multiple linear regression: gender, age, school type (disadvantaged/non-disadvantaged), SES, violent video game use and prosocial video game use. The dependent variable was empathy. This regression model was significant ($F(6,524)=17.916; p<.001$; $R^2=.170$). The value of $R^2$ indicates that approximately 17% of the variance in the dependent variable empathy, can be attributed to the variance of the independent variables.

As can be seen from Table 21 gender ($β=.324$, $p<.001$), school type ($β=.147$, $p<.001$) and prosocial video game use ($β=.216$, $p<.001$) emerged as a significant positive predictors of empathy in this model. Violent video game use ($β=-.252$, $p<.001$) emerged as a significant negative predictor of empathy.
Table 21 Regression coefficients: Empathy (Model 1)

<table>
<thead>
<tr>
<th>Variable</th>
<th>β</th>
<th>t</th>
<th>p</th>
<th>Tolerance</th>
<th>VIF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>.324</td>
<td>7.789</td>
<td>.001</td>
<td>.918</td>
<td>1.090</td>
</tr>
<tr>
<td>Age</td>
<td>.008</td>
<td>.203</td>
<td>.840</td>
<td>.953</td>
<td>1.050</td>
</tr>
<tr>
<td>School type</td>
<td>.147</td>
<td>3.238</td>
<td>.001</td>
<td>.772</td>
<td>1.296</td>
</tr>
<tr>
<td>SES</td>
<td>.055</td>
<td>1.263</td>
<td>.207</td>
<td>.841</td>
<td>1.189</td>
</tr>
<tr>
<td>Violent video game use</td>
<td>-.252</td>
<td>-4.161</td>
<td>.001</td>
<td>.432</td>
<td>2.315</td>
</tr>
<tr>
<td>Prosocial video game use</td>
<td>.216</td>
<td>3.565</td>
<td>.001</td>
<td>.430</td>
<td>2.327</td>
</tr>
</tbody>
</table>

Regression Model 2

The following independent variables were entered into a standard multiple linear regression: gender, age, school type (disadvantaged/non-disadvantaged), SES, weekly game play, violent video game use and prosocial video game use. The dependent variable was empathy. This regression model was significant ($F(7,523)=16.085; p<.001; R^2=.177$). The value of $R^2$ indicates that approximately 17.7% of the variance in the dependent variable empathy, can be attributed to the variance of the independent variables.

As can be seen from Table 22 gender ($β=.316$, $p<.001$), school type ($β=.138$, $p<.002$) and prosocial video game use ($β=.308$, $p<.001$) emerged as significant positive predictors of empathy in this model. Violent video game use ($β=-.153$, $p<.045$) and
weekly game play ($\beta=-.202$, $p<.036$) emerged as significant negative predictors of prosocial behaviour.

**Table 22 Regression coefficients: Empathy (Model 2)**

<table>
<thead>
<tr>
<th>Variable</th>
<th>$\beta$</th>
<th>$t$</th>
<th>$p$</th>
<th>Tolerance</th>
<th>VIF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
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<td>7.599</td>
<td>.001</td>
<td>.910</td>
<td>1.098</td>
</tr>
<tr>
<td>Age</td>
<td>.006</td>
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<td>.878</td>
<td>.952</td>
<td>1.050</td>
</tr>
<tr>
<td>School Type</td>
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<td>.002</td>
<td>.766</td>
<td>1.306</td>
</tr>
<tr>
<td>SES</td>
<td>.046</td>
<td>1.060</td>
<td>.290</td>
<td>.834</td>
<td>1.200</td>
</tr>
<tr>
<td>Weekly game play</td>
<td>-.202</td>
<td>-2.098</td>
<td>.036</td>
<td>.169</td>
<td>5.918</td>
</tr>
<tr>
<td>Violent video game use</td>
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<td>.045</td>
<td>.269</td>
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</tr>
<tr>
<td>Prosocial video game use</td>
<td>.308</td>
<td>4.127</td>
<td>.001</td>
<td>.283</td>
<td>3.538</td>
</tr>
</tbody>
</table>

**4.5 Factor analysis of the Prosocial Orientation Questionnaire (POQ)**

In order to examine the factorial structure of the POQ, a principal components analysis was carried out on all 40 items. As noted earlier there were 538 participants, however there were missing items for 162 participants. Therefore multiple value imputation was used given the large number of missing cases. The analysis was carried out using the dimension reduction/ factor analysis command in SPSS 20. A fixed number of four factors was selected to extract. Coefficients smaller than 0.3 were suppressed. Varimax rotation was applied. The four components explained 32.37% of the variance. The components did not load on to the four subscales of the POQ. For example in factor 1 one variable loaded on to Helping Behaviour (Item 9), three variables loaded on to Cooperation and Sharing (Items 1, 6 and 7), three
variables loaded on to affective relationships (Items 4, 6 and 7) and seven variables loaded on to normative behaviour (Items 1, 4, 5, 7, 8, 9 and 11). If the factor structure of the POQ was as was suggested by its authors (Cheung, Ma & Shek, 1998) the Helping Behaviour variables should all load on to Component 1, the Cooperation and Sharing variables should all load on to Component 2, the Affective relationship variables should all load onto Component 3 and the Normative Behaviour variables should all load onto Component 4. However in the present study this is clearly not the case (See Table 23).

Table 23 Principal Components Analysis of the Prosocial Orientation Questionnaire (POQ): Rotated Matrix of Variable Component Coefficients

<table>
<thead>
<tr>
<th>POQ variable</th>
<th>Component 1</th>
<th>Component 2</th>
<th>Component 3</th>
<th>Component 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Help Behav 1²</td>
<td>.62</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Help Behav 2</td>
<td>.62</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Help Behav 3</td>
<td></td>
<td>.56</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Help Behav 4</td>
<td></td>
<td>.43</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Help Behav 5</td>
<td>.51</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Help Behav 6</td>
<td>.56</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Help Behav 7</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Help Behav 8</td>
<td>.45</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Help Behav 9</td>
<td>.40</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Help Behav 10</td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>Help Behav 11</td>
<td>.49</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cooperation 1</td>
<td>.33</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Cooperation 2</td>
<td>.48</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Cooperation 3</td>
<td>.48</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

² Help Behav=Helping Behaviour subscale; Cooperation=Cooperation and sharing subscale; Affective=Affective relationships subscale; Norms=Normative Behaviour subscale.
<table>
<thead>
<tr>
<th>Cooperation 4</th>
<th>.40</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cooperation 5</td>
<td>.51</td>
</tr>
<tr>
<td>Cooperation 6</td>
<td>.62</td>
</tr>
<tr>
<td>Cooperation 7</td>
<td>.66</td>
</tr>
<tr>
<td>Affective 1</td>
<td>.67</td>
</tr>
<tr>
<td>Affective 2</td>
<td>.49</td>
</tr>
<tr>
<td>Affective 3</td>
<td>.49</td>
</tr>
<tr>
<td>Affective 4</td>
<td>-.35</td>
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<td>Affective 5</td>
<td>.42</td>
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<td>Affective 6</td>
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<td>Affective 7</td>
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<td>Affective 11</td>
<td>.67</td>
</tr>
<tr>
<td>Norms 1</td>
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<td>Norms 10</td>
<td>.35</td>
</tr>
<tr>
<td>Norms 11</td>
<td>-.48</td>
</tr>
</tbody>
</table>
5. Discussion

5.1 Summary of the overarching aim of the study

Previous researchers have studied the relationship between prosocial video game use in children and adolescents using correlational and longitudinal designs (Gentile et al., 2009; Prot et al., 2014). The present study partly replicated previous studies by using similar measures of prosocial behaviour and video game habits (Gentile et al., 2009; Prot et al., 2014). However the present study also extended previous studies by measuring prosocial behaviours such as the tendency to maintain friendly, sympathetic, affective relationships and the tendency to comply with social norms. In addition the present study extended previous studies by statistically controlling for confounding variables in the study of prosocial behaviour such as school type and socio-economic status (SES). In the following section the implications of the findings from the present study in relation to the overarching aim and the three related objectives will be discussed.

5.2 Discussion of findings

Overarching aim: to determine if there is a positive relationship between prosocial video game use and prosocial behaviour in Irish children and adolescents.

The findings in relation to the overarching aim indicate a positive and significant relationship between prosocial video game use and the following dependent variables: affective relationships and empathy (Models 1 and 2); cooperation and sharing (Model 2). These findings are consistent with previous research from the broader domain of prosocial television programmes which found a positive relationship between children viewing television programmes with prosocial messages and altruistic behaviour (Calvert & Kottler, 2003). In addition studies investigating the relationship between prosocial video game use and prosocial behaviour in children and adolescents have found a positive relationship between prosocial video game use and prosocial behaviour (Gentile et al., 2009; Prot et al., 2014). Previous correlational studies found that prosocial video game use was positively associated with co-operation, helping behaviour and empathy in children.
and adolescents (Gentile et al., 2009; Prot et al., 2014). These correlational studies did not measure normative behaviour or affective relationships.

Another unique aspect of the present study is the issue of suppression. One of the assumptions underlying multiple linear regression is that the independent variables are highly correlated with the dependent variable and have low correlations among themselves. However if an independent variable has a low correlation with the dependent variable and a high correlation with another independent variable and then is a significant variable in the multiple linear regression, suppression has occurred (Hinkle, Wiersma & Jurs, 1994).

In the present study prosocial and violent video game use were highly correlated with each other and had a low correlation or were not significantly associated with each of the dependent variables. As has been discussed earlier, prosocial and violent video game use were positively and negatively associated respectively with empathy and a variety of prosocial behaviours in the multiple linear regressions. Therefore it is possible that this is due to suppression.

Studies outside of the field of video game effects which have dealt with suppression will now be discussed and related to data from the present study. In a study investigating the relationship between strategies related to adjustment after a mastectomy, Orr (1986, 1987) found that seeking medical information about a mastectomy had a low negative correlation with adjustment. However in a multiple regression seeking information emerged as a positive predictor of adjustment. This is an example of negative suppression (Orr (1986,1987) as cited in Tzelgov & Henik, 1991).

Kline (2011) illustrates how negative suppression could occur using a hypothetical example. In Kline’s (2011) example the independent variables are amount of psychotherapy and degree of depression. The dependent variable is number of prior suicide attempts. In this example amount of psychotherapy and degree of depression are both positively correlated with number of prior suicide attempts. Therefore it may appear that psychotherapy is harmful due to its positive correlation with suicide attempts. However when both of these independent variables are entered into a
multiple linear regression amount of psychotherapy is negatively associated with amount of prior suicide attempts while degree of depression is positively associated with amount of prior suicide attempts. Kline (2011) notes that the positive correlation between amount of psychotherapy and suicide attempts is corrected in the Multiple Linear Regression when depression is controlled for as depressed people are more likely to be in psychotherapy and depressed people are also more likely to harm themselves.

In the present study prosocial video game use was negatively associated with empathy in a bivariate correlation. Nevertheless, prosocial video game use was positively associated with empathy in Multiple Linear Regression Models 1 and 2. This is an example of negative suppression. In Models 1 and 2 prosocial video game use was positively associated with empathy while violent video game use was negatively associated with empathy. In the present study prosocial and violent video game use were highly correlated. Participants in the sample from the present study engaged in both prosocial and violent video game use. Therefore it could be concluded that the participants were subject to the long-term influence of both prosocial and violent video game content.

For example a video game such as Clash of Clans involves prosocial behaviours such as protecting members of one’s own clan as well as violent behaviours such as fighting enemy clans. In the bivariate correlations, the negative correlation between prosocial video game use and empathy was lower than the correlation between violent video game use and empathy. It could be argued that prosocial video game use has a protective role against the effects of violent video game use causing less of a decline in empathy. However when the variance associated with violent video game use is controlled for in the multiple linear regression the positive contribution of prosocial video game use to the variance associated with empathy becomes apparent.

Hannah and Morrisey (1987) in an investigation into the development of “hardiness” in adolescents used the following independent variables: gender, state happiness, grade level and religious beliefs. The dependent variable was “hardiness”. While the zero-order correlation between age and hardiness was not significant, age emerged
as a significant predictor of “hardiness” when combined with the other predictors in the regression model. This is an example of reciprocal suppression (Hannah & Morrissey (1987) as cited in Tzelgov & Henik, 1991).

In the present study prosocial video game use was not significantly correlated with cooperation and sharing (Model 2) or affective relationships (Models 1 and 2). Nevertheless prosocial video game use was positively associated with the abovementioned dependent variables in the multiple linear regression. Therefore this is an example of reciprocal suppression. Violent video game use was negatively correlated with the abovementioned dependent variables. It could be argued that as with prosocial video game use and empathy, that when the variance associated with violent video game use was controlled for in the multiple linear regression, the positive contribution of prosocial video game use became apparent.

Therefore the emergence of prosocial video game use as a significant positive predictor of a variety of prosocial behaviours could be understood in the light of both negative and reciprocal suppression. Finally, it should be noted that the area of suppression in relation to multiple linear regression is a complex topic and the abovementioned conclusions are possible interpretations of the data.

Objective 1: to determine if prosocial video game use is positively associated with empathy

The positive association between prosocial video game use and empathy in the multiple linear regression (Models 1 and 2) is consistent with previous research which found that the relationship between prosocial video game use and prosocial behaviour was mediated by empathy (Prot et al., 2014).

According to the GLM learning experiences involve both short term and long term processes that have effects related to affect, arousal and cognition (Gentile et al, 2009). Repeated practice of these short-term processes could then lead to long-term processes such as changes to pre-cognitive and cognitive constructs; cognitive-emotional constructs as well as emotional constructs. Research evidence from the domain of violent video games indicates that increases in violent cognitions mediate
video game violence effects (Gentile et al., 2014). However studies into prosocial music effects have found that empathy as opposed to prosocial thought accessibility mediated the relationships between exposure to prosocial music and prosocial behaviour (Greitemeyer, 2009).

Bartlett and Anderson (2013) propose that "the affective processing route may be the most influential route in predicting short-term media effects on prosocial behaviour; however more work and replication is needed to support this claim" (Bartlett & Anderson, 2013, p.14). The findings from the present study support Bartlett and Anderson’s (2013) proposition.

Objective 2: to determine if the relationship between prosocial video game use and prosocial behaviour remains significant after controlling for theoretically relevant independent variables such as sociodemographic variables and weekly game play.

Two multiple linear regression models were created for the following dependent variables: helping behaviour, co-operation and sharing, normative behaviour, affective relationships and empathy. In model 1 the following independent variables were controlled for: gender, age, SES, school type and violent video game use. In model 2 weekly game play was added as an additional independent variable alongside the aforementioned independent variables.

As has been discussed in Chapter 1, each independent variable could theoretically explain part of the variance in the dependent variables measuring prosocial behaviour.

If the relationship between prosocial video game use and prosocial behaviour remains significant after controlling for theoretically relevant independent variables it could be argued that this provides stronger evidence for a prosocial video game effect (Prot & Anderson, 2013). In the multiple regressions in model 1 prosocial video game use was positively associated with affective relationships and empathy. When weekly game play was added as an independent variable in the multiple regressions in model 2 prosocial video game use was positively associated with cooperation and sharing, affective relationships and empathy. While the association between violent
video game use and affective relationships weakened in Model 2, the association between prosocial video game use and affective relationships grew stronger. It is possible that some of the differences between the variance of violent and prosocial video game use in Models 1 and 2 can be explained by the constructs that were measured in this study. If aggression related constructs were measured it is possible that the relationship between violent video game use and constructs such as hostile attribution bias would not be weakened by the inclusion of weekly game play as research evidence suggests that violent video game use is mediated by aggressive cognitions (Gentile et al., 2014). Nevertheless the significant association between prosocial video game use and empathy as well as prosocial video game use and affective relationships in Models 1 and 2 strengthens the evidence of a prosocial video game effect.

Objective 3: to determine if there is a negative relationship between violent video game use and prosocial behaviour in children and adolescents

The negative relationship between violent video game use and a variety of prosocial behaviours is consistent with findings from previous research. In the present study violent video game use was negatively associated with helping behaviour, cooperation and sharing, normative behaviour, affective relationships and empathy in regression Model 1. In Model 2 violent video game use was negatively associated with normative behaviour, affective relationships and empathy.

A meta-analysis investigating violent video game effects on aggression, empathy and prosocial behaviour in Eastern and Western countries included a number of correlational studies (Anderson et al., 2010). In order to investigate the relationship between violent video game exposure and empathy in correlational studies 15 effect sizes were pooled and a small negative violent video game effect was found. Regarding the relationship between violent video game exposure and prosocial behaviour in correlational studies, 10 effect sizes were pooled and a small negative violent video game effect was found (Anderson et al, 2010). A recent meta-analysis pooled 15 effect sizes from correlational studies investigating the relationship between violent video game exposure and prosocial behaviour and a small violent video game effect was found (Greitemeyer & Mugge, 2014).
In a correlational study into prosocial video game effects a negative association between violent video game exposure and helping behaviour as well as violent video game exposure and empathy was found. However a significant negative association was not found between violent video game exposure and cooperation and sharing or violent video game use and emotional awareness (Gentile et al, 2009). This correlational study controlled for gender, age, weekly game play and violent game exposure in measuring the association between prosocial video game exposure and various prosocial behaviours (Gentile et al, 2009). Gentile et al (2009) suggest that the non-significant association between violent video game exposure and cooperation and sharing in their study could be due to game content having specific rather than broad effects. For example a game such as *Call of Duty* involves violence towards enemies and cooperation with other soldiers. Following the theory of specific video game effects repeated exposure to video game content in *Call of Duty* could result in decreased levels of empathy without significantly decreasing cooperation and sharing.

As has already been noted, in the present study violent video game use was negatively associated with helping behaviour, cooperation and sharing, normative behaviour, affective relationships and empathy in Regression Model 1. These associations remained significant after controlling for age, gender, prosocial video game use, SES and school type. However when weekly game play was included alongside the aforementioned independent variables in Model 2, violent video game use was negatively associated with normative behaviour and affective relationships. Weekly game play, while not significantly associated with any of the dependent variables with the exception of empathy, appeared to account for some of the variance associated with violent video game use and prosocial behaviour. Previous research found that screen time in the form of weekly game play was negatively associated with prosocial behaviour (Gentile et al, 2009). The lack of a significant association between violent video game use and helping behaviour as well as violent video game use and cooperation and sharing, appeared to be explained by the inclusion of weekly game play in Model 2 as opposed to specific game effects. Therefore the present study did not find evidence for specific effects.
A possible reason that weekly gameplay was negatively associated with prosocial behaviour relates to the negative association between screen time and prosocial behaviour found in previous research (Gentile et al., 2009). Therefore it could be argued that increases in screen time (regardless of content) will decrease prosocial behaviour.

As has been discussed in Chapter 3, Anderson and Warburton (2012) use a food metaphor when discussing media effects on children and adolescents. This concept of a media diet could also help explain the relationship between prosocial video game use, violent video game use and weekly game play in the present study. In simplistic terms prosocial video game content could be seen as the equivalent of healthy food, violent video game content as the equivalent of unhealthy food and weekly game play as the equivalent of amount of food. Exposure to prosocial video game content could improve mental health in the same manner that consumption of healthy food improves physical health. However the benefits of prosocial video game use become diluted with increased screen time in the same manner as the benefits of healthy eating may become reversed with excessive consumption of food. Numerous guidelines recommend balancing the intake of healthy foods with physical exercise to prevent diseases such as cancer (Byers et al, 2002). It could be argued that exposure to prosocial media including video games needs to be balanced by real-life prosocial interactions.

5.2.1 Methodological strengths and weaknesses

According to Anderson et al (2007) high quality correlational studies into video game effects have the following characteristics: an adequate sample size (above 200); a reliable measure of video game exposure and reliable measure(s) of social outcome (aggression or prosocial behaviour). The present study accessed a large sample of 538 participants and used measures of video game exposure and prosocial behaviour that have been widely used in previous research (Gentile et al., 2009; Prot et al. 2014)

Furthermore Prot and Anderson (2013) propose that correlational studies into media effects have a number of strengths. Firstly, real-world outcomes can be measured, as
the independent variable (e.g. video game use) is measured instead of manipulated.
Secondly, different alternative explanations can be tested (e.g. violent video games
do not significantly reduce prosocial behaviour). Finally, new hypotheses about a
causal relationship can be suggested (e.g. socio-economic status moderates
prosocial video game effects).

A large number of studies into video game effects accessed normative community
based samples (e.g. Anderson et al, 2007; Gentile et al, 2009). By including five
disadvantaged schools and controlling for SES the present study sought to address
this gap in the video game effects research.

A further advantage of controlling for SES relates to the dependent variables used in
the multiple linear regressions in the present study. SES was positively associated
with affective relationships in the multiple linear regressions (Models 1 and 2),
indicating that participants with higher SES reported friendlier and more sympathetic
relationships with peers than participants with lower SES. The other prosocial
behaviours and empathy were not significantly associated with SES. A recent meta-
analysis concluded that lower SES is correlated with antisocial behaviour in children.
However the authors also note that while antisocial behaviour in a broadly
conceptualized form is correlated with lower SES, the strength of this relationship
may be influenced by study design and the variable being measured (Piotrowska,
Stride, Croft & Rowe, 2015). A significant association remained between prosocial
video game use and affective relationships, while SES also accounted for some of
the variance in affective relationships. It could be argued that this finding provides
evidence that prosocial video game effects may generalize to children and
adolescents from different socioeconomic groups.

School status was positively associated with empathy in the multiple linear
regressions (Models 1 and 2) indicating that students from non-disadvantaged
schools reported higher levels of empathy. The other prosocial behaviours and
empathy were not significantly associated with SES. However, lower SES is related
to disadvantaged school status. Previous research found that empathy in
adolescents was negatively associated with lower SES (Jolliffe & Farrington, 2006).
A significant association remained between prosocial video game use and empathy,
while school status also accounted for some of the variance in empathy. As with affective relationships, it could be argued that this finding provides evidence that some prosocial video games effects may generalize to children and adolescents in both disadvantaged and non-disadvantaged schools.

However this study also had a number of methodological weaknesses. Firstly the sample was a diverse one but it’s not possible to say it was necessarily representative, since it was a convenience sample rather than one drawn by random sampling.

Secondly, the reliability of a number of the prosocial measures was below the acceptable level of internal reliability. Thirdly, a principal components analysis was carried out on the POQ. While four components emerged from this analysis, these components did not load onto the four subscales of the POQ. This brings the construct validity of this measure into question. The four components that emerged did not appear to map onto four distinct areas of prosocial behaviour. For example component 1 contained items measuring behaviour at school (Item 18: “I always obey my school’s rules and regulations”), behaviour at home (Item 22: “Sometimes I would purposefully hurt my family”) and punctuality (Item 32: “I am always on time”). In contrast component 2 contained items measuring charitable behaviour (Item 3: “I would spend time and money to help those in need”), empathic sadness (Item 11: “I feel unhappy when someone is injured”) and friendship (Item 27: “I am close to my friends”).

In Chapter 1 prosocial behaviour within Social Psychology was reviewed. It could be argued that many of the constructs that relate to prosocial behaviour are complex and therefore difficult to divide into clearly defined subscales. The affective relationships subscale of the POQ contains items that relate to family (Item 1: “I am close to my family) and friends (Item 27: “I am close to my friends). As has been mentioned in Chapter 1, studies of nepotistic altruism have found that monozygotic twins displayed more co-operative behaviour than dizygotic twins in mixed–motive games (Segal & Hershberger, 1999). Therefore affective relationships between individuals may vary depending on the degree of relationship. Individuals may have positive relationships with family members and negative relationships with friends or
vice versa. Batson and Powell (2003) argue that studies of prosocial behaviour should not rely heavily on self-report questionnaires and that experimental designs in which behaviours can be observed are preferable. The abovementioned issues regarding the factor structure of the POQ highlight some of Batson and Powell’s (2003) concerns.

In addition, the use of self-report measures in the present study carries the risk of participants having a social desirability bias. Researchers have noted that prosocial behaviours are highly socially desirable (Eisenberg & Mussen, 1989). Nevertheless attempts were made to control for self-report by including a teacher report of prosocial behaviour, which was positively correlated with the participants self-reports. Although participants ratings of video game content were not compared to expert ratings in the present study, comparison of expert ratings and participants ratings of video game content have been highly correlated in previous research (Gentile at al, 2009).

Finally, a significant methodological weakness of this study was its cross-sectional correlational design. Cause and effect relationships between variables cannot be clearly established in this type of research design (Prot & Anderson, 2013). Difficulties establishing causation mean that it could be argued that children with a pre-existing prosocial orientation may choose to play prosocial video games. However it could also be argued that children tend to choose to play games due to their popularity and quality of game play rather than explicitly choosing a game based on its content. Therefore a child with high levels of prosocial behaviour could choose to play a violent video game due to the power of market forces such as advertising (Calvert, 2008).

5.2.2 Theoretical issues

In the following section a number of theoretical issues in relation to prosocial video game effects will be discussed. The present study has been guided by the predictions of the General Learning Model (GLM) (Gentile et al., 2009). As has been discussed in Chapter 1, the GLM is an extension of the General Aggression Model (GAM) (Anderson & Bushman, 2001). However while the GAM can explain violent
video game effects, the GLM has a broader scope that can be used to explain other issues such as prosocial video game effects and gender stereotypes in games. Both the GAM and the GLM are integrative theories.

As has been noted in Chapter 1, five social cognitive theories were integrated to create the GAM in an attempt to explain violent video game effects. The GAM was then extended to create the GLM to answer a broader set of research questions relating to areas such as prosocial video game effects.

Gentile et al (2009) note that prosocial and antisocial behaviour are not binary constructs. It is possible to be hostile towards enemies while behaving prosocially towards friends. As has been described in Chapter 1, the GLM proposes that two short-term processes explain prosocial video game effects. Firstly, the cognitive effect of priming scripts predicts that games with prosocial content will result in prosocial behavioural scripts being primed and rehearsed. Secondly, changes in cognitions, feelings and levels of physiological arousal while playing a prosocial game are reciprocally reinforced through both classical and operant conditioning (Gentile et al, 2009).

However there is a possible theoretical weakness in relation to the GLM and prosocial video game effects. In the present study prosocial video game effects were strongly associated with affective processing. The GLM is a theory which while containing emotional constructs has a strong focus on cognitive constructs. It could be argued that theories focussed on an individual’s emotional response to a stimulus might explain prosocial video game effects more clearly. Two theories from the field of Positive Psychology, described in Chapter 1 as mediators of prosocial behaviour, could possibly explain prosocial video game effects.

Haidt’s (2003) construct of elevation could possibly explain prosocial video game effects. As has been mentioned in Chapter 1, elevation has been defined as “an emotion triggered by people behaving in a virtuous, pure, or superhuman way” (Haidt, 2003, p.281). Observing video game clips of individuals such as Mother Teresa behaving prosocially has induced elevation in participants in experimental studies (Haidt, 2003). The video game Peacemaker
(http://www.peacemakergame.com) allows players to take the perspective of both an Israeli Prime Minister and the Palestinian authority. It is theoretically plausible that a prosocial video game such as Peacemaker could induce elevation in players which could mediate prosocial video game effects.

As has been discussed in Chapter 1, elevation has been described as an example of the Broaden and Build Theory of Positive Emotion. Therefore experiencing positive emotion through participating in prosocial video game play could create an upward spiral of positive emotion. This broadening of thought-action repertoires could potentially mediate the performance of prosocial acts.

In addition, Friedrickson (2001) highlights that the Broaden and Build Theory is particularly suited to describing positive emotions. The author contrasts this theory to models based on specific action tendencies. Specific action tendencies are the product of a psychological process that causes an individual’s thought action repertoire to narrow by bringing particular actions to mind. The author argues that these models are particularly suited to describing the function of negative emotions as well as actions based on these emotions such as the urge to escape or to fight. Berkowitz’s (1984, 1993) theory of Cognitive Neo-Associationism with its escape related tendencies network and attack related tendencies network is a theory based on specific action tendencies.

It could be argued that the Broaden and Build Theory of Positive Emotion could improve the GLMs ability to explain prosocial video game effects. At present the GLM’s theoretical framework is based on models that describe specific-action tendencies.

A further possible benefit of the Broaden and Build Theory of Positive Emotion (Friedrickson, 2001) relates to video game violence. Within this theoretical framework prosocial video game use opens up the possibility of creating an upward spiral of positive emotions and potentially undoing the downward spiral of negative emotions that video game violence could induce. There is some research evidence to support this theory. Experimental research has found that prosocial video game use is
associated with a reduction in hostile attribution bias and less accessibility to antisocial thoughts (Greitemeyer & Osswald, 2009).

5.2.3 Practical implications

The practical implications of prosocial video games are numerous. Video games have been used to train visual skills in adults (Achtman, Green & Bavelier, 2009), to teach civics to middle school students (https://www.icivics.org) and to teach geometry and social studies to elementary school students (http://minecraftedu.com). Granic et al (2014) note that “video games provide youth with immersive, compelling social, cognitive and emotional experiences. Further, these experiences may have the potential to enhance mental health and well-being in children and adolescents.” (Granic et al, 2014 p.66). Based on the evidence from the present study video games with prosocial content could be used by educators and clinicians to develop empathic concern and improve affective relationships in a diverse population of youth. Possible uses of prosocial video games in educational and clinical contexts will now be discussed.

The Irish Department of Education’s Curriculum for Social Personal and Health Education (SPHE) recommends the use of ICT in classrooms to teach SPHE (Government of Ireland, 1999). Recommendations include teaching turn-taking, sharing and co-operation through using and sharing classroom computers. These recommendations were created in 1999 and do not take account of the possibilities created by improvements in video game development, particularly the possibility of playing games collaboratively online. A video game such as Hay Day in which players can cooperate to maintain a farm could be played collaboratively in classrooms to teach turn taking, sharing and co-operation. Given the increased use of I-Pads in classrooms, using prosocial video games to teach social skills could bring the use of ICT in classrooms beyond the traditional goals of teaching academic subjects.

In relation to clinical contexts, videos games such as Pesky gNATs (http://peskygnats.com/) and SPARX (https://research.sparx.org.nz/) have been
developed to assist clinicians in delivering Cognitive Behavioural Therapy to adolescents. Researchers have noted the levels of engagement and interest that individuals with conditions such as ASD, Attention Deficit Hyperactivity Disorder and Specific Language Impairment have with video games (Durkin, 2010).

Prosocial video games could be particularly suited to interventions for individuals with ASD. The video game Secret Agent Society is used for social skills instruction for children with Asperger's Syndrome (http://www.sst-institute.net). Individuals with ASD could benefit from playing prosocial video games for two reasons. Firstly, as ASD is characterised by deficits in social cognition, perspective taking through controlling virtual avatars could help develop social cognition. Secondly, reading emotional cues in characters in video games such as Sims 4 could provide a training environment for reading emotional cues in real-life interactions. Media tools such as Mind Reading work on this principle. Mind Reading is a DVD-Rom designed to teach emotion recognition to individuals with ASD (Golan & Baron-Cohen, 2006).

5.2.4 Future research
It could be argued that disadvantaged populations could benefit from the use of prosocial video games in educational and clinical settings. Socio-economic disadvantage is associated with lower levels of academic achievement (Mc Loyd, 1998). Furthermore, longitudinal research has found that prosocial behaviour in childhood predicted academic achievement in adolescence (Caprara, Barbaranelli, Pastorelli, Bandura & Zimbardo, 2000). Video games do not depend exclusively on formal literacy and numeracy to teach skills and convey social messages. Therefore video games with prosocial content could become a vital pedagogical tool in the educational provision for youth from disadvantaged communities.

Future research in the area of prosocial video game effects could address this gap in the research using three different methodologies. Firstly, further correlational studies could gather data on the video game habits of youth in disadvantaged communities. Secondly, experimental studies could compare the efficacy of entertainment based games with prosocial content and clinically developed media tools such as Mind Reading (Golan & Baron-Cohen, 2006) in developing social cognition in youth from at risk and clinical populations. Finally, longitudinal research could gather data on the
long-term relationships between prosocial video game use and prosocial behaviour from youth in disadvantaged communities.

5.2.5 Conclusions

These findings are consistent with previous research which found that prosocial video game use was positively associated with prosocial behaviour and empathy in children and adolescents (Gentile et al., 2009; Prot et al., 2014). Previous research has also found that violent video game use was associated with reduced levels of prosocial behaviour (Anderson et al., 2010). However, the findings from the present study differ from previous research in that the tendency to maintain friendly, sympathetic, affective relationships was significantly associated with prosocial video game use. Previous research found that empathy, helping as well as co-operation and sharing were significantly associated with prosocial video game use (Gentile et al., 2009; Prot et al., 2014). The findings from the present study suggest that emotions rather than cognitions could explain prosocial video game effects. Therefore rebuilding the GLM using models from Positive Psychology such as Haidt’s (2003) construct of elevation or the Broaden and Build Theory of Positive Emotion (Friedrickson, 2001) could explain prosocial video game effects in children and adolescents more clearly.

Video games can be conceived as ‘virtual teachers’ that can teach both prosocial and anti-social behaviours. The findings from the present study contribute to an increasing body of evidence that is succinctly summarised in the maxim: “Video games are exemplary teachers” (Gentile & Gentile, 2008). Parents and educators should bear this maxim in mind when weighing up the risks and benefits of these virtual teachers in relation to the healthy development of the young people in their care.
References


Decety, J. & Grezes, J. (2006). *The power of simulation: Imagining one’s own and other’s behavior*. Brain Research 1079 4-14


### Appendices

#### Appendix A: Student and teacher questionnaires

*Children’s Empathic Attitudes Questionnaire (Funk, Fox, Chan & Curtiss, 2008)*

For each of these statements, put a tick in one of the boxes below.

<table>
<thead>
<tr>
<th>Item</th>
<th>Yes</th>
<th>No</th>
<th>Maybe</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Seeing a kid who is crying makes me feel like crying</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Other people’s problems really bother me</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. I would feel bad if the kid sitting next to me got in trouble</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. It bothers me when my teacher doesn’t feel well</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. When I see a kid who is upset it really bothers me</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. It would bother me if my friend got grounded</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. I understand how other kids feel</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. When I see someone who’s happy, I feel happy too</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. I would feel bad if my mom’s friend got sick</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. I feel sorry for kids who can’t find anyone to hang out with</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. I’m happy when the teacher says my friend did a good job</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. I feel happy when my friend gets a good grade</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. When I’m mean to someone, I usually feel bad about it later</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14. It’s easy for me to tell if my mom or dad has a good day at work</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15. If two kids are fighting, someone should stop it</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16. I would get upset if I saw someone hurt an animal</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The Prosocial Orientation Questionnaire (Cheung, Ma & Shek, 1998)

This is not a test. There are no right or wrong answers. We are interested in how you feel about the following issues. Please circle one answer for each of the following questions according to the following keys.

Key:
SA - Strongly Agree (I feel like this most of the time)
A - Agree (I feel like this sometimes)
D - Disagree (I do not feel like this most of the time)
SD - Strongly Disagree (I do not feel like this at all)

<table>
<thead>
<tr>
<th>Question</th>
<th>SA</th>
<th>A</th>
<th>D</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I am close to my family.</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>2. I welcome other classmates to join in while I am playing.</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>3. I would spend time and money to help those in need.</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>4. I love my father.</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>5. I would discourage my friends from fighting or arguing.</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>6. I would volunteer to help a charitable organization if they needed my help.</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>7. I would help my family when they are in need.</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>8. If a stranger left something behind, I would not tell him or her.</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>9. I feel happy when I share my things with others.</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>10. I always obey my parents.</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>11. I feel unhappy when someone is injured.</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>12. I would mistreat or hurt small animals.</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>13. I always feel angry at home.</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>14. I always think of helping people who have disabilities.</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>15. I would help my friends when they have a problem.</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>16. I always argue with my family.</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>17. If someone breaks my favourite thing, I would ask him or her to pay for it.</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>18. I always obey my school’s rules and regulations.</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

Please continue on the reverse page……
**Computer/Video Game Habits Questionnaire (Prot et al., 2014)**

### Section A

1. **Pick one day during the week:** *(Monday, Tuesday, Wednesday, Thursday or Friday)*
   How many hours do you **play computer/video games** during each of the following times?

<table>
<thead>
<tr>
<th>in the <strong>morning</strong> (from when you wake up till lunch)</th>
<th>in the <strong>afternoon</strong> (between lunch and dinner)</th>
<th>in the <strong>evening</strong> (between dinner and bedtime)</th>
</tr>
</thead>
<tbody>
<tr>
<td>○ None</td>
<td>○ None</td>
<td>○ None</td>
</tr>
<tr>
<td>○ Half an hours</td>
<td>○ Half an hours</td>
<td>○ Half an hours</td>
</tr>
<tr>
<td>○ 1 hours</td>
<td>○ 1 hours</td>
<td>○ 1 hour</td>
</tr>
<tr>
<td>○ 1 and a half hours</td>
<td>○ 1 and a half hours</td>
<td>○ 1 and a half hours</td>
</tr>
<tr>
<td>○ 2 hours</td>
<td>○ 2 hours</td>
<td>○ 2 hours</td>
</tr>
<tr>
<td>○ 2 and a half hours</td>
<td>○ 2 and a half hours</td>
<td>○ 2 and a half hours</td>
</tr>
<tr>
<td>○ 3 hours</td>
<td>○ 3 hours</td>
<td>○ 3 hours</td>
</tr>
<tr>
<td>○ 3 and a half hours</td>
<td>○ 3 and a half hours</td>
<td>○ 3 and a half hours</td>
</tr>
<tr>
<td>○ 4 hours</td>
<td>○ 4 hours</td>
<td>○ 4 hours</td>
</tr>
<tr>
<td>○ 4 to 5 hours</td>
<td>○ 4 to 5 hours</td>
<td>○ 4 to 5 hours</td>
</tr>
<tr>
<td>○ 5 to 6 hours</td>
<td>○ 5 to 6 hours</td>
<td>○ 5 to 6 hours</td>
</tr>
<tr>
<td>○ More than 6 hours</td>
<td>○ More than 6 hours</td>
<td>○ More than 6 hours</td>
</tr>
</tbody>
</table>

2. **Pick one day over the weekend** *(Saturday or Sunday)*
   How many hours do you **play computer/video games** during each of the following times?

<table>
<thead>
<tr>
<th>in the <strong>morning</strong> (from when you wake up till lunch)</th>
<th>in the <strong>afternoon</strong> (between lunch and dinner)</th>
<th>in the <strong>evening</strong> (between dinner and bedtime)</th>
</tr>
</thead>
<tbody>
<tr>
<td>○ None</td>
<td>○ None</td>
<td>○ None</td>
</tr>
<tr>
<td>○ Half an hours</td>
<td>○ Half an hours</td>
<td>○ Half an hours</td>
</tr>
<tr>
<td>○ 1 hours</td>
<td>○ 1 hours</td>
<td>○ 1 hour</td>
</tr>
<tr>
<td>○ 1 and a half hours</td>
<td>○ 1 and a half hours</td>
<td>○ 1 and a half hours</td>
</tr>
<tr>
<td>○ 2 hours</td>
<td>○ 2 hours</td>
<td>○ 2 hours</td>
</tr>
<tr>
<td>○ 2 and a half hours</td>
<td>○ 2 and a half hours</td>
<td>○ 2 and a half hours</td>
</tr>
<tr>
<td>○ 3 hours</td>
<td>○ 3 hours</td>
<td>○ 3 hours</td>
</tr>
<tr>
<td>○ 3 and a half hours</td>
<td>○ 3 and a half hours</td>
<td>○ 3 and a half hours</td>
</tr>
<tr>
<td>○ 4 hours</td>
<td>○ 4 hours</td>
<td>○ 4 hours</td>
</tr>
<tr>
<td>○ 4 to 5 hours</td>
<td>○ 4 to 5 hours</td>
<td>○ 4 to 5 hours</td>
</tr>
<tr>
<td>○ 5 to 6 hours</td>
<td>○ 5 to 6 hours</td>
<td>○ 5 to 6 hours</td>
</tr>
<tr>
<td>○ More than 6 hours</td>
<td>○ More than 6 hours</td>
<td>○ More than 6 hours</td>
</tr>
</tbody>
</table>
1. What age did you start playing computer/video games?

- O below 4
- O 4
- O 5
- O 6
- O 7
- O 8
- O 9
- O 10
- O 11
- O 12
- O 13
- O 14
- O 15
- O 16
- O 17
- O 18
- O 19
- O 20

2. If you are having problems (for example, being bullied in games), who would you ask for help? You may choose more than one.

- O Father
- O Mother
- O Brother or sister
- O Friends in school
- O Other “outside” friends
- O Online friends
- O Teacher
- O School counselor
- O Others _______________________
- O No one
- O Don’t know

Section B: Please answer the following questions using the scale below:

<table>
<thead>
<tr>
<th>Scale</th>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Agree</th>
<th>Strongly agree</th>
</tr>
</thead>
</table>

1. It is important to be powerful in games. ..........................  
2. Killing other players is violent. .................................  
3. I have many online friends. ...............................  
4. I play computer/video games to make new friends.  
5. It is ok to kill other players. ...............................  
6. I share real life information about myself with other players in computer/video games.  
7. I often try to make my in-game character look like me.  
8. I often try to make my in-game characters do things I can’t do in real life.
### Section C: Name the game you play most frequently and answer the questions

**What is the name of the game you play most?**

1. Pick one day during the week: (Monday, Tuesday, Wednesday, Thursday or Friday) _______. How many hours do you play this game on that day?
   - None
   - Half an hour
   - 1 hour
   - 1 and a half hours
   - 2 hours
   - 2 and a half hours
   - 3 hours
   - 3 and a half hours
   - 4 hours
   - 4 to 5 hours
   - 5 to 6 hours
   - 6 to 7 hours
   - 7 to 8 hours
   - 8 to 9 hours
   - 9 to 10 hours
   - More than 10 hours

2. Pick one day over the weekend (Saturday or Sunday): _______. How many hours do you play this game on that day?
   - None
   - Half an hour
   - 1 hour
   - 1 and a half hours
   - 2 hours
   - 2 and a half hours
   - 3 hours
   - 3 and a half hours
   - 4 hours
   - 4 to 5 hours
   - 5 to 6 hours
   - 6 to 7 hours
   - 7 to 8 hours
   - 8 to 9 hours
   - 9 to 10 hours
   - More than 10 hours

3. How many hours do you play each time you sit down to play this game?
   - None
   - Half an hour
   - 1 hour
   - 1 and a half hours
   - 2 hours
   - 2 and a half hours
   - 3 hours
   - 3 and a half hours
   - 4 hours
   - 4 to 5 hours
   - 5 to 6 hours
   - 6 to 7 hours
   - 7 to 8 hours
   - 8 to 9 hours
   - 9 to 10 hours
   - More than 10 hours

4. Do you play this game with any of the following people? (Mark all that apply)
   - Father
   - Mother
   - Older brother
   - Older sister
   - Younger brother
   - Younger sister
   - Cousins
   - School friends
   - Other “outside” friends
   - Online friends
   - Others _________
   - No one

5. How often do these things happen in the game you play most?

<table>
<thead>
<tr>
<th></th>
<th>Never</th>
<th>Seldom</th>
<th>Often</th>
<th>Almost Always</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) How often do other players help each other in this game?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b) How often do you help others in this game?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c) How often do you shoot or kill creatures in this game?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d) How often do you shoot or kill other players in this game?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>e) How often do characters try to hurt each other’s feelings in this game?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>f) How often does this game help you do better in your studies?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>g) How much is your in-game character like you in real life?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>h) How much is your in-game character like the person you want to be in real life?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>i) Is this game played online with other people?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Strengths and Difficulties Questionnaire (Prosocial Subscale) Teacher Version (Goodman, 1997)**

Please put a tick in the box which most accurately describes your student.

<table>
<thead>
<tr>
<th>Item</th>
<th>Not True</th>
<th>Somewhat True</th>
<th>Certainly True</th>
</tr>
</thead>
<tbody>
<tr>
<td>Considerate of other people’s feelings</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shares readily with other children (treats, toys, pencils etc.)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Helpful if someone is hurt, upset or feeling ill</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kind to younger children</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Often volunteers to help others (parents, teachers, other children)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Appendix B: Glossary for the Prosocial Orientation Questionnaire

1. grade = mark for school work (for example, an “A”, “B” or “C” grade).
2. discourage my friends from fighting and arguing = stop my friends from fighting and arguing.
3. volunteer = work without being paid
4. charitable organisation = a charity like Trocáire or Concern
5. obey = do what you are told
6. mistreat = to treat an animal or a person badly
7. disabilities = for example, a person in a wheelchair has a physical disability
8. regulations = rules or laws
9. sacrifice = to give something up
10. to purposely hurt = to hurt someone on purpose
11. to be attentive = to listen (for example, to listen to your teacher class).
12. to look down someone = to think that you are better than someone else
13. perform poorly in school = when you find something difficult in school and make mistakes
14. queue = a line of people waiting (for example, “I stand in the queue in Tesco”).
15. powerful = strong
16. in-game character = the person whose actions you control in a video game
17. frequently = very often, almost all the time
18. seldom = not very often
19. character = an imaginary person in a story
20. creature = an animal or an imaginary being (for example, an alien).
Appendix C: Paired sampled t-test for two measures of weekly game play

A significant difference was found between “Average weekly Game Time” and “Total Weekly Hours of Game Play” as a measure of Weekly Game Play ($t=-15.89; p<.001; df=537$). The magnitude in the difference of the means (Mean difference=-12.28, 95% CI: -13.79 to -10.76) was large. Based on these results it can be concluded that “Average Weekly Game Time” is a significantly lower estimate of Weekly Game Play than “Total Weekly Hours of Game Play”.

Appendix D: Letters to schools; information sheets/consent forms for parents/guardians; assent forms for children and adolescents; ethical approval letter.

Letter to school principals

UCD School of Psychology

Newman Building
University College Dublin
Belfield, Dublin 4, Ireland

T: +353 1 7168369/8363
F: +353 1 7161181

Dear Sir/ Madam,

My name is Brian Harrington. I am a qualified primary school teacher currently on career break. I am currently completing a Master of Literature in Psychology in the UCD School of Psychology under the supervision of Dr. Michael O’Connell. I would like to ask your permission to carry out some research in your school. The aim of the study is to investigate the relationship between playing pro-social video games and prosocial behaviours. This study hopes to further our understanding of how young people can be helped to behave prosocially. Studies like this may contribute to our understanding of young people’s development and could inform future curriculum development in secondary schools in subjects such as CSPE.

I would be most grateful if you would agree to let me ask the parents/guardians of the students in 1st, 2nd and 3rd year for permission to allow their sons/daughters to participate. The students would complete three short tasks. There are three tasks in this study measuring video game habits, levels of empathy and prosocial behaviour. These tasks would take approximately 30 minutes. In addition, I would like the student’s class teacher to complete a short five item questionnaire on the prosocial behaviours of each student in their class who has consent to take part in this study.
With your permission, I propose to administer these tasks to the students in their class group. For example, all the students from 1st year whose parents/guardians have given consent would complete the tasks together in the classroom with me and the class teacher present. However I would be conscious of causing minimum disruption to your school day. I would be most grateful for your help in allowing me to conduct this study in your school. With your permission, I will telephone you next week to answer any queries you have. I enclose with this letter a copy of the letter to parents/guardians and an information sheet for parents/guardians. I also enclose a copy of the questionnaires that are being used in this study. I would be happy to answer any questions which you or any members of staff may have concerning the research. I would be delighted to give your school an overall summary of the finished research upon completion. If you wish to contact me or my supervisor in the meantime, our e-mails are given below.

Yours sincerely,

Brian Harrington, B.A., H. Dip in Primary Ed., H. Dip in Psych. e-mail: brian.harrington@ucdconnect.ie

Supervisor: Dr. Michael O’Connell, School of Psychology, UCD e-mail: michael.f.oconnell@ucd.ie
Dear Parent/Guardian,

My name is Brian Harrington. I am a qualified primary school teacher currently on career break. At present I am completing a Master of Literature in Psychology in University College Dublin. The principal of your school has agreed to allow me to carry out some research on the relationship between playing video games and prosocial behaviour in primary school children. I would like to ask your permission to include your son/daughter in this study. Information about it is outlined below and I would be very grateful if you could read the information and consider allowing your child to participate.

Information for parents

Study Title: The relationship between prosocial video game use, empathy and prosocial behaviour in children and adolescents.

Researcher: Brian Harrington B.A., Higher Diploma in Primary Ed., Higher Diploma in Psych, Email: brian.harrington@ucdconnect.ie

Supervisor: Dr. Michael O'Connell e-mail: michael.f.oconnell@ucd.ie

What is the aim of this study? The aim of this study is to investigate the relationship between children’s video gaming habits and their prosocial behaviour. This study hopes to further our understanding of how technology could help children to behave pro-socially. Studies like this may help educators to understand this aspect of children’s development. In order to explore this issue we are inviting children in 4th, 5th and 6th class in your child’s school to take part in the study. This study involves the children completing three tasks and it will take approximately 30 minutes.

Why has my son/daughter been asked to participate in this study? All parents/guardians of children in 4th, 5th and 6th class in your school are being asked to give their permission for their child to be involved in the study.
What happens if my child takes part? The children who have permission from parents/guardians to take part will be given a form to find out if they want to participate. If they agree the children will complete three short tasks in their classroom with the other children who have been given consent to take part. Both myself and the class teacher will be present. Every effort will be made to make this process pleasant and relaxed for every child. Children will be assured that this is not a test of them as an individual, but that the researcher is trying to learn about how children of their age behave.

What will happen to the results of the study? Results from this study will form the basis of a thesis to be submitted in one year’s time. These results might also be published in academic journals and presented at academic conferences. However at no point will any individuals or schools be identified.

Confidentiality: Neither the name of the school nor any of the children’s names will be noted in the written report from the study. Children’s answers to the questions will be noted and each child will receive a unique code number. The list of names of children for whom consent from parents/guardians has been received will be stored separately to the children’s answers, and will be used to ensure that only children with signed permission are invited to participate on the day. Therefore complete confidentiality is guaranteed. Children will only be asked to give their age and their gender will also be noted. Paper copies of the tasks completed by the children will be held for 13 months after thesis submission and then shredded. After your child’s answers are submitted it will not be possible to give individual feedback regarding your child’s answers for each task.

Voluntary participation: It is entirely up to you and your child to decide whether s/he is going to take part or not. On the day I visit the school, only children for whom consent forms have been received will be invited to take part and those children will have the right not to take part if they do not wish to take part. I will remind each child of this when I talk to them about what is involved before the study begins. Children need to have a reasonable fluency in English in order to take part: if your child is a language learner, or has an intellectual or other language difficulty but you think they would like to participate, you are invited to indicate this on the consent form overleaf.

What happens if I do not let my child take part? That is your choice and your child will remain with the rest of the class throughout the period. There will be no negative effects for your child or you.

Are there any benefits in participating? While there will be no direct benefit from participation, studies such as this one could help to further our understanding of how children’s video game habits influence their behaviour. No rewards will be offered for participation, but your child might enjoy the tasks e.g. as they are simple, and offer some novelty, which children of this age enjoy. They will be reminded that it is not a test, but that they are helping us to understand better how children help each other.

Are there any risks involved? Every effort will be made to make this process as relaxed as possible for every child. The study will follow ethical procedures and confidentiality for both
the school and individual children is assured. The tasks are simple and short and will take place under the supervision of adults, in a familiar place. Children will be reminded that it is not a school test where each person’s results are recorded to track progress, but that instead they are helping the researcher to find out about how children this age think and behave. In the very unlikely event that a child becomes uncomfortable during the tasks, they will be offered the option of ending them and resuming their class work, and children will be informed of this at the outset.

**Important: the consent form:** There is a consent form attached to this information sheet. Every child participating in the study must have a consent form signed by a parent or guardian. Please note that research practice guidelines do not allow any exceptions, and verbal permission cannot replace the signed consent form. **Further information:** If you require any assistance or have any questions about the research study, please feel free to contact me or my supervisor (contact details above).

Note: Could you please provide the following demographic information:

Father’s occupation: ____________________

Mother’s occupation: ____________________

**Thank you very much for supporting this research**
3ú Márta 2014

A t(h)uismitheoir,

Thug priomhoide na scoile cead dom roinnt taighde a chur i gcrích ar an ngaol idir cluichí físeáin agus iompar pro-sóisialta i leanaí bunscoile. Ba mhaith liom do chara a iarraidh maidir le do mhac / iníon páirt a dhéanadh sa staidéar seo. Tá eolas faoi leith le do chuid oideachais a thuiscint ar an ngaol seo. Tá súil ag an staidéar seo chuigh a gealadh le bhunóirí cabhrú le na hádaí a thugfadh sé a fháil. Is féidir staidéir mar seo cabhrú le oideachasóirí níos mó thuiscint a fháil ar an ngaol seo d'fhorbairt leanáraí. D'fhonn iníúchadh a dhéanamh ar an gceist seo ag taispeáint an tábhacht a dhéanadh do pháistí i rang 3, 4, 5 agus 6 i ____________ páirt a dhéanadh sa staidéar. Bheadh ar na páistí trí thasc a chríochnú agus toghaidh sé thart ar 30 nóiméad.

The principal of your school has agreed to allow me to carry out some research on the relationship between playing video games and prosocial behaviour in primary school children. I would like to ask your permission to include your son/daughter in this study. Information about it is outlined on the following pages and I would be very grateful if you could read the information and consider allowing your child to participate.

The aim of this study is to investigate the relationship between children’s video gaming habits and their prosocial behaviour. This study hopes to further our understanding of how technology could help children to behave pro-socially. Studies like this may help educators to understand this aspect of children’s development. In order to explore this issue we are inviting children in 3rd, 4th, 5th and 6th class in your child’s school to take part in the study. This study involves the children completing three tasks and it will take approximately 30 minutes.
Le dea-mhéin,

Consent form for parents/guardians

UCD School of Psychology

Newman Building
University College Dublin
Belfield, Dublin 4, Ireland

T: +353 1 7168369/8363
F: +353 1 7161181

Title: The relationship between prosocial video game use, empathy and prosocial behaviour in children and adolescents.

Researcher: Brian Harrington B.A., Higher Diploma in Primary Ed., Higher Diploma in Psych. Email: brian.harrington@ucdconnect.ie

Supervisor: Dr. Michael O’Connell Email: michael.f.oconnell@ucd.ie

I agree _____do not agree_____ to my son/daughter taking part in this study.

Child’s name (please print):

If you do agree please complete the rest:

I confirm that I have read and understood the Information Leaflet for Parents/Guardians for the above research study. I also confirm that the Information Leaflet contains the following information: the type of study taking place; the reason for the study; the length of time the study will take.

I understand what my child has to do in this study and I am happy that it will be explained to them on the day what is involved.

I have thought about whether I want my child to take part and any questions I had have been answered satisfactorily.

I understand that my child’s participation is voluntary and that my child can withdraw from the study up to the time of completing the tasks.

I am aware that although my child will be given a unique code number that all hardcopy and electronic data will be stored separately to the consent forms and therefore complete confidentiality is guaranteed.

I understand that the information collected is for the purpose of this study only and will be included in a thesis and may in the future be included in academic presentations and academic journals, but no individual will be identifiable from the information.
Please note: If you feel that your child would like to take part rather than feel excluded but you would like to bring to my attention that he/she is learning English as an additional language or has a language or intellectual disability, please feel free to indicate below:

____________________________________________________________________________________

Parent’s/Guardian’s name (Please Print)____________________________________________________

Parent’s/Guardian’s signature____________________________________________________________

Date:________________________________________________________________________________
Thank you for agreeing to take part in this project. My name is Brian Harrington. I am a university student. Before I went back to university I was teaching children in a primary school in Galway. As part of my studies in university I am doing a project about the video games children play.

The tasks you will do today are about two different things. Firstly, you will be asked questions about the video games that you play. Secondly, you will be asked about the situations where you think it is important to help other people.

Your parents/guardians have already given me permission to give you these tasks. I also want to give you a chance to agree to do these tasks. Can you put a tick in the space below beside either ‘I agree’ or ‘I do not agree’:

I agree  ______   I do not agree_____ to do these tasks.

Finally, if you agree to do these tasks but change your mind while you are in the middle of doing one of the tasks you can speak to me. If the tasks aren’t finished but you want to stop, that is fine and you can go back to doing your classwork.

Child’s signature____________________________________________________

Date:__________________________________________
Thank you for agreeing to take part in this project. My name is Brian Harrington. I am a research student in University College Dublin. As part of my studies in university I am doing a project about the video games young people play.

The tasks you will do today are about two different things. Firstly, you will be asked questions about the video games that you play. Secondly, you will be asked about the situations where you think it is important to help other people.

Your parents/guardians have already given me permission to give you these tasks. I also want to give you a chance to agree to do these tasks. Can you put a tick in the space below beside either ‘I agree’ or ‘I do not agree’:

I agree _____ I do not agree_____ to do these tasks.

Finally, if you agree to do these tasks but change your mind while you are in the middle of doing one of the tasks you can speak to me. If the tasks aren’t finished but you want to stop, that is fine and you can go back to doing your classwork.

Signature:__________________________________________________________

Date:___________________________
November 14th, 2013

Mr Brian Harrington
C/o Dr Michael O’Connell
UCD School of Psychology
Newman Building
Belfield
Dublin 4

Re: HS-13-43-Harrington-O’Connell: The influence of pro-social video games on children’s behaviours

Dear Mr Harrington

Thank you for your response to the Human Research Ethics Committee – Humanities (114/11/13). The Decision of the Committee is to grant approval for this application which is subject to the conditions set out below.

Please note that approval is for the work and the time period specified in the above protocol and is subject to the following:

- If applicable, all permissions to access participants, whether internal (heads of Schools/Committee) or external are obtained before the recruitment of the participants is commenced;
- Any amendments or requests to extend the original approved study will need to be approved by the Committee. Therefore you will need to submit by email the Request to Amend/Extend Form (HREC Doc 10);
- Any unexpected adverse events that occur during the conduct of your research should be notified to the Committee. Therefore you will need to Submit, by email, an Unexpected Adverse Events Report (HREC Doc 11);
- You or your supervisor (if applicable) are required to submit a signed End of Study Report Form (HREC Doc 12) to the Committee upon the completion of your study;
• This approval is granted on condition that you ensure that, in compliance with the Data Protection Acts 1988 and 2003. If applicable, all data will be destroyed in accordance with your application and that you will confirm this in your End of Study Report (HREC Doc 12), or indicate when this will occur and how this will be communicated to the Human Research Ethics Committee;
• You may require copies of submitted documentation relating to this approved application and therefore we advise that you retain copies for your own records;
• Please note that the granting of this ethical approval is premised on the assumption that the research will be carried out within the limits of the law;
• Please also note that approved applications and any subsequent amendments are subject to a Research Ethics Compliance Review.

The Committee wishes you well with your research and look forward to receiving your End of Study Report. All forms are available on the website www.ucd.ie/researchethics please ensure that you submit the latest version of the relevant form. If you have any queries regarding the above please contact the Office of Research Ethics and please quote your reference in all correspondence.

Yours sincerely,

__________________________
Dr Joan Tiernan
Chair Human Research Ethics Committee - Humanities
Appendix E: Histograms for the main continuous variables of interest

Figures 9 to 16 contain histograms with information regarding the distribution of scores for the following continuous variables: prosocial video game use, violent video game use, hours of weekly gameplay, empathy, helping behaviour, cooperation and sharing, affective relationships and normative behaviour.

![Histogram for prosocial video game use](image)

*Figure 9 Distribution of scores for prosocial video game use*
Figure 10 Distribution of scores for violent video game use

Mean = 23.13
Std. Dev. = 45.962
N = 532
Figure 11 Hours of weekly gameplay reported by participants

Mean = 9.13
Std. Dev. = 11.656
N = 538
Figure 12 Distribution of scores on the measure of empathy

Mean = 21.76
Std. Dev. = 5.064
N = 537
Figure 13 Distribution of scores on the measure of helping behaviour
Figure 14 Distribution of scores on the measure of cooperation and sharing
Figure 15 Distribution of scores on the measure of affective relationships

Mean = 38.77
Std. Dev. = 3.546
N = 537
Figure 16 Distribution of scores on the measure of normative behaviour

Mean = 35.79
Std. Dev. = 3.917
N = 537
Appendix F: Bivariate scatterplots illustrating relationships between prosocial and violent video game use and prosocial behaviours.

Figure 17 contains a bivariate scatterplot illustrating the relationship between prosocial and violent video game use. Figures 20 to 24 contain bivariate scatterplots illustrating the relationship between prosocial video game use and various prosocial behaviours. Figures 25 to 29 contain bivariate scatterplots illustrating the relationship between violent video game use and various prosocial behaviours.

Figure 17 Bivariate scatterplot for prosocial video game use and violent video game use
Figure 18: Bivariate scatterplot for prosocial video game use and hours of weekly game play.
Figure 19 Bivariate scatterplot for violent video game use and hours of weekly gameplay
Figure 20 Bivariate scatterplot for prosocial video game use and helping behaviour.
Figure 21 Bivariate scatterplot for prosocial video game use and cooperation and sharing
Figure 22 Bivariate scatterplot for prosocial video game use and affective relationships.
Figure 23 Bivariate scatterplots for prosocial video game use and normative behaviour
Figure 24 Bivariate scatterplot for prosocial video game use and empathy
Figure 25 Bivariate scatterplot for violent video game use and helping behaviour
Figure 26 Bivariate scatterplot for violent video game use and cooperation and sharing
Figure 27 Bivariate scatterplot for violent video game use and affective relationships.
Figure 28 Bivariate scatterplot for violent video game use and normative behaviour.
Figure 29 Bivariate scatterplot for violent video game use and empathy