

***Video games as virtual teachers: Prosocial video game use by children and adolescents from different socioeconomic groups is associated with increased empathy and prosocial behaviour***

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## **Abstract**

**1. Objective:** The main aim of this study was to determine if there was a positive relationship between prosocial 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 socioeconomic status of participants was also gathered.

**3. Results:** Multiple linear regressions were conducted on these data. Prosocial video game use was positively associated with the tendency to maintain positive affective relationships, cooperation and sharing as well as empathy. This association remained significant after controlling for gender, age, school type (disadvantaged/non-disadvantaged), socioeconomic status, weekly game play and violent video game use.

**4. Conclusions:** These findings provide evidence that prosocial video game use could develop empathic concern and improve affective relationships in a diverse population of young people.

**Keywords:** Prosocial video game use, violent video game use, prosocial behaviour, empathy, socioeconomic status, young people

## 1. Introduction

The increasing engagement of young people with media including video games is well documented (Rideout, Foehr & Roberts, 2010). 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). 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). In this context the use of video games in both educational and clinical settings has received attention recently from researchers (Granic, Lobel & Engels, 2014).

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). According to researchers in this area, a prosocial video game is a game in which the player must help and cooperate in order to succeed. 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)<sup>1</sup>.

The General Learning Model (GLM) (Gentile et al., 2009) proposes that each experience (eg. playing a video game) an individual has is a learning trial which temporarily alters cognitions, emotions and levels of physiological arousal. The GLM proposes that two short-

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<sup>1</sup> 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.

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 video game are reciprocally reinforced through both classical and operant conditioning.

Repeated practice of video games could produce certain long-term effects such as changes to precognitive and cognitive constructs, cognitive-emotional constructs and affective traits. This model when applied to prosocial video game use predicts 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 repeated practice producing these short-term effects could change personality traits in the individual playing prosocial 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).

A recent meta-analysis has provided evidence that video games have social outcomes (Greitemeyer & Mugge, 2014). This meta-analysis and other recent studies have concluded that violent video game use leads to desensitization and aggression while prosocial video game use increases empathy and therefore prosocial behaviour (Greitemeyer & Mugge, 2014; Prot et al. 2014; Gentile, Khoo, Prot & Anderson, 2014; Gentile et al., 2009).

### *1.1 Empathy and prosocial video game use*

Researchers have suggested that the relationship between prosocial video game use and prosocial behaviour could be mediated by empathy as opposed to accessibility to prosocial thoughts (Bartlett & Anderson, 2013). 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). A recent longitudinal study found that prosocial video game use was a significant predictor of prosocial behaviour and that this change was mediated by 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.

### *1.2 Theoretically relevant confounding variables such as sociodemographic factors and weekly game play*

Research has shown that when controlling for long-term causal factors for aggressive behaviour, such as personality and environmental factors, violent video game effects can disappear (Ferguson, San Miguel, Garza and Jerabeck, 2012). Therefore in the case of prosocial video game effects, it is theoretically possible that when controlling for sociodemographic factors and weekly gameplay that prosocial video game effects could disappear.

The following independent variables could theoretically explain part of the variance in prosocial behaviour: age, gender, socioeconomic status (SES), 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). Gender differences in prosocial behaviour have focussed on the agentic theory of male gender role models (Eagly & Crowley, 1986) as well as differences in the levels of prosocial behaviour in male and female children (Calvo, Gonzalez & Martorell, 2014). While experimental research found that lower levels of social status were associated with higher levels of prosocial behaviour (Guinote, Cotzia, Sandhu & Siwa, 2014), 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). 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 prosocial behaviour.

If the relationship between prosocial video game use and prosocial behaviour remains significant after controlling for the abovementioned theoretically relevant independent variables it could be argued that this provides stronger evidence for a prosocial video game effect (Prot & Anderson, 2013).

### *1.3 Violent video game use and prosocial behaviour*

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 suggesting 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 violent video game use will be negatively associated with prosocial behaviour in children and adolescents.

### *1.4 The present study*

Previous studies into violent and prosocial video game effects have generally accessed normative community-based samples (Anderson, Gentile & Buckley, 2007). Boxer, Huesmann, Bushman, O'Brien and Moceris (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 numerous studies have investigated the video game use of specific clinical samples such as individuals with Autistic 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 studies investigating prosocial video game effects in both children and adolescents that socioeconomic status (SES) and parental education were measured. However, neither of these variables were controlled for in the statistical analysis. Therefore to our knowledge this is the first correlational study into prosocial video game effects to statistically control for both SES and school status.

The present study primarily aimed to determine if there was a positive relationship between prosocial video game use and prosocial behaviour in children and adolescents. In addition three related objectives were pursued. These objectives related to theoretically relevant variables that were identified based on a review of the literature on both video game effects and prosocial behaviour.

These three objectives were as follows:

Objective 1: to determine if prosocial video game use was positively associated with empathy in children and adolescents.

Objective 2: 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.

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

## **2. Material and methods**

### *2.1 Participants*

The population under study were students ( $n=538$ ) from 10 schools in the Republic of Ireland. Participants ranged in age from 9 to 15 years, ( $M=11.6$  years,  $SD=1.44$ ). There were more males ( $n=315$  (59%)) than females ( $n=223$  (41%)) in the sample. Five of the schools in the sample were co-educational, two of the schools were all male schools and three of the schools were all female schools.

Four of these schools were located in a city in western Ireland, while the remaining six schools were located in a city in eastern Ireland. Five of these schools could be described as socio-economically disadvantaged, based on either a formal DEIS<sup>2</sup> rating (four) or in one case, based on the analysis of professionals working with the school. In addition to five socio-economically disadvantaged schools (two primary, three post-primary), a private

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<sup>2</sup> DEIS schools are schools in the Republic of Ireland that are designated disadvantaged and therefore allocated additional resources. The DEIS initiative used the following definition of educational disadvantage in the Education Act (1998) to guide the implementation of this project when it first began in 2005: "...the impediments to education arising from social or economic disadvantage which prevent students from deriving appropriate benefit from the education in schools" (<https://www.education.ie>).

primary school, two Gaelscoileanna, an Educate Together primary school and a mainstream post-primary school were included in this sample<sup>3</sup>.

Snowballing or chain referral was used to access this sample. Snowball sampling is a technique widely used to reach populations that are generally difficult to access (Biernacki & Waldorf, 1981).

## *2.2 Procedure*

Data were collected between March and December 2014. The average overall response rate was 52% (range from 83% to 17%). The average response rate in the disadvantaged schools was 49% while the average response rate in the non-disadvantaged schools was 53%. The response rates for teacher questionnaires was 97%. The response rate for the measure of SES from parents/guardians who consented for their child to participate was 75%.

Participants completed measures of computer/ video game habits, empathy and prosocial behaviour. The researcher administered a battery of these questionnaires to each class group in the participating schools. Participants also received a glossary explaining potentially difficult words and phrases in the questionnaires. Class teachers were also asked to rate the prosocial behaviour of the participating students in their class group. Details regarding the measures used in this study are provided in the following section.

## *2.3 Measures*

### *2.3.1 Prosocial video game use*

Computer/Video game habits were measured using an adapted version of the Computer/Video Game Habits Questionnaire (Prot et al, 2014). 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,

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<sup>3</sup> . 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. However there are a number of exceptions. 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 ([www.education.ie](http://www.education.ie)).

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 4-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). Participants’ 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 weekly hours playing a particular game. Total weekly 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. <sup>4</sup>

### 2.3.2 Violent video game use

In order to measure violent video game use participants completed two items that rated the violent content of each game on a 4-point Likert scale from Never to Almost Always (Example: “How often do you shoot or kill creatures in this game?” ). Violent video game use was measured using the same procedure that had been used to measure prosocial video game use.

As has been referred to in the Introduction many games involve both prosocial and violent behaviours. The procedure for rating games as described above allowed a participant to simultaneously rate a game in relation to both the degree of violent and prosocial behaviour in the game. 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. This issue will be addressed in more detail in the Discussion section.

### 2.3.3 Weekly game play

The weekly hours spent playing each game were divided by three to obtain a measure of average game time (Weekly game play  $\alpha=.93$ ) When mean scores for weekly gameplay were

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<sup>4</sup> 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 this analysis. As some participants only listed one game in Section C, sections D and E of some questionnaires were not completed. 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 excluded in this instance.

compared to international studies this method of calculating weekly gameplay produced mean scores that were consistent with international evidence (Rideout et al, 2010).

#### *2.3.4 Empathy*

Empathy was measured using the 16-item Children's Empathic Attitudes Questionnaire (CEAQ) (Funk, Fox, Chan & Curtiss, 2008). Funk et al (2008) note that this scale is a measure of cognitive empathy a construct which the authors conceptualise as 'empathic attitudes'. The CEAQ is designed to measure attitudes and likely behaviour in children in relation to empathic responding (Example: "I feel sorry for kids who can't find anyone to hang out with".)  $\alpha = .74$ .

#### *2.3.5 Helping behaviour, cooperation and sharing, affective relationships and normative behaviour*

Helping behaviour, cooperation and sharing, affective relationships and normative behaviour were assessed using the 40 item Prosocial Orientation Questionnaire (POQ) (Cheung, Ma & Shek, 1998). The original scale was adapted to an Irish context after consultation with professionals working with participants from the current sample. Helping behaviour was measured with an 11-item subscale from the POQ (Example: "I would spend time and money to help those in need.")  $\alpha = 0.63$ . Co-operation and sharing were measured using a 7-item subscale from the POQ (Example: "I feel jealous when my friends win an award or prize.")  $\alpha = 0.50$ . The tendency to maintain friendly, affective and sympathetic relationships with family and peers was measured with an 11-item subscale from the POQ (Example: "I always argue with my family")  $\alpha = .66$ . The tendency to comply with social norms (normative relationships) was measured with an 11-item subscale from the POQ (Example: "I am always on time.")  $\alpha = .63$ .

#### *2.3.6 Prosocial behaviour (Teacher evaluation)*

The 5-item Prosocial Behaviour Subscale of The Strengths and Difficulties Questionnaire (Teacher version) (SDQ) (Goodman, 1997) was used for the teacher evaluation of the participants' prosocial behaviour. 43 teachers took part in this study. These teachers were asked to evaluate the prosocial behaviour of participating students in their classes in order to control for biases associated with self-report. The teachers were given the following instructions: "Please put a tick in the box which most accurately describes your student: Not

True, Somewhat True, Certainly True. (Example: Item 3: Helpful if someone is hurt, upset or feeling ill)  $\alpha=.89$

### *2.3.7 Socioeconomic status*

On the information sheet/consent form that was sent to all participants, parents/guardians were given the option of giving information in relation to their occupational status. The occupations of parents/guardians were coded for socioeconomic status (SES) using an Irish census based social class scale (O'Hare, Whelan & Cummins, 1991).<sup>5</sup>

### *2.4 Partial missingness*

In relation to missing data three separate strategies were used.

Firstly, in relation to the CEAQ and POQ missing values were left blank. Multiple value imputation was used for these measures as the missing values were "Missing at Random" (MAR). MAR is also referred to as ignorable non-response. According to Tabachnick and Fidell (2014) attention should be paid to the pattern rather than the amount of missing data. In the present study missing values were randomly distributed throughout the data matrix, therefore missing data could be predicted using other variables in the data set. The multiple value imputation function was used in SPSS 20 for this purpose.

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 measure were not MAR. This was due to the fact that participants who did not play games were instructed to leave the questionnaire blank. A small number of missing values that were

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<sup>5</sup> 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, eg. Social Class 1=7, Social Class 2=6. Participants who were unemployed were coded as 1. Where two parents/guardians gave their occupations, the occupation in the higher social class was used to code SES.

MAR (eg. Participants who played video games but had omitted an item rating the game's content) 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 the researcher has sufficient knowledge to input missing values (Tabachnick & Fidell, 2014). Other cases in which the same game was rated were examined by the researcher. In addition video clips of gameplay were watched by the researcher to obtain knowledge of the game's content.

Thirdly, 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. While some authors caution against the use of mean substitution when there are a large percentage of missing cases (Tabachnick & Fidell, 2014) for the purposes of multiple linear regression listwise deletion would have reduced the number of cases substantially.

Finally, in relation to 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. As this variable was not being used in the multiple linear regression it was not necessary to increase the number of cases.

## *2.5 Ethics*

Ethical approval for this project was received on 14<sup>th</sup> November 2013 from the University College Dublin Human Research Ethics Committee. 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.

### 3. Results

Table 1 displays mean scores, standard deviations and range of scores for the main scales of interest.

*Table 1 Mean scores, standard deviations and range of scores for main scales of interest*

| <b>Variable</b>                 | <b><i>N</i></b> | <b><i>M</i></b> | <b><i>SD</i></b> | <b><i>Range</i></b> |
|---------------------------------|-----------------|-----------------|------------------|---------------------|
| <b>Socio-economic status</b>    | 538             | 5.25            | 1.33             | 1-7 <sup>6</sup>    |
| <b>Prosocial video game use</b> | 532             | 28.99           | 48.08            | 0-504 <sup>7</sup>  |
| <b>Violent video game use</b>   | 532             | 23.18           | 45.96            | 0-504 <sup>8</sup>  |
| <b>Weekly game play</b>         | 538             | 9.13            | 11.06            | 0 hours-84 hours    |
| <b>Empathy</b>                  | 537             | 21.75           | 5.08             | 0-32 (max=32)       |
| <b>Helping behaviour</b>        | 530             | 34.55           | 3.66             | 17-42 (max=44)      |
| <b>Co-operation and sharing</b> | 537             | 23.15           | 2.55             | 13-28 (max=28)      |
| <b>Affective relationships</b>  | 537             | 38.77           | 3.55             | 22-44 (max=44)      |
| <b>Normative behaviour</b>      | 537             | 35.79           | 3.92             | 23-44 (max=44)      |
| <b>Prosocial behaviour</b>      | 521             | 8.23            | 2.24             | 0-10 (max=10)       |
| <b>(Teacher evaluation)</b>     |                 |                 |                  |                     |

<sup>6</sup> 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). See section 2.3 Measures for more detailed information in relation to professions corresponding to each social class.

<sup>7</sup> Scores are calculated by multiplying average ratings over 3 games by average time playing a game. Therefore a score of 0 approximates to either ratings of 0 for prosocial content or no video game play. A score of 510 approximates to 84 hours weekly game play multiplied by an average prosocial rating of 6 (e.g. a rating of “Almost Always” for each of the items measuring prosocial video game use).

<sup>8</sup> The procedure for calculating violent video game use is identical to the procedure for calculating prosocial video game use. See footnote 7 above.

Table 2 displays bivariate correlations between video game use and a variety of prosocial behaviours. The negative correlations between prosocial video game use and helping behaviour, normative behaviour, empathy and the teacher evaluation of prosocial behaviour appear to contradict the predictions of the GLM which predicts a positive association between prosocial video game use and prosocial behaviour.

*Table 2 Bivariate correlations between video game use and prosocial behaviours*

| <b>Variable</b>                         | <b>Helping<br/>behaviour</b> | <b>Cooperation<br/>and sharing</b> | <b>Affective<br/>relationships</b> | <b>Normative<br/>behaviour</b> | <b>Empathy</b> | <b>Prosocial<br/>Behaviour<br/>(teacher<br/>evaluation)</b> |
|-----------------------------------------|------------------------------|------------------------------------|------------------------------------|--------------------------------|----------------|-------------------------------------------------------------|
| <b>Prosocial<br/>video<br/>game use</b> | -.11*                        | -.07                               | -.05                               | -.12**                         | -.10*          | -.11*                                                       |
| <b>Violent<br/>video<br/>game use</b>   | -.16**                       | -.16**                             | -.16**                             | -.21**                         | -.22**         | -.16**                                                      |
| <b>Weekly<br/>game<br/>play</b>         | -.17**                       | -.14**                             | -.14**                             | -.17**                         | -.21**         | -.14**                                                      |
| ** p<.001    * p<.05                    |                              |                                    |                                    |                                |                |                                                             |

However as can be seen in Table 5 prosocial video game use had a significant positive association with cooperation and sharing, the tendency to maintain positive affective relationships and empathy in the multiple linear regressions. It is possible that this is a suppression effect (Tzelgov & Henik, 1991).

In addition the correlation between prosocial and violent video game use was high ( $r = .75$ ,  $p < .01$ ). Multicollinearity occurs when different predictors in a multiple linear regression are highly inter-related. In this case the individual predictors become redundant as all the predictors are measuring the same construct.

Multicollinearity diagnostics were carried out. Variance Inflation Factors were less than 10 in relation to each of the regression coefficients. Therefore the assumption of multicollinearity was not violated (Tabachnick & Fidell, 2014).

Finally, Pearson's Product Moment Correlations revealed that the teachers' evaluation of students' prosocial behaviour was positively correlated with the students' 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 ( $r=.25, p<.001$ ) (See Table 3).

*Table 3 Bivariate correlations between participants' self-report of prosocial behaviour and teachers' evaluation of participants' prosocial behaviour*

| <b>Variable (Participants' self-report)</b> | <b>Prosocial behaviour (teacher evaluation)</b> |
|---------------------------------------------|-------------------------------------------------|
| <b>Helping behaviour</b>                    | .20**                                           |
| <b>Cooperation and sharing</b>              | .21**                                           |
| <b>Affective relationships</b>              | .15**                                           |
| <b>Normative behaviour</b>                  | .25**                                           |

\*\*  $p<.001$

### *3.1 Empathy and prosocial video game use*

Empathy was regressed onto the variable prosocial video game use after controlling for gender, age, school type, SES, weekly game play and violent video game use. The value of  $R^2$  for empathy indicates that approximately 17.7% of the variance in the dependent variable, can be attributed to the variance of the independent variables (See Table 4). Prosocial video game use was positively related to empathy ( $\beta=.308, p<.001$ ) in a multiple linear regression (See Table 5).

### *3.2 Theoretically relevant confounding variables such as sociodemographic factors and weekly game play*

Each prosocial behaviour was regressed onto the variable prosocial video game use after controlling for the following theoretically relevant confounding variables: gender, age, school

type, SES, weekly game play and violent video game use. While all of the regression models were significant, the  $R^2$  values for cooperation and sharing as well as affective relationships are of particular interest given the positive associations between prosocial video game use and these variables in the regression models. The value of  $R^2$  for cooperation and sharing indicates that 8.6% of the variance in the dependent variable can be attributed to the variance of the independent variables. The value of  $R^2$  for affective relationships indicates that approximately 9.6% of the variance in the dependent variable can be attributed to the variance of the independent variables (See Table 4). Prosocial video game use was positively related to cooperation and sharing ( $\beta=.190$ ,  $p<.016$ ) as well as the tendency to maintain affective, friendly and sympathetic relationships ( $\beta=.222$ ,  $p<.005$ ) in the multiple linear regressions (See Table 5).

### *3.3 Violent video game use and prosocial behaviour*

Violent video game use was negatively associated with the tendency to comply with social norms ( $\beta=-.243$ ,  $p<.003$ ), the tendency to maintain affective, friendly and sympathetic relationships ( $\beta=-.189$ ,  $p<.019$ ) as well as empathy ( $\beta=-.153$ ,  $p<.045$ ) (See Table 5).

*Table 4 Model summary for multiple linear regressions for prosocial behaviours*

| <b>Dependent variable</b>                                                                                                       | <b>R</b> | <b>R<sup>2</sup></b> | <b>Adjusted R<sup>2</sup></b> | <b>Std. error of the estimate</b> |
|---------------------------------------------------------------------------------------------------------------------------------|----------|----------------------|-------------------------------|-----------------------------------|
| <b>Helping</b>                                                                                                                  | .292     | .085                 | .073                          | 3.524                             |
| <b>Cooperation and sharing</b>                                                                                                  | .294     | .086                 | .074                          | 2.456                             |
| <b>Normative behaviour</b>                                                                                                      | .269     | .073                 | .060                          | 3.797                             |
| <b>Affective relationships</b>                                                                                                  | .309     | .096                 | .084                          | 3.397                             |
| <b>Empathy</b>                                                                                                                  | .421     | .177                 | .166                          | 4.643                             |
| <b>Independent variables: Gender, age, school type, SES, violent video game use, prosocial video game use, weekly game play</b> |          |                      |                               |                                   |

*Table 5 Regression coefficients for associations between prosocial video game use and prosocial behaviour*

| <b>Prosocial variable</b>             | <b><math>\beta</math></b> | <b>t</b> | <b>p</b> |
|---------------------------------------|---------------------------|----------|----------|
| <b><i>Helping behaviour</i></b>       |                           |          |          |
| <b>Gender <sup>9</sup></b>            | .210                      | 4.766    | .001     |
| <b>Age</b>                            | .051                      | 1.181    | .238     |
| <b>School type<sup>10</sup></b>       | -.051                     | -1.054   | .292     |
| <b>SES<sup>11</sup></b>               | .043                      | .926     | .355     |
| <b>Weekly game play</b>               | -.174                     | -1.705   | .089     |
| <b>Violent video game use</b>         | -.068                     | -.843    | .400     |
| <b>Prosocial video game use</b>       | .137                      | 1.736    | .083     |
| <b><i>Cooperation and sharing</i></b> |                           |          |          |
| <b>Gender</b>                         | .190                      | 4.348    | .001     |
| <b>Age</b>                            | -.148                     | -3.456   | .001     |
| <b>School type</b>                    | -.019                     | -.407    | .684     |
| <b>SES</b>                            | .025                      | .549     | .583     |
| <b>Weekly game play</b>               | -.145                     | -1.424   | .155     |
| <b>Violent video game use</b>         | -.157                     | -1.942   | .053     |
| <b>Prosocial video game use</b>       | .190                      | 2.416    | .016     |

<sup>9</sup> Gender (1=male; 2=female)

<sup>10</sup> School type (1=disadvantaged; 2=non-disadvantaged)

<sup>11</sup> 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 5 Regression coefficients for associations between prosocial video game use and prosocial behaviour (Continued)*

| <b>Prosocial variable</b>       | <b><math>\beta</math></b> | <b>t</b> | <b>p</b> |
|---------------------------------|---------------------------|----------|----------|
| <b>Normative behaviour</b>      |                           |          |          |
| <b>Gender</b>                   | .150                      | 3.388    | .001     |
| <b>Age</b>                      | -.060                     | -1.384   | .167     |
| <b>School type</b>              | -.019                     | -.397    | .692     |
| <b>SES</b>                      | .078                      | 1.690    | .092     |
| <b>Weekly game play</b>         | .003                      | .029     | .977     |
| <b>Violent video game use</b>   | -.243                     | -2.995   | .003     |
| <b>Prosocial video game use</b> | .090                      | 1.138    | .256     |
| <b>Affective relationships</b>  |                           |          |          |
| <b>Gender</b>                   | .127                      | 2.911    | .004     |
| <b>Age</b>                      | -.167                     | -3.923   | .001     |
| <b>School Type</b>              | -.069                     | -1.454   | .147     |
| <b>SES</b>                      | .140                      | 3.073    | .002     |
| <b>Weekly game play</b>         | -.147                     | -1.451   | .147     |
| <b>Violent video game use</b>   | -.189                     | -2.363   | .019     |
| <b>Prosocial video game use</b> | .222                      | 2.845    | .005     |
| <b>Empathy</b>                  |                           |          |          |
| <b>Gender</b>                   | .316                      | 7.599    | .001     |
| <b>Age</b>                      | .006                      | .153     | .878     |
| <b>School type</b>              | .138                      | 3.051    | .002     |
| <b>SES</b>                      | .046                      | 1.060    | .290     |
| <b>Weekly game play</b>         | -.202                     | -2.098   | .036     |
| <b>Violent video game use</b>   | -.153                     | -2.005   | .045     |
| <b>Prosocial video game use</b> | .308                      | 4.127    | .001     |

### *3.4 Results and the GLM*

These results are consistent with some of the predictions of the GLM which predicts that prosocial video game use will be positively associated with prosocial behaviour and that violent video game use will be negatively associated with prosocial behaviour. However previous research has found associations between prosocial video game use and other prosocial behaviours such as helping behaviour (Gentile et al., 2009; Prot et al., 2014).

## **4. Discussion**

### *4.1 Discussion of findings*

The main findings from this study indicate a positive and significant relationship between prosocial video game use and the following dependent variables: cooperation and sharing, the tendency to maintain positive affective relationships as well as empathy. Previous studies investigating the relationship between prosocial video game use and prosocial behaviour in children have found a positive relationship between prosocial video game use and prosocial behaviour (Gentile et al., 2009; Prot et al., 2014). These studies found that prosocial video game use was positively associated with cooperation, helping behaviour and empathy in children and adolescents (Gentile et al., 2009; Prot et al., 2014). These studies did not measure normative behaviour or affective relationships. In sections 4.1.1 to 4.1.3 the findings of the present study will be discussed in relation to the three objectives outlined in the Introduction.

#### *4.1.1 Objective 1: To determine if prosocial video game use was positively associated with empathy in children and adolescents.*

The positive association between prosocial video game use and empathy in the multiple linear regression model 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). 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.

*4.1.2 Objective 2: 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.*

Multiple linear regressions were carried out with the following dependent variables measuring prosocial behaviours: helping behaviour, cooperation and sharing, normative behaviour, affective relationships. The following independent variables were controlled for: gender, age, school type, SES, weekly game play and violent video game use. As has been discussed in the introduction, 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 linear regressions prosocial video game use was positively associated with prosocial behaviours such as cooperation and sharing as well as the tendency to maintain positive affective relationships. The significant association between prosocial video game use and the abovementioned prosocial behaviours while controlling for confounding variables strengthens the evidence of a prosocial video game effect.

*4.1.3 Objective 3: To determine if there was a negative relationship between violent video game use and prosocial behaviour in children and adolescents.*

Finally, 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 affective relationships, normative behaviour and empathy.

#### 4.1.4 Suppression

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.

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 the multiple linear regression. This is an example of negative suppression (Tzelgov & Henik, 1991). Violent video game use was negatively associated with empathy both in a bivariate correlation and the multiple linear regression. Therefore suppression effects did not occur in relation violent video game use.

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 *Call of Duty* involves prosocial behaviours such as cooperating with members of an army unit as well as violent behaviours such as fighting enemy armies. 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.

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. These findings further outline the complexity of studying video game use in young people. Behaviour in the virtual reality of a video game environment cannot be neatly compartmentalised into a dichotomy of purely prosocial or violent behaviour. In the same way that individual human behaviour can contain both prosocial and violent components, behaviour within a video game environment can be influenced by both prosocial and violent motives.

#### *4.2 Limitations*

This study had a number of methodological weaknesses. Firstly, the sample was a convenience sample rather than one drawn by random sampling. Although the sample was not necessarily representative it was diverse, drawn from ten schools representing various socio-economic groups. Therefore it could be argued that the sample was an accurate reflection of the diversity of 9-15 year old young people. Secondly, the internal reliability estimates of a number of the measures of prosocial behaviour were below 0.70. However previous studies which have used these measures of prosocial behaviour have found similar levels of internal reliability (Cheung et al, 1998). Thirdly the present study used a number of self-report measures which 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 evaluation of the participants' prosocial behaviour, which was positively correlated with the participants' self-report of prosocial behaviour. Although video game use was also measured by self-report, comparison of expert ratings and participant's ratings of video game ratings have been highly correlated in previous research (Gentile et al, 2009).

Finally, a significant methodological weakness of this study was its cross-sectional correlational design. 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).

#### *4.3 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). 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. Each model integrates elements of five different socio-cognitive theories of personality theories in an attempt to explain video game effects. These five theories are Cognitive Neo-Associative Theory (Berkowitz, 1984), Excitation Transfer Theory (Zillman, 1971), Social Learning Theory (Bandura, 1977), Script Theory (Huesmann, 1986) and Social Information Processing (Crick & Dodge, 1994) (as cited in Bartlett & Anderson, 2013).

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 noted in the introduction, 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 video game are reciprocally reinforced through both classical and operant conditioning.

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 consistent with the social cognitive theories of personality, which are integrated in this model (Prot et al, 2014). 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 positive psychology could be advanced to explain prosocial video game effects.

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). It is theoretically plausible that a prosocial video game such as *Peacemaker* (<http://www.peacemakergame.com>) might induce elevation in players which could mediate prosocial video game effects.

The Broaden and Build Theory of Positive Emotion (Friedrickson, 2001) hypothesises that positive emotion broadens thought-action repertoires in the actual moment. 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

#### *4.4 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, 2008), to teach civics to middle school students ([www.icivics.org](http://www.icivics.org)) and to teach geometry and social studies to elementary school students (<https://minecraftedu.com>). The video game Secret Agent Society is used for social skills instruction for children with Asperger's Syndrome (<http://www.sst-institute.net>). Based on the evidence from the present study video games with prosocial content could be used by educators to develop empathic concern and improve affective relationships in a diverse population of youth.

#### *4.5 Future research*

Disadvantaged populations could particularly 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 by using experimental and longitudinal designs in order to establish causal relationships.

### **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). However, the findings from the present study suggest that emotions rather than cognitions could explain prosocial video game effects. Therefore future studies 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

- Achtman, R. L., Green, C. S., & Bavelier, D. (2008). Video games as a tool to train visual skills. *Restorative Neurology and Neuroscience*, 26(4-5), 435–446.
- Anderson, C.A., & Bushman, B.J. (2001). Effects of violent video games on aggressive behavior, aggressive cognition, aggressive affect, physiological arousal, and prosocial behavior: A meta-analytic review of the scientific literature. *Psychological Science*, 12, 353-359.
- Anderson, C.A., Gentile, D.A. & Buckley, K.E. (2007). *Violent video game effects on children and adolescents: Theory, research, and public policy*. New York: Oxford University Press.
- Anderson, C. A., Shibuya, A., Ihori, N., Swing, E. L., Bushman, B. J., Sakamoto, A. et al., (2010). Violent video game effects on aggression, empathy, and prosocial behavior in Eastern and Western countries: A meta-analytic review. *Psychological Bulletin*, 136(2), 151-173.
- Bandura, A. (1977). *Social Learning Theory*. Englewood Cliffs, NJ: Prentice Hall.
- Bartlett, C.P. & Anderson, C.A. (2013) Examining media effects: the General Aggression and General Learning Models. In Erica Scharrer (ed.) *The International Encyclopedia of Media Studies Volume 5: Media Effects/Media Psychology* (pp. 1-20). London: Blackwell.
- Berkowitz, L. (1984). Some effects of thoughts on anti- and prosocial influences of media events: A cognitive neoassociation analysis. *Psychological Bulletin*, 95 (3) 410-427
- Biernacki, P. & Waldorf, D. (1981). Snowball sampling: problems and techniques of chain referral sampling. *Sociological Methods and Research*, 10(2) 141-163.
- Bijvank, M.N., Konijn, E.A. & Bushman, B.J. (2012). “We don’t need no education”: Video game preferences, video game motivations, and aggressiveness among adolescent boys of different educational ability levels. *Journal of Adolescence*, 35(1) 153–162.

- Boxer, P, Huesmann, R.L., Bushman, B.J., O'Brien, M. & Mocer, D (2008). The role of violent media preference and cumulative developmental risk for violence and general aggression. *Journal of Youth and Adolescence*, 38 417-428.
- Calvert, S.L. (2008). Children as Consumers: Advertising and Marketing. *The Future of Children*, 18(1), 205-234.
- Calvo, A.J., Gonzalez, R. & Martorell, M.C. (2014). Variables relacionadas con la conducta prosocial en la infancia y adolescencia: personalidad, autoconcepto y género/ Variables related to prosocial behaviour in childhood and adolescence: Personality, self-concept and gender. *Infancia y Aprendizaje: Journal for the Study of Education and Development*. 24(1) 95-111.
- Caprara, G.V. & Pastorelli, C. (1993). Early emotional instability, prosocial behaviour, and aggression: some methodological aspects. *European Journal of Personality*, 7, 19-36
- Caprara, G.V., Barbaranelli, C., Pastorelli, C., Bandura, A. & Zimbardo, P. (2000). Prosocial Foundations of Children's Academic Achievement. *Psychological Science*, 11(4), 302-306.
- Cheung, P.C., Ma, H.K., & Shek, T.L.D. (1998). Conceptions of success: their correlates with prosocial orientation and behaviour in Chinese adolescents. *Journal of Adolescence*, 21, 31-42.
- Crick, N.R. & Dodge, K.A. (1994). A review and reformulation of social information processing mechanisms in children's social adjustment. *Psychological Bulletin*, 115 (1), 74-101.
- Dietz, T.L. (1998). An Examination of Violence and Gender Role Portrayals in Video Games: Implications for Gender Socialization and Aggressive Behavior. *Sex Roles*. 38(5-6), 425-442.

- Eagly, A.H. & Crowley, M. (1986) Gender and helping behavior: A meta-analytic review of the social psychological literature. *Psychological Bulletin*, 100(3), 283-308.
- Eisenberg, N. & Mussen, P.H. (1989). *The Roots of Prosocial Behaviour in Children*. Cambridge: Cambridge University Press.
- Entertainment Software Association (2015). *Sales, Demographic and Usage Data: Essential Facts about the video game industry*.
- Ferguson, C.J, San Miguel, C., Garza, A. & Jerabeck, J.M. (2012). A longitudinal test of video game violence influences on dating and aggression: A 3-year longitudinal study of adolescents. *Journal of Psychiatric Research*, 46(2), 141–146
- Friedrickson, B.L. (2001). The role of positive emotions in positive psychology: the broaden-and-build theory of positive emotions. *American Psychologist*, 56(3), 218-226
- Funk, J.B., Fox, C.M., Chan, M. & Curtiss, K. (2008). The development of the Children's Empathic Attitudes Scale using classical and Rasch analyses. *Journal of Applied Developmental Psychology*, 29 187-198
- Gee, J.P. (2003). What video games have to teach us about learning and literacy. *Computers in Entertainment*, 1, 1-4.
- Gentile, D.A. & Gentile, J.R. (2008). Violent Video Games as Exemplary Teachers: A Conceptual Analysis. *Journal of Youth and Adolescence*, 37(2) 127-141.
- Gentile, D.A., Anderson, C.A., Yukawa, S., Ihoro, N., Kam Ming, L., Shibuya, A., Liau, A.K., Khoo, A., Bushman, B.J., Huesmann, L.R. & Sakamoto, A. (2009). The effects of prosocial video games on prosocial behaviors: International Evidence from correlational, longitudinal and experimental studies. *Personality and Social Psychology Bulletin*, 35(6), 752-763.

- Gentile, D.A., Li, D., Khoo, A., Prot, S. & Anderson, C.A. (2014). Mediators and Moderators of Long-term Effects of Violent Video Games on Aggressive Behavior. *JAMA Pediatrics*, 168(5), 450-457.
- Goodman, R. (1997). The Strengths and Difficulties Questionnaire: a research note. *Journal of Child Psychology and Psychiatry*, 38(5), 581-586.
- Granic, I. Lobel, A. & Engels, R.C.M.E. (2014). The benefits of playing video games. *American Psychologist*, 69(1), 66-78.
- Greitemeyer, T. & Osswald, S. (2010). Effects of prosocial video games on prosocial behaviour. *Journal of Personality and Social Psychology*, 98(2), 211-221
- Greitemeyer, T. & Mugge, D. (2014). Video games do affect social outcomes: A meta-analytic review of the effects of violent and prosocial video game play. *Personality and Social Psychology Bulletin*, 40(5), 578-589.
- Guinote, A., Cotzia, I., Sandhu, S. & Siwa, P. (2015). Social status modulates prosocial behavior and egalitarianism in preschool children and adults. *PNAS*, 122(3), 731-736.
- Haidt, J. (2003). Elevation and the positive psychology of morality. In C. L. M. Keyes & J. Haidt (Eds.) *Flourishing: Positive psychology and the life well-lived* (pp. 275-289). Washington DC: American Psychological Association.
- Hinkle, D.E., Wiersma, W. & Jurs, S.G. (1994). *Applied Statistics for the Behavioral Sciences*. Boston: Houghton Mifflin.
- Hoglund, W.L. & Leadbetter, B.J. (2004). The effects of family, school, and classroom ecologies on changes in children's social competence and emotional and behavioral problems in first grade. *Developmental Psychology*, 40(4), 533-544.

- Huesmann, L.R. (1986). Psychological processes promoting the relation between exposure to media violence and aggressive behaviour by the viewer. *Journal of Social Issues*, 42 (3) 125-139
- Kazdin, A. E. (1987). Treatment of antisocial behavior in children: Current status and future directions. *Psychological Bulletin*, 102(2), 187-203.
- Mazurek, M.O. & Engelhardt, C.R. (2013). Video game use in boys with Autism Spectrum Disorder, ADHD, or typical development. *Pediatrics*, 132(2) 260 -266.
- Mc Loyd, V.C. (1998). Socioeconomic disadvantage and child development. *American Psychologist*, 53(2), 185-204.
- O'Hare, A., Whelan, C. T. & Commins, P. (1991). The development of an Irish census-based social class scale. *Economic & Social Review*, 22(2), 135-156.
- Prot, S. & Anderson, C.A. (2013). Research methods, design and statistics in media psychology. In Karen E. Dill (Ed.). *The Oxford Handbook of Media Psychology* (pp. 109-136). New York: Oxford University
- Prot, S., Gentile, D.A., Anderson, C.A., Suzuki, K., Swing, E., Lim, K.M., .... Lam, B.C.P. (2014). Long-term relations among prosocial-media use, empathy and prosocial behavior. *Psychological Science*, 25 (2) 358-368.
- Rideout, V.J., Foehr, U.L. & Roberts, D.F. (2010). *Generation M: Media in the Lives of 8-18 Year-Olds*. Menlo Park, CA: Henry J. Kaiser Family Foundation.
- Tabachnick, B.G. & Fidell, L.S. (2014). *Using multivariate statistics*. Edinburgh: Pearson Education Limited.
- Tzelgov, J. & Henik, A. (1991). Suppression situations in psychological research: Definitions, implications, and applications. *Psychological Bulletin*, 109(3), 524-536.

Zillmann, D. (1971). Excitation transfer in communication-mediated aggressive behaviour.  
*Journal of Experimental Social Psychology*, 7 (4), 419-434.

