

## The effect of video games on positive and negative cognitions

## O efeito dos videogames nas cognições positivas e negativas

## El efecto de los videojuegos en las cogniciones positivas y negativas

*Tailson Evangelista Mariano(1); Valdiney Veloso Gouveia(2); Carlos Eduardo Pimentel(3)*

1 Universidade Federal da Paraíba – Paraíba, Brasil.

E-mail: tailsonmariano@hotmail.com | ORCID: <https://orcid.org/0000-0001-6716-0250>

2 Universidade Federal da Paraíba – Paraíba, Brasil.

E-mail: vvgouveia@gmail.com | ORCID: <https://orcid.org/0000-0003-2107-5848>

3 Universidade Federal da Paraíba – Paraíba, Brasil.

E-mail: carlosepimentel@bol.com.br | ORCID: <https://orcid.org/0000-0003-3894-5790>

**Revista de Psicologia da IMED**, Passo Fundo, vol. 12, n. 1, p. 7-18, Janeiro-Junho, 2020 - ISSN 2175-5027

[Submetido: Fevereiro 04, 2019; Revisão1: Março 10, 2019; Revisão2: Julho 11, 2019;

Aceito: Julho 12, 2019; Publicado: Dezembro 20, 2019]

DOI: <https://doi.org/10.18256/2175-5027.2020.v12i1.3172>

### Endereço correspondente / Correspondence address

Tailson Evangelista Mariano

Universidade Federal da Paraíba

Campus I - Lot. Cidade Universitaria, PB, Brasil

CEP 58051-900

Sistema de Avaliação: *Double Blind Review*

Editor: Roberto Guedes de Nonohay

Como citar este artigo / To cite this article: [clique aqui!/click here!](#)

## Abstract

The effects of video games have attracted the attention of many researchers in psychology, especially when one suggests aggressive behavior related to violent games. Games with pro-social content have attracted less attention, but research in the field reveals that pro-social games increase positive cognitions and that violent games increase the incidence of aggressive cognitions. The objective of the current study was to verify the effect of violent and pro-social games on the cognitions of the players within two days of experiments. To this end, 30 undergraduate students played one type of game each day for 20 minutes and responded to a word-free association task to categorize their cognitions into either positive or negative. The main findings showed that violent games increased the occurrence of negative cognitions, but the pro-social games did not increase the pro-social cognitions. Finally, these findings are discussed based on previous research on the effect of violent and pro-social video game play.

**Keywords:** video games, aggression, cognition

## Resumo

Os efeitos dos videogames atraíram a atenção de muitos pesquisadores em psicologia, especialmente quando se sugere comportamentos agressivos relacionados a jogos violentos. Os jogos com conteúdo pró-sociais despertaram menos atenção, mas as pesquisas na área revelam que os jogos pró-sociais aumentam as cognições positivas e que os jogos violentos aumentam a incidência de cognições agressivas. O objetivo do atual estudo foi verificar o efeito de jogos violentos e pró-sociais sobre as cognições dos jogadores dentro de dois dias de experimentos. Para este fim, 30 participantes estudantes de graduação jogaram durante 20 minutos um tipo de jogo em cada dia de experimento e responderam a uma tarefa de associação livre de palavras para categorizar suas cognições em positivas ou negativas. Os principais achados mostraram que os jogos violentos aumentaram a ocorrência de cognições negativas, mas os jogos pró-sociais não aumentaram as cognições pró-sociais. Por fim, essas descobertas são discutidas com base em pesquisas anteriores sobre o efeito de jogos de videogames violentos e pró-sociais.

**Palavras-chave:** jogos de vídeo, agressão, cognição

## Resumen

Los efectos de los videojuegos atrajeron la atención de muchos investigadores en psicología, especialmente cuando se sugiere comportamientos agresivos relacionados con juegos violentos. Los juegos con contenido pro-social despertaron menos atención, pero las investigaciones en el área revelan que los juegos pro-sociales aumentan las cogniciones positivas y que los juegos violentos aumentan la incidencia de cogniciones agresivas. El objetivo del actual estudio fue verificar el efecto de juegos violentos y pro-sociales sobre las cogniciones de los jugadores dentro de dos días de experimentos. Para este fin, 30 participantes estudiantes de graduación jugó durante 20 minutos un tipo de juego en cada día de experimento y respondieron a una tarea de asociación libre de palabras para categorizar sus cogniciones en positivas o negativas. Los principales hallazgos mostraron que los juegos violentos aumentaron la ocurrencia de cogniciones negativas, pero los juegos pro-sociales no aumentaron las cogniciones pro-sociales. Por último, estos descubrimientos se discuten sobre la base de investigaciones anteriores sobre el efecto de juegos de videojuegos violentos y pro-sociales.

**Palabras clave:** videojuegos, agresión, cognición

## Introduction

The popularity of video games brought with it the interest in knowing the effects that this type of media can cause in the life of the players, mainly considering that most players prefer violent games (Funk, 2008; Pimentel, Mendes, Lobo, Barbosa, & Mariano, 2017). This has led to much research in recent years showing results of positive and negative effects of videogames (Anderson et al., 2010; Bushman & Huesman, 2014; Ferguson, 2015; Greitemeyer & Osswald, 2009, 2010; Greitemeyer & Mügge, 2014) and involving a fierce dispute (Anderson et al., 2010; Bushman, Rothstein, & Anderson, 2010; Ferguson & Kilburn, 2010).

Studies have investigated the effect of videogames on human cognition and show that participants playing violent games present more aggressive cognitions (e.g., negative thoughts) than participants who played nonviolent video games (Anderson & Carnagey, 2009; Anderson et al., 2010) and that prosocial games increase prosocial cognitions (e.g., positive thoughts) (Narvaez, Mattan, MacMichael, & Squillace, 2008) and reduce aggressive cognitions (Greitemeyer & Osswald, 2009). Based on General Aggression Model (GAM, Anderson, & Bushman, 2002; Anderson & Carnagey, 2004; Anderson & Huesmann, 2003), playing a violent video game can influence aggression through the cognitive route, which could stimulate aggressive thoughts for example (Anderson et al., 2004). Thus, it is important to consider not only the short-term effects but also the consequences that the constant contact that certain types of video game can cause in the long-term behaviours and cognitions of the players (Hasan, Bègue, Scharkow, & Bushman, 2013).

The GAM (Anderson & Bushman, 2002; Anderson & Carnagey, 2004; Anderson & Huesmann, 2003) was the theoretical model used to base the current study because it is the most widespread and because it is an integrative social-cognitive model that seeks to explain both short-term and cumulative (long-term) effects of exposure to violent and prosocial media. According to this model, media content (e.g., violent or prosocial video game) affects the processing of new information by activating at least one of three routes: cognitions, arousal, and affect. This process results in cognitions (positive or negative thoughts), which in turn results in behaviours (Anderson & Bushman 2002; Anderson & Dill, 2000; Anderson et al., 2004; Cavalcanti & Pimentel, 2016; DeWall, Anderson, & Bushman, 2011; Greitemeyer & Osswald, 2009; Tear & Nielsen, 2013).

In sum, the current evidence suggests most of studies have mainly focused on violent games, being carried out in the United States milieu (Anderson et al., 2010). They are still scarce studies with prosocial games and those on video games effects in Brazil (Mariano, 2016; Sarmet & Pilati, 2016). Moreover, it seems relevant the importance of replication advocated by the APA for the development of psychological

science (Amir & Sharon, 1990; Galak, LeBoeuf, Nelson, & Simmons, 2012; Novotney, 2014). Thus, the aim of the objective of the present research was to verify the effects of violent and prosocial video games in positive and negative cognitions, considering the interval of 1 and 2 days, in line with the studies of Greitemeyer and Osswald (2009), and Hasan et al. (2013).

For the current experiment, positive and negative cognitions of the players were measured after playing one of the three types of games. We expect that players who play the prosocial game will manifest more positive cognitions than those who played the other types of games (short-term effect) and that these cognitions will increase from the first to the second experiment day (long-term effect). In addition, we also predict that players in violent play conditions will have more negative cognitions after playing on the first experiment day (short-term effect) and will increase their negative cognition on the second experiment day (long-term effect). Participants in the control group will remain constant.

## Method

### Participants

Thirty college students participated in this study, of which 21 were female and nine were male, with a mean age of 22.3 years ( $SD = 4.9$ , ranging from 18 to 44). Most of them are Catholics (56.7%) and consider themselves very religious (30%). It was a convenience sample (not probabilistic).

### Instruments

Participants were told they would be part of a two-day experiment on the fun level of classic video game games. After signing the consent form, participants were randomly assigned to play a prosocial ( $n = 10$ ), violent ( $n = 10$ ) or neutral ( $n = 10$ ) game. We used two prosocial games (City Crisis and Firefighter, all rated 10+), two violent games (Mortal Kombat III and Shadows of Rome, all rated 18+) and two neutral games (Tetris and Beach Volleyball, all rated 10+). Participants played the same type of game for 20 minutes on each day. The order of the games was also randomized.

### Procedure

After playing the game, the participants performed a task of expression of positive and negative cognitions in the two days of experiment. Participants should write down the first ten thoughts they think about after playing (e.g., “help” and “fight”)

and then classify them as positive or negative. Similar experimental tasks have been used successfully in previous research on the effects of prosocial and violent games (Bushman & Anderson, 2002; Greitemeyer & Osswald, 2009).

Finally, participants rated (1 = not at all to 7 = extremely) how much they liked the game, level of difficulty and fun, which was the ostensible goal of the study (In order not to alert participants to the true purpose of the experiment, participants were not asked about how prosocial and violent they perceived the games, Greitemeyer & Osswald, 2009). The other classifications were used as possible covariates to control differences between cognitions and game types. However, as the same pattern of results were obtained with and without the covariables, we did not use them in the analyzes. On the last day of the experiment, the debriefing was done, which included the participants' level of suspicion. No participants realized the purpose of the study. All ethical procedures in human research were followed according to resolution 466/12 of the National Health Council, obtaining approval from the ethics committee under protocol 1,159,428.

## Data Analysis

For the tabulation and the statistical analyzes of the data was used IBM SPSS Statistics 21. Used to carry out descriptive statistical analysis. In addition to analysis of variance (ANOVA), with the purpose of identifying the differences between the groups that compose the study.

## Results

A analysis of variance (ANOVA) with repeated measure was used to test the hypothesis for each day of experiment. The total number of words used as cognitive expressions for each study group on the two days of experiment is shown in Table 1.

**Table 1.** Amount of cognitions expressed by participants

	Day 1 Positive Cognitions	Day 1 Negative Cognitions	Day 2 Positive Cognitions	Day 2 Negative Cognitions
Neutral	86	14	78	22
Violent	51	49	49	51
Prosocial	80	20	76	24

The ANOVA reveal an significant interaction between type of cognition and type of video game,  $F(2, 27) = 9.15, p < .001, \eta^2 = .40$ . However, contrary to what was expected, the condition of neutral play was the one that presented a higher average of positive cognitions ( $M = 8.60, SD = 2.75; M = 7.80, SD = 3.04$ ) than the violent ( $M = 5.10,$

$SD = 1.66$ ;  $M = 4.90$ ,  $SD = 1.85$ ) and prosocial ( $M = 8.00$ ,  $SD = 1.05$ ;  $M = 7.60$ ,  $SD = 1.26$ ) conditions. This results show that continuously playing a prosocial game does not increase the incidence of positive cognitions (see Figure 1).

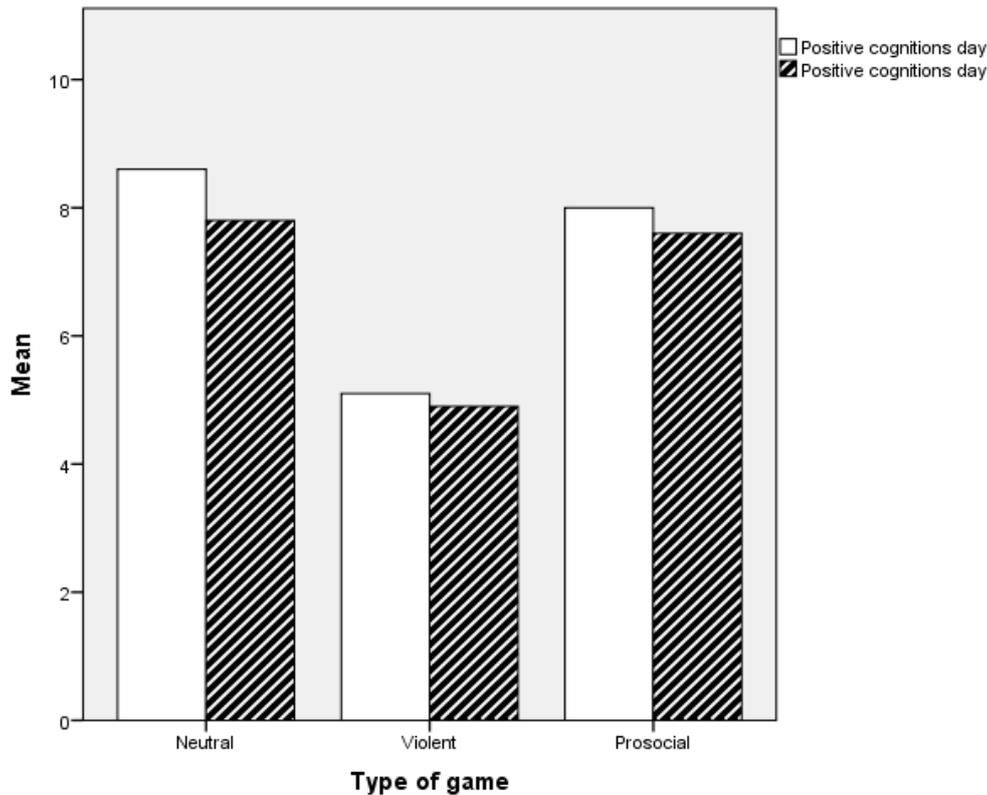


Figure 1. Means of positive cognitions from neutral, violent and prosocial games.

Likewise an ANOVA showed that there was a significant interaction between type of cognition and type of video game,  $F(2, 27) = 5.49$ ,  $p < .01$ ,  $\eta^2 = .29$ . As expected, there was an increase in negative cognitions in the three game types from the first to the second experiment day: neutral ( $M = 1.40$ ,  $SD = 2.75$ ;  $M = 2.20$ ,  $SD = 3.04$ ), violent ( $M = 4.90$ ,  $SD = 1.66$ ;  $M = 5.10$ ,  $SD = 1.85$ ) and prosocial ( $M = 2.00$ ,  $SD = 1.05$ ;  $M = 2.40$ ,  $SD = 1.26$ ). See Figure 2.

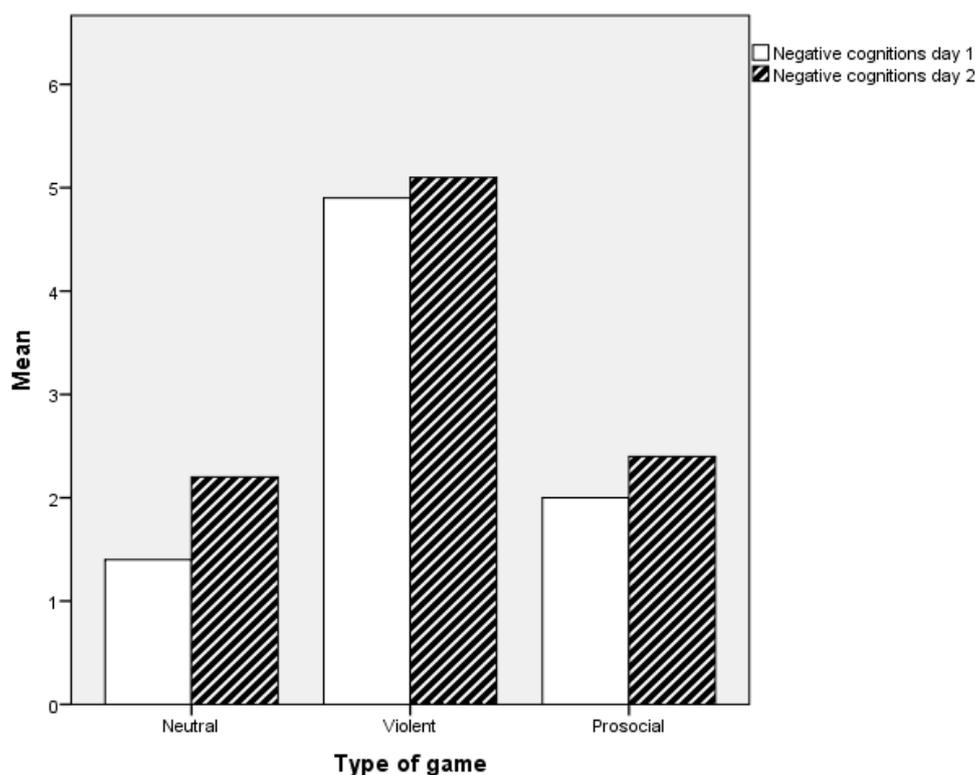


Figure 2. Means of negative cognitions from neutral, violent and prosocial games.

## Discussion

Does video games do good or bad? This debate has gone on for many decades in the scientific arena, and many researchers have been researching the effects of video games to respond (Greitemeyer & Mügge, 2014). In this sense, we conducted a 2-day experiment to verify the short-term and long-term effects of prosocial and violent games.

As expected, participants in the prosocial game condition had higher means in positive cognitions compared to violent game players in both days of experiment (short-term effect). However, these cognitions did not increase from the first to the second experiment day as predicted (long-term effect) (Greitemeyer & Osswald, 2009). Likewise, violent game players had higher average than participants in the conditions of prosocial and neutral game. The incidence of negative cognitions increased from the first to the second experiment day. These findings corroborate the hypotheses about the short-term and long-term effects of violent games reducing prosocial (positive) cognitions and increasing antisocial cognitions (negative). Following the example of Anderson et al. (2004), who conducted a study using various methods to test key assumptions about the short- and long-term impact of exposure to violent video games. In this research, they found that violent video games generally increase the accessibility of aggressive thoughts (negative cognition).

Moreover, the study by Hasan et al. (2013) tested the cumulative effects of playing violent video games for three consecutive days. They found that there was an increase

in aggressive behavior and hostile expectations. Thus, the results found in this study are in consonance with the results published in the last 25 years of research in this field (Bushman & Huesmann, 2014). These results are consistent with the idea that exposure to violent media, such as violent videogames, may have a cumulative effect of aggressive thoughts and behaviour over time, as stated by GAM (Anderson & Bushman, 2002).

One possible reason why prosocial games did not increase positive words concerns the choice of prosocial games used in this study. Although they are titles already used in research as prosocial games (Greitemeyer, Agthe, Turner, & Gschwendtner, 2012, Greitemeyer & Osswald, 2010), both are likely to stimulate negative thoughts as well as prosocial because they both involve fire, death, injuries, pain and so on. Thus, it is suggested that in future studies the same neutral and violent games should be used, but that prosocial games should be replaced by games involving the main character helping other characters and not thinking about injury and death.

Other variables such as competition and difficulty may have contributed to these results too. There is evidence that violent games themselves do not differ from prosocial games only by aggressive content but by these two variables (Adachi & Willoughby, 2011; Przybylski, Deci, Rigby, & Ryan, 2014). The violent game of the first experiment day (*Shadow of Rome*) is more intuitive and less competitive, so the player is in an arena with other characters with limited artificial intelligence, posing no challenge even for the most inexperienced participants. Meanwhile, the second violent game used (*Mortal Kombat III*) is a classic fighting game between two fighters, which can increase competitiveness. In addition, greater skill is required to perform combos of blows and cast spells that require extensive sequences of buttons, which may influence its greater difficulty.

It should also be considered that studies about the effects of videogames have so far shown an average effect ( $r = 0.24$ , Anderson et al., 2010) of violent video games on negative cognitions, others an almost non-existent effect ( $r = 0.04$ , Ferguson, 2015). On the other hand, there is evidence that prosocial video games increase prosocial cognitions and behaviours while reducing antisocial cognitions and behaviours (Gentile et al., 2009; Greitemeyer & Osswald, 2009, 2010).

## Final considerations

Like all scientific research, this experiment is not without limitations. Thus, we can cite the possible sample bias, as our sample included only ten participants in each game condition. In addition, the time of exposure to games perhaps 20 minutes is too short to influence the behaviour of the participants (Ferguson et al., 2008). Another relevant factor was the age of the participants, who were mostly young adults ( $M = 22.3$  years). Older participants may be accustomed to the violence contained in video games,

which may have had an impact on their responses. In addition, older participants may be more familiar with the media debate about violence in video games and may have adjusted their behaviour, possibly to confirm the effects of the experiment (Bender, Rothmund, & Gollwitzer, 2013). Future research should consider these limitations.

This research and the conclusions that follow suggest important implications for the study of the short-term and long-term effects of videogames, especially in the Brazilian context. Thus, it is recommended that further replication studies be conducted, as well as longitudinal studies with designs that do not only assess video games impact in isolation, collaborating to this recurrent debate in the literature.

### *Acknowledgments*

We thank Professor Craig A. Anderson for their helpful comments on an earlier version of this work.

## References

- Adachi, P., & Willoughby, T. (2011). The effect of video game competition and violence on aggressive behaviour: which characteristic has the greatest influence? *Psychology of Violence, 1*(4), 259-274. doi: <https://doi.org/10.1037/a0024908>
- Amir, Y., & Sharon, I. (1990). Replication research: A “must” for the scientific advancement of psychology. *Journal of Social Behavior and Personality, Special Issue, 5*, 51-69.
- Anderson, C. A., & Bushman, B. J. (2002). Human aggression. *Annual Review of Psychology, 53*, 27-51. doi: <https://doi.org/10.1146/annurev.psych.53.100901.135231>
- Anderson, C. A., & Carnagey, N. L. (2004). Violent evil and the general aggression model. In A. Miller (Ed.), *The social psychology of good and evil* (pp. 168–192). New York: Guilford Publications.
- Anderson, C. A., & Huesmann, L. R. (2003). Human aggression: A social–cognitive view. In M. Hogg & J. Cooper (Eds.), *Handbook of social psychology* (pp. 296–323). London: Sage Publications.
- Anderson, C. A., & Carnagey, N. L. (2009). Causal effects of violent sports video games on aggression: Is it competitiveness or violent content? *Journal of Experimental Social Psychology, 45*(4), 731-739. doi: <https://doi.org/10.1016/j.jesp.2009.04.019>
- Anderson, C. A., & Dill, K. E. (2000). Video games and aggressive thoughts, feelings, and behaviour in the laboratory and in life. *Journal of Personality and Social Psychology, 78*(4), 772-790. doi: <https://doi.org/10.1037/0022-3514.78.4.772>
- Anderson, C. A., Carnagey, N. L., Flanagan, M., Benjamin, A. J., Eubanks, J., & Valentine, J. C. (2004). Violent video games: Specific effects of violent content on aggressive thoughts and behaviour. *Advances in Experimental Social Psychology, 36*, 199–249. doi: [https://doi.org/10.1016/S0065-2601\(04\)36004-1](https://doi.org/10.1016/S0065-2601(04)36004-1)
- Anderson, C.A., Shibuya, A., Ihori, N., Swing, E.L., Bushman, B. J., Sakamoto, A., Rothstein, H. R., & Saleem, M. (2010). Violent video game effects on aggression, empathy, and prosocial behaviour in eastern and western countries: A meta-analytic review. *Psychological Bulletin, 136*(2), 151-173. doi: <https://doi.org/10.1037/a0018251>
- Awh, E., Vogen, E., & Oh, S. (2006). Interactions between Attention and Working Memory. *Neuroscience, 139*, 201-08. doi: <https://doi.org/10.1016/j.neuroscience.2005.08.023>
- Bender, J., Rothmund, T., & Gollwitzer, M. (2013). Biased estimation of violent video game effects on aggression: Contributing factors and boundary conditions. *Societies, 3*(4), 383-398. doi: <https://doi.org/10.3390/soc3040383>
- Bushman, B. J., & Huesmann, L. R. (2014). Twenty-five years of research on violence in digital games and aggression revisited: a reply to Elson and Ferguson (2013). *European Psychologist, 19*(1), 47-55. doi: <https://doi.org/10.1027/1016-9040/a000164>
- Bushman, B. J., Rothstein, H. R., & Anderson, C. A. (2010). Much ado about something: Violent video game effects and a school of red herring: Reply to Ferguson and Kilburn. *Psychological Bulletin, 136*(6), 182-187. doi: <https://doi.org/10.1037/a0018718>

- Cavalcanti, J. G., & Pimentel, C. E. (2016). Personality and aggression: A contribution of the General Aggression Model. *Estudos de Psicologia*, 33, 443-451. doi: <https://doi.org/10.1590/1982-02752016000300008>
- Ferguson, C. J. (2015). Do angry birds make for angry children? A meta-analysis of video game influences on children's and adolescents' aggression, mental health, prosocial behaviour and academic performance. *Perspectives on Psychological Science*, 10(5), 646-666. doi: <https://doi.org/10.1177/1745691615592234>
- Ferguson, C. J., Rueda, S. M., Cruz, A. M., Ferguson, D. E., Fritz, S., & Smith, S. M. (2008). Violent video games and aggression: Causal relationship or byproduct of family violence and intrinsic violence motivation? *Criminal Justice and Behavior*, 35(3), 311-332. doi: <https://doi.org/10.1177/0093854807311719>
- Ferguson, C.J., & Kilburn, J. (2010). Much ado about nothing: The misestimation and overinterpretation of violent video game effects in Eastern and Western nations: Comment on Anderson et al. (2010). *Psychological Bulletin*, 136(2), 174-178. doi: <https://doi.org/10.1037/a0018566>
- Funk, J. B. (2008). Video games. In V. Strasburger, B. Wilson, & A. Jordan (Eds.), *Children, adolescents, and the media*. Thousand Oaks, CA: Sage.
- Galak, J., LeBoeuf, R. A., Nelson, L. D., & Simmons, J. P. (2012, August 27). Correcting the Past: Failures to Replicate Psi. *Journal of Personality and Social Psychology*. doi: <https://doi.org/10.1037/a0029709>
- Gentile, D. A., Anderson, C. A., Yukawa, S., Ichori, N., Saleem, M., Ming, L. K., ... Sakamoto, A. (2009). The effects of prosocial video games on prosocial behaviours: International evidence from correlational, longitudinal, and experimental studies. *Personality and Social Psychology Bulletin*, 35(6), 752-763. doi: <https://doi.org/10.1177/0146167209333045>
- Greitemeyer, T., Agthe, M., Turner, R., & Gschwendtner, C. (2012). Acting prosocially reduces retaliation: Effects of prosocial video games on aggressive behavior. *European Journal of Social Psychology*, 42(2), 235-242. doi: <https://doi.org/10.1002/ejsp.1837>
- Greitemeyer, T., & Mügge, D. (2014). Video games do affect social outcomes: A meta-analytic review of the effects of violent and prosocial video game. *Personality and Social Psychology Bulletin*, 40, 578-589. doi: <https://doi.org/10.1177/0146167213520459>
- Greitemeyer, T., & Osswald, S. (2009). Prosocial video games reduce aggressive cognitions. *Journal of Experimental Social Psychology*, 45, 896-900. doi: <https://doi.org/10.1016/j.jesp.2009.04.005>
- Greitemeyer, T., & Osswald, S. (2010). Effects of prosocial video games on prosocial behaviour. *Journal of Personality and Social Psychology*, 98, 211-221. doi: <https://doi.org/10.1037/a0016997>
- Hasan, Y., Bègue, L., Scharrow, M., & Bushman, B. (2013). The more you play, the more aggressive you become: A long-term experimental study of cumulative violent video game effects on hostile expectations and aggressive behaviour. *Journal of Experimental Social Psychology*, 49, 224-227. doi: <https://doi.org/10.1016/j.jesp.2012.10.016>

- Li, R., Polat, U., Scalzo, F., & Bavelier, D. (2010). Reducing Backward Masking through Action Game Training. *Journal of Vision*, 10, 1–13. doi: <https://doi.org/10.1167/10.14.33>
- Mariano, T. E. (2016). *The impact of video games in prosocial and antisocial cognition [in Portuguese]*. Unpublished master dissertation. Brazil: Federal University of Paraíba.
- Mishra, J., Zinni, M., Bavelier, D., & Hillyard, S. (2011). Neural Basis of Superior Performance of Action Videogame Players in an Attention-Demanding Task. *Journal of Neuroscience*, 31, 992–998. doi: <https://doi.org/10.1523/JNEUROSCI.4834-10.2011>
- Narvaez, D., Mattan, B., MacMichael, C., & Squillace, M. (2008). Kill Bandits, Collect Gold or Save the Dying: The Effects of Playing a Prosocial Video Game. *Media Psychology Review*. 1(1).
- Novotney, A. (2014, September). Reproducing results. *American Psychological Association*. Retrieved from <http://www.apa.org/monitor/2014/09/results.aspx>
- Pimentel, C. E., Mendes, L. A., Lobo, R., Barbosa, L. H., & Mariano, T. E. (2017). *Social psychology and media [in Portuguese]*. In C. F. Lima & C. E. Pimentel (Eds.), *Revisitando a psicologia social* (pp. 233-256). Curitiba: Juruá Editora.
- Przybylski, A. K., Deci, E. L., Rigby, C. S., & Ryan, R. M. (2014). Competence-impeding electronic games and players' aggressive feelings, thoughts, and behaviours. *Personality Processes and Individual Differences*, 106(3), 441-457. doi: <https://doi.org/10.1037/a0034820>
- Sarmet, M. M., & Pilati, R. (2016). Efeito dos jogos digitais no comportamento: Análise do General Learning Model. *Temas em Psicologia*, 24, 17-31. doi: <https://doi.org/10.9788/TP2016.1-02>
- Tear, M. J., & Nielsen, M. (2013). Failure to demonstrate that playing violent video games diminishes prosocial behaviour. *PLoS One*, 8, e68382. doi: <https://doi.org/10.1371/journal.pone.0068382>