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# Violent Videogame Playing and Its Relations to Antisocial Behaviors

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***Abstract*—**The presented study focuses on relations between violent videogames playing and various types of antisocial behavior, namely bullying (verbal, indirect, and physical), physical aggression and delinquency. Relevant relationships were also examined with respect to gender. Violent videogames exposure (VGV) was measured by respondents' most favored games and self-evaluation of its level of violence and frequency of playing. Antisocial behaviors were assessed by self-report questionnaires. The research sample consisted of 333 (166 males, 167 females) primary and secondary school students at the age between 10 and 19 years (m=14.98, sd=1.77). It was found that violent videogames playing is associated with physical aggression (rho=0.288, 95% CI [0.169;0.400]) and bullying (rho=0.369, 95% CI [0.254;0.476]). By means of gender, these relations were slightly weaker in males (VGV - physical aggression: rho=0.104, 95% CI [-0.061;0.264], VGV – bullying: rho=.200, 95% CI [0.032;0.356]) than in females (VGV - physical aggression: rho=0.257, 95% CI [0.089;0.411], VGV – bullying: rho=0.279, 95% CI [0.110;0.432]).

***Keywords*—**Aggression, bullying, gender, violent videogames.

## I. Introduction

WITH increasingly realistic depiction of violent acts in video games the primary focus of research activities has been set on the relationship between violent game playing and real-life aggression. Despite numerous papers and several meta-analytic studies, there is still a controversy on the existence of such relationship. Anderson & Bushman [1] and Anderson [2] in their meta-analyses bring evidence about the connection between exposure to violent video games and aggressive behavior with estimated effect size 0.26 [3]. According to this meta-analysis, experimental studies reveals that violent games cause higher level of aggressive cognition, aggressive behavior, and aggressive affect. Correlation studies complete the picture by revealing the linkage of video games to real-life type of aggression. However, Ferguson [4], [5] and Ferguson & Kilburn [6] claim that there is significant publication bias in the video games effects literature and conclude that the evidence fails to prove the linkage. Nevertheless, the debate still continues, as Anderson et al. [7] confirms his own previous findings and criticize the methodology of Ferguson's studies.

As an independent contribution to the debate can be considered European meta-analysis performed by Greitemeyer & Mügge [8]. The authors analyzed research findings from 28 studies published after 2008, which altogether provided 364 various effect sizes with overall sample size larger than 35 thousands. Greitemeyer and Mügge suggest that videogame playing can have positive as well as negative influence. More specifically, violent videogames increase aggressive behavior, cognition and affectivity and decrease prosocial behavior and prosocial affectivity. On the other side, videogames with prosocial content cause opposite effect, i.e. decrease aggressive behavior and affectivity and increase prosocial behavior and cognition. In case of both violent and prosocial games the effect sizes were comparable and fluctuated around r=0.20 level. When categorizing studies according to the research design they found out that effect sizes were higher in case of experimental and correlational studies in comparison to longitudinal studies. The authors further report that publication bias has no significant influence on the effect sizes. Interestingly enough, Greitemeyer and Mügge also took into account authorship of original studies and revealed that studies coauthored by Anderson or his co-worker Bushman produced studies focused on influence of videogame violence on aggression with average effect-size of r=0.19, while Ferguson studies report average effect-size around r=0.02. Studies independent on these key figures in violent videogames debate produced effect sizes around r=0.20, which corresponds to Anderson's and Bushman's results [8].

Other studies contribute to the debate by identifying of potential moderators of the relationship. Part of the studies explores the role of game characteristics. Jerabeck & Ferguson [9] report that cooperative (vs. solitary) gameplay may lessen the extent of aggressive behavior and is more important than the extent of violent content in the game. Charles et al.[10] found out that more realistic user control (motion-capture vs. standard analog controls) does not significantly increase the level of aggressive behavior. Another part of the studies focuses on the characteristics of the gamer. The relationship between video game playing and aggressive behavior is reported to be moderated by gender. While Olson et al. [11] in their correlation study identified weaker association between M-rated (i.e. mature-rated games suitable for ages 17 and up according to the Entertainment Software Rating Board) games dose and risk for bullying and physical fights in boys than in girls, Bartholow & Anderson [12] in laboratory settings found opposite effect of gender on the association between playing violent game and aggression. It was also found that the relationship between in-game violence and aggressive behavior is moderated by personality traits. Markey & Markey [13] in their literature review study note that negative effect of violent games is moderated by psychoticism and aggressiveness, which are

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connected to high neuroticism, low agreeableness and conscientiousness. Further, Bijvank, Konijn, & Bushman [14] report that lower education ability male students (according to the type of school attended) more favor violent video games and are also higher in aggressiveness and sensation seeking traits, while higher educational ability boys are more attracted to social and/or multiplayer games. Other factors being mentioned as worth exploring for possible moderator role are e.g. game engagement [15] and motivation to gaming [16]. The effect of violent video games on aggression can be mediated by dehumanization [17] or by desensitization [18], or by perceiving violent acts as less aggressive [19].

The purpose of the presented study is to evaluate the link between violent videogame exposure and aggressive real life behaviors (i.e. physical aggression and bullying and its components) in adolescence. Additional aim is to describe potential moderation effects of gender.

## II. Method

### A. Data Collection and Sample Description

The data collection procedure was performed in the time period from October 2015 to April 2016. The data were collected using paper/pencil questionnaire administered in school settings. The schools included in our study were intentionally sampled to cover the variability in school types (elementary schools, high schools – gymnasia and multi-year gymnasia, and vocational schools). The administration of the questionnaire took two lessons.

The research sample consisted of 333 students (166 males, 167 females) at the age between 10 and 19 years (m=14.98, sd=1.77).

### B. Instruments

The instruments used in the actual study were:

*Physical aggression* [11] was measured by two items (hitting or beating up someone; getting in physical fights in the last years) with response scale 1 (0 times), 2 (1 times), 3 (2 times), 4 (3-4 times), 5 (5+ times). Reliability of the scale was (Spearman-Brown ρ=0.685).

*Olweus Bully/Victim Questionnaire* [20] consists of 40 items. In this study we used only 8 items focused on bullying others (physically, verbally, and indirectly) in the last several months. The response scale was 1 (did not do it), 2 (only 1 or 2 times), 3 (2 or 3 times per month), 4 (once a week), 5 (several times per week). Reliability of the scale was 0.833.

*VGV* was measured using method suggested by Anderson & Dill [21]. Participants were asked to name their three favorite video games. After naming each game (none if non-gamer and three at maximum), participants responded on scales anchored at 1 and 7, rating how often they played the game and how violent the game were. Responses of 1 were labeled rarely, little or no violence. Responses of 7 were labeled often, extremely violent. For each participant, we computed a violence exposure score for each of their favorite games by multiplying the subjective violence level of the game by the how-often rating. These video game violence exposure scores were averaged to provide an overall index of exposure to videogame violence. The overall index was computed in those cases, where respondent rated at least one game. Coefficient alpha was 0.727.

In case of missing values, we used expectation maximization method for imputation (highest level of missingness was 5.4 % in case of videogame violence exposure).

### C. Data Analysis

The data were analyzed using Bayesian approach. We used the JAGS library version 3.3.0 [22] in the R statistical environment [23]. The relationships were assessed using Bayesian counterpart of Pearson's correlation coefficient and its robust variants with uninformative priors [24]. In result are reported median values of posterior distributions of respective statistics together with 95% highest density intervals (HDI).

## III. Results

### A. Violent Videogame Exposure

The exposure to violent videogame content was measured by interaction between subjectively perceived level of violence in favorite games and frequency of playing the games as suggested by Anderson & Dill [21]. Description of the scoring procedure is stated in the Instruments section. The respondents in our study were asked to list and evaluate their three most favored videogames. Descriptive statistics for our sample are summarized in Table I.

TABLE I
THREE MOST FAVORED VIDEOGAMES – LEVEL OF VIOLENCE AND FREQUENCY OF PLAYING

| | N (m/f) | m (m/f) | sd (m/f) |
|---|---|---|---|
| Game 1 | 313 | 2.46 | 1.77 |
| perceived violence | (156/157) | (1.82/3.10) | (1.41/1.86) |
| Game 1 | 315 | 3.69 | 2.09 |
| playing frequency | (156/159) | (2.56/4.79) | (1.66/1.87) |
| Game 2 | 295 | 2.56 | 1.88 |
| perceived violence | (138/157) | (1.91/3.12) | (1.58/1.94) |
| Game 2 | 294 | 2.95 | 1.62 |
| playing frequency | (138/156) | (2.20/3.62) | (1.38/1.52) |
| Game 3 | 283 | 2.51 | 2.03 |
| perceived violence | (128/155) | (1.68/3.19) | (1.43/2.19) |
| Game 3 | 281 | 2.69 | 1.56 |
| playing frequency | (127/154) | (2.12/3.17) | (1.40/1.53) |

Note. Response scale was 1 to 7 (see Instruments). m-males, f-females.

It is evident from Table I that there is noticeable level of violence in videogames reported by respondents and also considerably high frequency of gaming. Moreover, as expected, boys scored higher in all variables, i.e. they play more often and more violent games.

### B. Violent Videogame Exposure in Relation to Bullying and Physical Aggression

Correlation coefficients suggest that there exist significant relations between violent videogame exposure and physical aggression, bullying and its various manifestations (see Table II).

In general, in the whole sample, there are significant correlations between violent videogame exposure and physical aggression and bullying. These relations are mostly driven by

considerably higher correlations in the girls' subsample. To understand this gender difference, we can take closer look on graphical depiction of relationships (see Fig. 1).

TABLE II
VIOLENT VIDEOGAME EXPOSURE IN RELATION TO BULLYING AND PHYSICAL AGGRESSION – CORRELATION COEFFICIENTS

| | Rho (95% HDI) N=333 | Rho (95% HDI) Boys, N=166 | Rho (95% HDI) Girls, N=167 |
|---|---|---|---|
| Physical aggression | 0.28 (0.18; 0.37) | 0.09 (-0.07; 0.23) | 0.45 (0.32; 0.56) |
| Bullying | 0.39 (0.29; 0.47) | 0.14 (-0.06; 0.29) | 0.62 (0.52; 0.71) |
| Bullying - verbal | 0.38 (0.29; 0.47) | 0.17 (0.02; 0.32) | 0.60 (0.49; 0.68) |
| Bullying - indirect | 0.26 (0.16; 0.36) | -0.02 (-0.17; 0.14) | 0.56 (0.44; 0.65) |
| Bullying - physical | 0.31 (0.21; 0.4) | 0.15 (0.00; 0.3) | 0.45 (0.33; 0.57) |

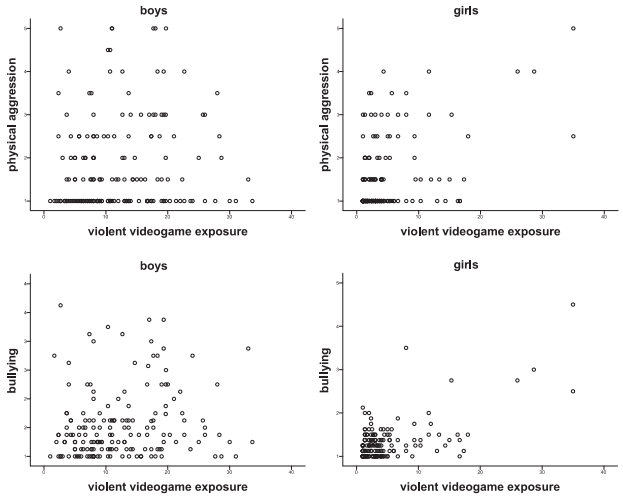


Fig. 1 The relationships between violent videogame exposure and physical aggression and bullying. For the sake of clarity, the relationships between components of bullying and videogame violence exposure were omitted due to their similar nature of relationships as in case of the bullying total score.

TABLE III
VIOLENT VIDEOGAME EXPOSURE IN RELATION TO BULLYING AND PHYSICAL AGGRESSION – ROBUST CORRELATION COEFFICIENTS

| | Robust rho (95% HDI) N=333 | Robust rho (95% HDI) Boys, N=166 | Robust rho (95% HDI) Girls, N=167 |
|---|---|---|---|
| Physical aggression | 0.29 (0.17; 0.4) | 0.10 (-0.06; 0.26) | 0.26 (0.09; 0.41) |
| Bullying | 0.37 (0.25; 0.48) | 0.20 (0.03; 0.36) | 0.28 (0.11; 0.43) |
| Bullying - verbal | 0.36 (0.24; 0.46) | 0.23 (0.06; 0.38) | 0.25 (0.07; 0.40) |
| Bullying - indirect | 0.25 (0.13; 0.36) | 0.01 (-0.15; 0.18) | 0.17 (-0.02; 0.34) |
| Bullying - physical | 0.30 (0.18; 0.40) | 0.22 (0.05; 0.38) | 0.28 (0.12; 0.43) |

[1] The exact procedure in case of correlation coefficient was inspired by blogpost of Rasmus Bååth [32].

Relatively high correlation coefficients in case of girls (as reported in Table II) can be ascribed to a small portion of girls characterized by noticeably higher scores in all variables. Due to this fact we computed robust variants correlation coefficients, which is able to deal with this issue[1] by incorporating t distribution instead of normal distribution [25]. The values of robust correlations are summarized in Table III.

When comparing statistics in Tables II and III, we can say that there is virtually no difference between standard Pearson correlation coefficients and their robust counterparts in case of whole sample and marginal differences in case of boys. As expected from the graphical depiction, the robust correlations in the girls' subsample are considerably lower than standard coefficients. Still, we can see that the relationships between violent videogame exposure and physical aggression and bullying is slightly closer in girls, although the respective highest density intervals considerably overlap.

## IV. DISCUSSION

In this study, we focused on the potential connection between exposure to violent videogame content and real life aggressive manifestations in adolescence and also on gender differences in this manner. The phenomenon of videogame playing is prevalent by far most in adolescence and in this developmental period the youth are especially susceptible to potentially negative influences. In general, we found supporting evidence that there is weak, yet significant, relationship between playing violent videogames and aggressive behaviors (bullying and physical aggression). Our findings corresponds with results reported by Anderson and his colleagues [1], [7], [26] or Greitemeyer & Mügge [8]. Our results are not in concordance with Ferguson's claims [4], [27] that there are virtually no relationships between the phenomena in question.

Due to the correlation nature of the study design our findings themselves don't say anything about direction of causality. But in connection with previous experimental studies [28], [29] we suggest that violent videogames at least partly causes real life aggression. Generally accepted explanation for the processes behind the causality offers the GAM (General Aggression Model, [30]) or GLM (General Learning Model, [31]). According to the GAM, playing violent videogame affects the immediate mental state (affective and cognitive components and arousal). This mental state consequently influences situational appraisal and choosing appropriate behavior (impulsive or intentional). Long-term effect is elicited by accumulation of short-term episodes and can lead to development of aggressive personality.

When looking at gender differences in the assessed relationships, we found a huge gap between boys and girls. While relationships in boys can be considered as weak, in girls the respective relations were quite close. Visual inspection revealed that there exist a small separated group of girls who scored substantially higher in all variables (i.e. violent videogame exposure, physical aggression, and bullying).

Therefore, we took this fact into consideration and evaluated the relationships using robust variant of correlation coefficient. As expected, after the adjustment the coefficients in girls were lowered, but still not marginal, and generally slightly higher than in boys. Our findings are supported by Olson et al. [11], who came to the same conclusions in similar settings regarding gender differences in relations between M-rated game dose and physical fights and risk for bullying.

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