SINGLE-STUDY PAPER

Video Game Playing Frequency, Social Cognition, and Social Behavior in Childhood

Gardy A. Lavertu1, 2, Anne G. Seni1, Evelyn Vera-Estay1, 2, 3, Maria Tran2, Gregory L. West1, and Miriam H. Beauchamp1, 2

1 Department of Psychology, University of Montreal
2 Sainte-Justine Hospital Research Center, Montreal, Quebec, Canada
3 Centro de Desarrollo de Tecnologías de Inclusión, Escuela de Psicología, Pontificia Universidad Católica de Chile, Santiago, Chile

Socialization is the basis of human behavior and thus an individual’s social competence is key to creating and maintaining satisfying relationships, communicating with others, and functioning adaptively in society. With video games increasingly omnipresent in the leisure activities of young people, concerns have been raised as to their potential harmfulness, or conversely, their utility with respect to developing cognitive, affective, and social skills. However, reported links between video game playing frequency (VGPF) and markers of social competence are equivocal, with some studies reporting adverse associations and others highlighting measurable benefits. Much of the previous work in this area has focused on adolescents, yet video game use is also common in elementary school children. This study aimed to explore associations between VGPF and three components of social competence: social cognitive skills, social adaptive skills, and social behavior. Children (n = 57, 6–12 years) completed measures of these components, and their parents completed a video game habits questionnaire. Weekly VGPF was positively associated with executive and social behavior difficulties and negatively associated with social adaptive skills and prosocial behavior. Social adaptive skills, empathy, and lower VGPF were independently associated with prosocial behavior, while poorer empathy and executive difficulties were associated with social behavior problems. In conclusion, elementary school children who played video games less frequently in this study displayed better social competence in terms of prosocial behavior, but there was no association between VGPF and social behavior problems. Limiting gaming frequency could possibly increase opportunities for real-life social interaction, promoting prosocial behavior.

Keywords: video games, social competence, prosocial behavior, social cognition, childhood

Video games and online gaming have become a leading part of the entertainment industry over the last few decades, with 72% of teenagers (84% of boys, 59% of girls) in the U.S. reportedly playing some form of video game (Lenhart, 2015). The question of the benefit or harm of video games is the subject of debate with studies reporting associations between video game exposure and both prosocial behavior, aggression, cognition, and affect, depending on the content (see Greitemeyer & Mügge, 2014, for a review). Some evidence suggests that both cognitive and social skills are enhanced or reinforced by playing video games (see Boyle et al., 2016; Nuyens et al., 2018, for reviews). For example, frequency of video game playing and video game experience are associated with improved intellectual function (Glass et al., 2013), attention (Dye et al., 2009), executive functioning (Granic et al., 2014; Homer et al., 2018; Staiano et al., 2012; Strobach et al., 2012; West et al., 2013), visuospatial abilities (Ferguson, 2007; West et al., 2008, 2015, 2018; West, Konishi, & Bobbot, 2017; West, Zendel, et al., 2017), creativity (Jackson et al., 2012), and some forms of civic and social engagement (Lenhart et al., 2008). It is unclear, however, what the link is between time spent playing video games and different facets of social competence. Although video game playing can at times be a social activity shared among physical or virtual peers, it can also be a passive and solitary activity when played alone (Lenhart et al., 2008; Steinkuehler & Williams, 2006), effectively displacing crucial time...
spent on civic, social, and community-building activities (Putnam, 2001). A main concern among researchers and policymakers is that youth are spending an increasing amount of time playing video games, giving up real-life activities (Liu & Peng, 2009), and leaving less time for social group interactions that contribute to social competence (Lenhart et al., 2008; Putnam, 2001).

Social competence is an umbrella term referring to the broad set of skills required to display appropriate social behaviors and includes social cognitive abilities (i.e., a complex set of mental abilities underlying social stimulus perception, processing, interpretation, and response) and social adaptive abilities (i.e., the collection of social skills learned by people throughout development that support everyday functioning; Beauchamp & Beauchamp, 2020; Tassé, 2013). Social behaviors are characterized as prosocial if they have positive effects on social interactions or are motivated by the desire to benefit another person rather than one’s own goals (Eisenberg et al., 2015), or antisocial if their core intention is to harm or disadvantage others (Kavussanu, 2006). Although definitions vary, social competence determines the degree to which individuals engage in adaptive and appropriate social behaviors and are able to successfully create and maintain positive social interactions (Anderson-Butcher et al., 2008). The development of social competence, as proposed in the SOCIAL biopsychosocial framework (Socio-Cognitive Integration of Abilities Model; Beauchamp & Anderson, 2010), is underpinned by biological (e.g., brain development and integrity) determinants as well as by children’s internal (e.g., temperament) and external (e.g., socioeconomic status, culture) characteristics (Beauchamp & Anderson, 2010), the latter including broad social experiences such as social learning opportunities and exposure to diverse social contexts (Thompson et al., 2018). Finally, SOCIAL highlights the critical role of brain-based social cognitive skills in determining social competence, such as emotion processing, theory of mind (ToM), empathy, moral reasoning (MR), and all high-level cognitive processes used to perceive and process social cues (Beauchamp & Anderson, 2010; Eisenberg et al., 2015; Happé & Frith, 2014).

The gaming world is not unidimensional. Games vary by genre (e.g., action, adventure, role-playing, simulation, strategy, sports), subgenre (e.g., platform and shooter action games, vehicle, or life simulation), purpose (e.g., educational, serious, creative), interface, platform, and medium (e.g., consoles, mobile, online), as well as content (e.g., prosocial, violent, nonviolent). A bulk of research has focused on the negative social outcomes related to gaming, specifically with regard to their associations with aggressive behavior, cognition, and affect (see Boyle et al., 2016 and Hilgard et al., 2017, for reviews). Links have also been found between violent video game playing and increased externalized behaviors (Milani et al., 2015), attention disorders (Tiraboschi et al., 2022), physiological arousal (Anderson & Bushman, 2001), depression (Tortolero et al., 2014), game addiction and social isolation (Kraut et al., 1998), poor quality friendships (Verheijen et al., 2018), and reduced prosocial behavior (Anderson & Bushman, 2001). Others have reported associations between violent video game playing and desensitization toward violence, changes in attitudes toward violence, as well as lower levels of empathy and moral reasoning (Funk, 2005). Some suggest that video game players express a preference for virtual life that is associated with dependency on gaming, decreased adherence to social norms, loneliness, depression, and poor social competence (Liu & Peng, 2009).

Yet, the findings regarding the links between video games on social competence are not unanimous (Ferguson & Colwell, 2017). A meta-analysis of 101 studies by Ferguson (2015) found that associations between video games and aggression, prosocial behavior, academic performance, depressive symptoms, and attention deficit symptoms are weak. Sakamoto (1994) studied elementary school-age children in Japan and found no relation between video game use and social competence. In particular, games with prosocial content, that is, games designed to reward cooperation and help, have been positively associated with prosocial behavior, empathy, and reduced aggression (Gentile et al., 2009; Greitemeyer et al., 2012; Harrington & O’Connell, 2016; Kral et al., 2018; Prot et al., 2014). And cooperative team play within violent video games may be beneficial (Greitemeyer et al., 2012; Velez et al., 2016). Finally, there is also support for enhanced social cognitive skills, such as ToM and mentalizing, through in-game storytelling (Bormann & Greitemeyer, 2015).

Studies on video games thus present diverging evidence and views on the association between the amount of time spent playing video games and social competence, and some discrepancies are likely due to methodological differences between studies and design limitations. A meta-analysis by Anderson et al. (2010) concluded that exposure to violent video games is a risk factor for increased aggressive behavior and decreased empathy and prosocial behavior. These results were, however, contested by Hilgard et al. (2017), arguing that publication bias inflated the observed data. Studies tend to focus on selected game types or content within a single study (e.g., violent vs. nonviolent, cooperative vs. competitive, online world only) rather than on general usage (Ewoldsen et al., 2012; Liu & Peng, 2009; Milani et al., 2015). The study by Gentile et al. (2009) is one of the few studies linking weekly usage and prosocial behaviors. Also, few studies measure both positive and negative displays of social competence simultaneously (e.g., prosocial and externalized behaviors), likely to be independent tendencies rather than comprising opposite ends of the same spectrum (Krueger et al., 2001). Moreover, previous research has typically considered broad demographic variables such as socioeconomic status and family values (DeCamp & Ferguson, 2017; Funk, 2005; Harrington & O’Connell, 2016), but rarely takes into account the contribution of individual social cognitive and social adaptive skills to social competence. A further methodological issue is that some studies focus on subgroups of individuals (e.g., addicted players) hindering generalizability to the normative population. When studies on typically developing individuals have been performed, most of the research has focused on adolescents and adults, with few focusing on video game playing in middle childhood. This developmental group is relevant to consider given reports that elementary school-age children also frequently engage in video game playing and that gaming among younger children is increasing in frequency and popularity (National Purchase Diary Panel Inc. [NPD] Group, 2019). In addition, middle childhood is a formative period for the development of social competence given the intense maturation of social cognitive skills such as emotion recognition, ToM, empathy, and moral reasoning, and the importance of positive relationships during this period (Bornstein et al., 2010; Eisenberg et al., 2015; Ornaghi et al., 2014). Kovess-Masfety et al. (2016) conducted one of the few studies on video games and social competence in elementary school children (6–11 years). High video game usage was correlated with fewer peer relationship problems and better prosocial skills.
suggesting a positive association. Conversely, in a longitudinal study, Lobel et al. (2017) found that gaming frequency in children 7–11 years was associated with increased internalizing and emotion problems (but not externalizing or peer problems) 1 year later. They also found that frequent competitive gaming was associated with declines in prosocial behavior, even after controlling for cooperative gaming (Lobel et al., 2017).

The overarching goal of the present study was to explore the associations between frequency of video game playing and social competence in elementary school children. The specific aims were to (a) explore the relations between children’s video game playing frequency (VGPF), their social cognitive skills (including everyday executive functioning, ToM, empathy, moral reasoning, and affect recognition), social adaptive skills, and social behavior (prosocial behavior and social behavior problems), and (b) explore the contribution of VGPF to both positive and negative aspects of social behavior (i.e., prosocial behavior and social behavior problems), after taking into account demographic characteristics, social cognitive, and social adaptive skills. We expected to find negative associations between VGPF and social cognitive and social adaptive skills. We also hypothesized that greater VGPF would be related to less prosocial behavior and more social behavior problems, even after accounting for social cognitive and social adaptive skills.

Method

Participants

Participants were a subgroup of a larger cohort originally recruited to document social competence in elementary school children. A substudy was introduced part way through recruitment with the addition of a video game habits questionnaire given evolving research questions. Thus, 57 children aged between 6 and 12 years (47.4% males, M = 9.5, SD = 1.69 years) participated in this substudy. Children were recruited among two schools in an urban school board setting through a letter invitation sent to parents via the children’s homeroom teacher. All participants and their families were French speakers, predominantly Caucasian (98%), had no history of any psychiatric or neurological condition, had intellectual functioning in the low to high average range (87–129, M = 109, SD = 8.5), and were primarily from middle-class families (Statistics Canada, 2015). All parents provided written informed consent prior to participation. Children received a $30 bookstore gift card for their participation, and parents received a $5 gift card as compensation. The study was approved by the University of Montreal Faculty of Arts and Science ethics committee.

Measures

Video Game Habits Questionnaire

Parents of participants completed a questionnaire documenting their child’s video game playing habits. The questionnaire was adapted from Kühn et al. (2014) and included the following questions: “How many days per week does your child play video games?”; “How many hours does your child play video games on these days on average?”; and “How many years has your child been playing video games on a regular basis?” VGPF was derived based on total hours played per week and used as the main video gaming playing outcome variable in analyses. As a secondary indicator of video game usage, parents were also asked to report the types of video games played by their children in a nonmutually exclusive list of genres and provide the titles of the games played. Based on this information, games were classified as follows: building and simulation games (e.g., Minecraft, Sim City), real-time strategy games (e.g., StarCraft, Ancestors Legacy), sports and racing games (e.g., National Basketball Association [NBA] 2K20, Grand Turismo), adventure games (e.g., The Legend of Zelda), action games (e.g., Call of Duty, Tomb Raider), and puzzle and platform games (e.g., Tetris, Super Mario Brothers). These classifications were chosen based on previous evidence that these distinct video game genres are associated with brain structure differences (Kühn et al., 2014; West, Zendel, et al., 2017; West et al., 2018) and were used to verify whether the broader VGPF measure would hold across categories. Parents were also asked if their children played either mainly alone (e.g., single player games), with online interactions (e.g., multiplayer games with people not physically present with them), or with friends in person (e.g., playing multiplayer games together with people on a split screen, or single player games with people present and taking turns playing). Answers were grouped into nonsocial (single player game alone) and social game interaction (single and multiplayer games with online and physical interactions) categories. Games were also categorized into low violence (e.g., Minecraft, Super Mario, and Final Fantasy) and high violence (e.g., Call of Duty, Resident Evil 1–3, Mortal Kombat). Games were rated as high violence if the game’s content asked the player to inflict violence (e.g., shooting, kicking) on other characters. All Entertainment Software Rating Board (www.esrb.org) ratings in this category were either Teen or Mature.

Intellectual Functioning

The Wechsler Abbreviated Scale of Intelligence (WASI; Wechsler, 1999) was used to provide an estimate of general intellectual ability based on the Vocabulary and Matrix Reasoning subtests (Intelliecut Quotient [IQ], M = 100, SD = 15) for descriptive purposes.

Social Cognitive Skills

Everyday Executive Functioning. The Behavior Rating Inventory of Executive Function (BRIEF-PF; Gioia et al., 2000) is a parent-report questionnaire for children aged 5–18 years, assessing emotional and behavioral manifestations of executive functioning in both home and school environments. This executive measure was used given established links between executive and social cognitive skills (Beauchamp & Anderson, 2010). This 86-item questionnaire provides eight scales, a Global Executive Composite (GEC), along with a Metacognition Index (MCI; including Initiate, Working Memory, Plan/Organize, Organization of Materials, and Monitor scales) and a Behavior Regulation Index (BRI; including Inhibit, Shift, and Emotional Control scales). The raw GEC was used as the main measure of everyday executive functioning, and the raw BRI and MCI were also reported. A higher score indicates higher levels of executive dysfunction.

Empathy. The Griffith Empathy Measure (GEM; Dadds et al., 2008) is a 23-item parent-report questionnaire adapted from Bryant’s Index of Empathy for Children and Adolescents (Bryant, 1982) in which parents rate the empathetic abilities of their child on a 9-point Likert scale from –4 (strongly disagree) to 4 (strongly agree) on
questions such as: “my child would eat the last cookie, even when they know someone else wants it” or “my child reacts badly when they see people kiss and hug in public.” This questionnaire provides three scores: cognitive empathy (score −56 to 56), affective empathy (score −68 to 68) and total empathy (score −92 to 92), with higher scores corresponding to higher levels of empathy.

**Theory of Mind.** The Theory of Mind subtest from the Developmental Neuropsychological Assessment (NEPSY-II; Korkman et al., 2007) assesses social cognitive skill through children’s ability to understand others’ perspectives (verbal task) and how emotion relates to social context (contextual task). The total ToM score (0–28), obtained by the total number of correct responses in the verbal and the contextual tasks, was used in this study. Higher scores indicate better ToM.

**Affect Recognition.** The Affect Recognition subtest from the NEPSY-II (Korkman et al., 2007) assesses social cognitive skills in terms of the ability to recognize affect from pictures of children’s faces expressing one of five basic emotions (happiness, sadness, anger, fear, and disgust) or a neutral expression. Higher scores indicate better emotion recognition.

**Moral Reasoning.** The children’s version of the Socio-Moral Reasoning Aptitude Level task (SoMoral-Child; Beauchamp et al., 2013; Chiasson et al., 2017; Dooley et al., 2010) is a visual, computer-based task that presents nine moral dilemmas specifically designed for children and has gender-specific versions. Each dilemma consists of an introductory screen presenting the name of the dilemma (e.g., “exam”), three separate screens showing first-person perspective pictures of child actors in various social scenarios representing a conflict centered on a moral domain according to Social Domain Theory (Turil, 1983), and a final screen presenting a dichotomous decision (e.g., whether or not to engage in a particular action such as stealing from a shop, cheating at a game, etc.). Participants are then asked to provide a justification for their choice. Each participant’s justification is recorded verbatim and subsequently scored according to a coding system based on a cognitive developmental framework (Gibbs, 2010). Further details on the coding are provided in Chiasson et al. (2017). The MR maturity score (0–45), obtained by summing the nine justification scores, was used to represent social cognitive skills with higher scores indicating more mature moral reasoning.

**Social Adaptive Skills**

The Social subscale from the Adaptive Behavior Assessment System-Second Edition (ABAS-II; Harrison & Oakland, 2003) was used to assess children’s social adaptive skills, as reported by their parents. This 23-item subscale documents the manifestation of everyday skills needed to interact socially and initiate and maintain friendships. This includes engaging in play and recreational activities and expressing and recognizing emotions. Higher scores represent better social adaptive skills.

**Social Behavior**

**Prosocial Behavior.** The parent version of the prosocial tendencies measure (PTM; Carlo & Randall, 2002), translated into French and adapted by Girard et al. (2014), was used to assess children’s prosocial behavior. Parents are asked to rate their child’s prosocial tendencies on a 5-point Likert scale from 1 (extremely unlikely) to 5 (extremely likely), with questions such as: “when people ask my child for help, they don’t hesitate” or “most of the time, my child helps others when they do not know who helped them.” They are divided into six types of prosocial behaviors: public, anonymous, in response to dire situations, emotional, compliant, and altruistic. Higher scores indicate more prosocial behavior manifestations.

**Social Behavior Problems.** The Child Behavior Checklist for ages 6–18 (CBCL 6–18; Achenbach & Rescorla, 2001) is a parent-report questionnaire rating the presence of internalizing and externalizing problems in their child, such as anxiety, depression, rule breaking, aggressive behavior, somatic, social, and attention problems. Higher scores indicate more problem behaviors.

### Statistical Analyses

Prior to all statistical analyses, data were examined for any violations of test assumptions (normality, linearity, and homoscedasticity). Partial correlation coefficients were calculated (controlling for age) to examine the relation between children’s VGPF and demographic variables (sex and socioeconomic status [SES]), social cognitive skills (ToM, empathy, affect recognition, MR), social adaptive skills (ABAS), and social behavior including prosocial behavior (PTM) and social behavior problems (CBCL). Linear regression was used to test the relation between video game categories and the social behavior outcomes to decide whether any game categories should be included in the main model. Hierarchical multiple regression analyses were used to explore the contribution of VGPF (and game categories if relevant) to children’s prosocial behavior (PTM) and social behavior problems (CBCL), after considering the contribution of demographic (age, sex, and SES; Block 1) and social cognitive and social adaptive variables (Block 2). Given the modest sample size and to avoid overfitting the model, we referred to the “one to ten” rule of thumb (approximately 10 observations for every independent variable) when including predictors in the main regression analysis, and only social cognitive variables significantly correlated with at least one of the independent social behavior variables (PTM or CBCL) were included in the models.

## Results

### Descriptive Results and Correlations

Participant demographic characteristics are presented in Table 1 and correlations in Table 2. Significant positive correlations were found between VGPF and age, everyday executive functioning (everyday EF) difficulties, and social behavior problems. Negative associations were found between VGPF and social adaptive skills and prosocial behavior. No associations were found between VGPF and sociodemographic variables (sex, SES), intellectual functioning, or with social cognitive skills (empathy, affect recognition, ToM, and moral reasoning). Among the social cognitive variables, only empathy significantly correlated with one of the main dependent variables (prosocial behavior) and was included in the regression model to represent social cognitive skills.

### Video Game Usage

In total, 29.8% of children played video games exclusively alone (17 children), and the others (40 children) reported playing either online or with friends; 15.8% of children played high violence video...
games (9 children in total). With respect to video game category, it was reported that 43.9% played building and simulation games, 10.5% played real-time strategy games, 56.1% played sports and racing games, 35.1% played adventure games, 24.6% played action games, and 66.7% played puzzle and platform games. Analysis of the relations between video game category, violent content, or playing context (i.e., alone or online/with friends) on the outcome variables revealed no significant associations, and thus these variables were not considered further (all ps > .05).

Regression Analyses

Variables Contributing to Children’s Prosocial Behavior

The results of hierarchical regression analyses are presented in Table 3. Age, sex, and SES did not significantly contribute to prosocial behavior, \( F(3, 53) = .52, p = .67 \). However, introducing everyday EF, social adaptive skills, and empathy to the model explained an additional 30% of the variance in prosocial behavior, and the change in \( R^2 \) was significant, \( F (3, 50) = 7.40, p < .001 \), with a large effect size (\( f^2 = .43 \)). Finally, the inclusion of VGPF explained an additional 6% of the variation in prosocial behavior scores, \( F (1, 49) = 4.47, p = .04 \), with a small effect size (\( f^2 = .06 \)). Together, the variables included in the regression model explained 38% of prosocial behavior scores, \( F (7, 49) = 4.35, p = .001 \), considered a large effect size (\( f^2 = .61 \)). Better social adaptive skills (\( \beta = .30, p = .04 \)), higher empathy (\( \beta = .31, p = .03 \)), and lower VGPF (\( \beta = -.27, p = .04 \)) were significant, independent predictors of prosocial behavior in the final model.

Variables Contributing to Children’s Social Behavior Problems

Age, sex, and SES did not significantly contribute to CBCL social problems, \( F(3, 53) = 1.72, p = .17 \) (Table 3). Introducing everyday EF, social adaptive skills, and empathy to the model explained an additional 28% of the variance in social behavior problem scores, and the change in \( R^2 \) was significant, \( F (3, 50) = 7.32, p < .001 \), with a large effect size (\( f^2 = .38 \)). However, the inclusion of VGPF did not explain any additional variance, \( F (1, 49) = .72, p = .40 \). Together, the variables included in the regression model explained 38% of social behavior problems, \( F (7, 49) = 4.22, p = .001 \), considered a large effect size (\( f^2 = .61 \)). Empathy (\( \beta = .27, p = .048 \)) and everyday EF difficulties (\( \beta = .43, p = .002 \)) were significant, independent predictors of social behavior problems in the final model.

Discussion

This study examined the association between VGPF and social behavior from both positive (prosocial) and negative (social behavior problems) perspectives in elementary school-age children, taking into account the contributions of social cognitive and social adaptive skills. The study hypotheses were partially supported given that some significant associations were found between VGPF, social cognitive (empathy), and social adaptive skills and behavior. The main findings indicated that lower VGPF contributes to prosocial behavior in children when demographic, social cognitive, and social adaptive factors are taken into account. That is, children who played video games less frequently displayed more prosocial behavior. However, the association between VGPF and parent-reported social behavior problems was not supported. Social behavior problems were instead associated only with performance on social cognitive measures targeting everyday EF and empathy. Essentially, these results suggest that while it may not be the case that frequently playing video games makes you prone to exhibiting social problems, playing video games more frequently is associated with fewer prosocial behavior tendencies. Despite being correlated with age, executive function, social adaptive skills, prosocial behavior, and social behavior problems, no association was found between VGPF and specific social cognitive skills including empathy, affect recognition, ToM, and moral reasoning. Although it is difficult to speculate on the basis of null results, it is possible that the video game playing habits documented here and the relatively low consumption overall of games that involve emotional or violent content known to induce physiological stress in adults, for example (Hasan et al., 2013; Ivarsson et al., 2013), were not salient enough to be associated with the hard-wired, brain-based, cognitive skills that underlie social competence.

The main results of the study suggest that spending less time per week playing video games is associated with prosocial behavior. This is in line with work suggesting that excessive video game play in pre-teens and early teenagers is associated with fewer displays of prosocial behavior (Przybylski, 2014). A possible explanation for the association between more frequent video game playing and
fewer prosocial behavior displays may be that real-life interactions are more complex, more nuanced, and ultimately more generalizable in terms of social learning experiences when compared to the social aspects of video game playing. Face-to-face conversations and social interactions support the development of higher level social cognitive skills, such as advanced ToM, due to the presence of competing mental perspectives in a single situation (Nathanson et al., 2013), and children’s social understanding is constructed significantly through social interaction (Carpendale & Lewis, 2004). Moreover, children who play video games more frequently may also miss important developmental opportunities (Przybylski, 2014), and real-life friendships and relationships may provide more emotional and physical support and proximity in a way that online/gaming counterparts cannot (Kowert & Oldmeadow, 2013). Finally, while engaging in video game playing in social contexts or as part of virtual worlds may function as a “third place” for informal sociability, these interactions may not be as valuable as real-life social interactions in promoting prosocial and altruistic behaviors (Steinkuehler & Williams, 2006). This could possibly explain the current results indicating that video game playing was not associated with social behavior problems in children, as the “third places” presented in games may be social enough not to induce social problems, but ultimately not social enough to promote complex prosocial behaviors. However, given the noncausal design, we cannot exclude that the correlation is bidirectional and that children who are less prosocial spend more time playing video games. Nonetheless, the findings linking video game playing and prosocial behavior are important given the crucial role of traditional forms of play with peers in providing positive contexts for children’s social development, especially as video gaming may be considered a form of (digital) play slowly replacing physical playgrounds (Granic et al., 2014; Lobel et al., 2017). Moreover, video game playing may keep those children already vulnerable to displaying problematic social behaviors busy and out of trouble, thus limiting exposure to social situations that could contribute to misinterpretation and aggressive or disinhibited reactions, ultimately resulting in fewer displays of social problems. The study results also replicate Lobel et al.’s (2017) report of a lack of association between gaming frequency and externalized behavior problems in a similar age group.

Table 2
Main Descriptive Results and Partial Correlations Adjusted for Age

<table>
<thead>
<tr>
<th>Predictor</th>
<th>M</th>
<th>SD</th>
<th>VGPF</th>
<th>Prosocial behavior</th>
<th>Social behavior problems</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (months)</td>
<td>113.4</td>
<td>20.2</td>
<td>0.314*</td>
<td>0.005</td>
<td>−0.135</td>
</tr>
<tr>
<td>Sex</td>
<td>−</td>
<td>−</td>
<td>−</td>
<td>−0.162</td>
<td>0.267*</td>
</tr>
<tr>
<td>SES</td>
<td>0.1</td>
<td>0.6</td>
<td>0.013</td>
<td>0.046</td>
<td>0.026</td>
</tr>
<tr>
<td>Intellectual functioning (WASI)</td>
<td>109.4</td>
<td>8.5</td>
<td>0.071</td>
<td>−0.039</td>
<td>−0.088</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Social cognitive skills</th>
<th></th>
<th></th>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Everyday EF</td>
<td>51.8</td>
<td>9.8</td>
<td>0.288*</td>
<td>−0.279*</td>
<td>0.506***</td>
</tr>
<tr>
<td>Empathy</td>
<td>35.7</td>
<td>23.5</td>
<td>−0.164</td>
<td>0.459**</td>
<td>0.032</td>
</tr>
<tr>
<td>Affect recognition</td>
<td>25.8</td>
<td>4.6</td>
<td>0.060</td>
<td>−0.029</td>
<td>−0.201</td>
</tr>
<tr>
<td>ToM</td>
<td>21.7</td>
<td>2.7</td>
<td>0.038</td>
<td>−0.020</td>
<td>−0.187</td>
</tr>
<tr>
<td>Moral reasoning</td>
<td>18.4</td>
<td>5.2</td>
<td>−0.152</td>
<td>0.035</td>
<td>−0.033</td>
</tr>
<tr>
<td>Social adaptive skills</td>
<td>57.3</td>
<td>8.4</td>
<td>−0.277*</td>
<td>0.488***</td>
<td>−0.338**</td>
</tr>
<tr>
<td>Social behavior</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prosocial behavior</td>
<td>82.7</td>
<td>11.4</td>
<td>−0.386**</td>
<td>−</td>
<td>−0.129</td>
</tr>
<tr>
<td>Social behavior problems</td>
<td>2.4</td>
<td>2.3</td>
<td>0.282*</td>
<td>0.344</td>
<td>—</td>
</tr>
</tbody>
</table>

Note. Everyday EF = everyday executive functioning; VGPF = video game playing frequency; WASI = Wechsler Abbreviated Scale of Intelligence; ToM = Theory of Mind; BRIEF-P = Behavior Rating Inventory of Executive Function; ABAS-II = Adaptive Behavior Assessment System-Second Edition; CBCL = Child Behavior Checklist; NEPSY = Developmental Neuropsychological Assessment; SES = socioeconomic status.

Table 3
Predictors of Prosocial and Social Behavior Problems in Childhood

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Prosocial behavior</th>
<th>Social behavior problems</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>( \Delta R^2 )</td>
<td>( \beta )</td>
</tr>
<tr>
<td><strong>Step 1</strong></td>
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</tr>
<tr>
<td>Age</td>
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<td>.09</td>
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<tr>
<td>Sex</td>
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<td>−.16</td>
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<tr>
<td>SES</td>
<td></td>
<td>.05</td>
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<tr>
<td><strong>Step 2</strong></td>
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<td>Age</td>
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<td>.26**</td>
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<td>Sex</td>
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<td>−.02</td>
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<tr>
<td>SES</td>
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<tr>
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</tr>
<tr>
<td>Social cognitive (empathy)</td>
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<td>.31*</td>
</tr>
<tr>
<td><strong>Step 3</strong></td>
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<td>.01</td>
</tr>
<tr>
<td>Age</td>
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<td>−.09</td>
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<tr>
<td>Sex</td>
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<td>VGPF</td>
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<td><strong>Total R^2</strong></td>
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<td>.38**</td>
</tr>
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Note. Everyday EF = everyday executive functioning; SES = socioeconomic status; VGPF = video game playing frequency.

* \( p < .05 \). ** \( p < .01 \). *** \( p < .001 \).
The divergence in our findings regarding the association of video game playing to prosocial behavior, but not to social behavior problems, suggests that these two constructs may not simply be opposite ends of a continuum but rather may be complementary indicators of child social competence. The findings are reminiscent of previous claims that the relations between video game (and other media usage) and social competence are not straightforward. Kraut et al. (1998), for example, suggest that time spent online displaces social activity, leading to social isolation, declines in psychological well-being and general social adjustment deficits. However, factors related to general video game usage and social problems are unclear and cannot be fully understood through correlational designs, such as in the present study. For example, poor social competence could be explained by the negative effects of spending too much time gaming (displacement hypothesis; Kowert et al., 2015) or could be attributable to preexisting problems, in that those with poorer social competence are more drawn to video game usage as a way to avoid real social interactions (compensation hypothesis) or as a form of escapism (Hussain et al., 2021). A third possibility is that poor social competence in relation to media usage is due to displacement of both social interactions and strong social ties (better quality social relationships supported by physical proximity) that are typically found in real-life social interactions (Kraut et al., 1998).

Contrary to Gentile and Anderson (2003), who reported that the negative social outcomes associated with video game playing were mostly dependent on the type of content of the game played (e.g., nonviolent vs. violent), no associations were found in this study with video game categories or context. Of note, a small but nonnegligible portion of the sample (9/57, 15.8%) was reported to play violent video games not recommended for their age. There is some evidence that video game age ratings seldom act as barrier and even and can even attract youth as young as 7 years old (Bijvank et al., 2009). No other games were classified as violent but age appropriate, and thus the violence category may not be representative of children’s usual exposure to violent content through games. The study questions did not specifically address the difference between violent and nonviolent games. Nevertheless, it is possible that the type of video game children play is not as relevant as the fact that they spend time playing a video game, and therefore not interacting socially in real life, missing opportunities for generalizable social experience and for refining their perception and integration of complex social cues.

Study Limitations

Several limitations should be considered when interpreting the study findings. First, it has been suggested that the use of VGPF may overlook the broad and diverse world of video games, particularly as it cannot capture other factors that may contribute to the level of children’s involvement within gaming, such as social identification with the gaming community (Kowert & Oldmeadow, 2013). Weekly frequency of play was nonetheless chosen as the main variable in this study because it provides a clear, quantitative measure of time spent engaging in the activity without confounds related to age-dependent cumulative effects or with calculating lifetime exposure to gaming, for example. More fine-grained research is needed to examine which elements of a video game (difficulty, number of players, type of content, and genre) might contribute to any long-term social and behavioral outcomes, both positive and negative. Second, due to the cross-sectional and correlational nature of the study, temporal or causal relations cannot be established, and we cannot exclude the possibility of a bidirectional association between preexisting individual differences in social competence and gaming frequency, as suggested by Gentile et al. (2012). Longitudinal studies should focus on clearer usage trajectories and how they modulate differences in social competence and social cognition in later years and could shed light on short-term versus long-term social outcomes. Third, parents may not be fully aware of the exact time spent playing each of the different types of games. With respect to video game content, we were unable to draw any conclusions, possibly due to the fact that the content played by children was fairly homogenous. Future studies could draw out greater variability in this measure to further explore this relationship. Fourth, the lack of associations with video game genre (sports and racing games, building and simulation, action games, etc.) could be due to the small number of children in any of the specific categories (e.g., only 9 children played video games considered to be violent). It is therefore possible that with a larger number of children in this category, significant associations may emerge. Fifth, the participant sample was modest in size, Caucasian, and predominantly middle-class, limiting the generalizability of the results. Thus, despite the novelty of the approach looking at a seldom studied developmental group in terms of video game playing, and the inclusion of seldom considered social cognitive variables, we were not able to address previous critiques pertaining to power in this field of research (e.g., Hilgard et al., 2017; Delhove & Greitemeyer, 2020). Future work in larger, more representative samples would be useful in exploring a broader range of factors that could be associated with the video game–social competence association, including family and parental factors such as, for example, parenting style and the degree to which parents monitor their children’s activities.

Conclusion

This study contributes to work exploring the association between video game playing and social competence in middle childhood. The results indicate that aspects of child social cognitive skills, including everyday executive functioning and empathy, as well as social adaptive skills, logically contribute to social behavior in children. While playing video games more frequently was not related to social behavior problems in their children, more frequent playing was associated with less prosocial behavior. The research adds to the growing body of work disputing broad and all-encompassing claims that video game playing leads to socially maladapted individuals.

References

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