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VIDEO GAME USE AMONG CHILDREN AND ADOLESCENTS WITH ATTENTION DEFICIT HYPERACTIVITY DISORDER

BY

JOSEPH J. ARMENDAREZ

A THESIS SUBMITTED IN PARTIAL FULLFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF ARTS IN PSYCHOLOGY

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MASTER OF ARTS THESIS

OF

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ABSTRACT

Electronic media use by children and adolescents is growing each year. From 2004 to 2009, electronic daily media exposure increased from six hours and twenty-one minutes to seven hours and thirty-eight minutes. The ubiquity of electronic media among youth is apparent in our technology-driven culture; however, more research on video gaming patterns and characteristics of children and adolescents with developmental disabilities is warranted - specifically, individuals with Attention Deficit Hyperactivity Disorder (ADHD). As of 2011, the number of children and adolescents with ADHD in schools represents 6.4 million in the USA. Given that ADHD is a prevalent disability in children and adolescents, there is a need to be able to effectively discern the most time and cost effective interventions for youth with ADHD, including those that are electronically mediated. Thus, this study examines parent-reported video game use among children and adolescents with ADHD collected from a clinical sample, and compares their rates of use with previously reported data from national samples. Parents completed the Children's Use of Video Games and Digital Media, comprised of 13 questions that assessed ADHD type characteristics expressed during activities, duration spent across different activities, parent involvement, perceptions, and parent use of video games. The present study found that only weekend/vacation days video game play for youth with ADHD was reported by parents as more frequent than video game play among the national sample reported by Rideout and colleagues. Male youth statistically played more video games than female youth, and the only statistical age difference was found among 11-14 year-old children/adolescents and 5-7 year-old children, with older children/adolescents playing

more video games. The majority of parents in the present sample endorsed that their children demonstrated fewer ADHD behaviors during video game play (i.e., less inattention, hyperactivity, and disorganization). In conclusion, the variability of video game and media use indicate potential areas to capitalize on teachable moments for ADHD youth while in the home. Findings from this study are expected to inform future research and practice with children with ADHD, particularly in the areas of effective parenting, intervention development, and the use of technology-based learning strategies.

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Overall, this thesis process has provided me with the ability to complete scholarly work and to troubleshoot through many statistical quandaries. Also, it has provided me with the confidence to understand what I do not know and to seek out the appropriate answers when I do not know something.

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Chapter 1: Introduction

Statement of the Problem

Electronic media use by children and adolescents is growing each year. From 2004 to 2009, daily electronic media exposure increased from six hours and twenty-one minutes to seven hours and thirty-eight minutes (Rideout, Foehr, & Roberts, 2010). The ubiquity of electronic media among youth is apparent in our technology-driven culture (Alvermann, 2013; Lim, Zhao, Tondeur, Chai, & Tsai, 2013; Pera, 2013). However, research is lacking on video gaming patterns and characteristics of children and adolescents with developmental disabilities – specifically, individuals with Attention Deficit Hyperactivity Disorder (ADHD). This area is important to study because technology mediated interventions, such as those possible with video games, hold promise for ADHD youth (Barkley, 2014; DuPaul & Stoner, 2014).

Play and video game use

Learning is a process of acquiring information through experience that results in behavior change (Domjan, 2014). Generally, children and adolescent learn via their academic experiences, social interactions, and explored interests (Anning & Edwards, 2006; Hansen, 2003). Primarily children learn through experiences such as social interactions, manipulation of objects, interactive instruction, and play-based learning (Bergen & Fromberg, 2009). As compared with childhood, adolescent learning is more self-directed and socially constructed (Hansen, 2003). Irrespective of developmental periods, play can nevertheless support learning across childhood and adolescence (Bodrova & Leong, 2003; Brotherson, 2009).

Play can be defined as a self-selected activity, engaged in independently or

with others, that elicits gratification (Bergen & Fromberg, 2009; VanderVen, 2008). Plato discussed play as a mechanism for learning rules and developing skills that would prove useful to later adult functioning (D'Angour, 2013). Contemporary research further suggests that learning through play promotes healthy cognitive, social, and emotional functioning from early childhood through adolescence (Bergen & Fromberg, 2009; Drew, Christie, Johnson, Meckley, & Nell, 2008; Ginsburg, 2007; Gronlund, 2006). While play can take on many different forms and expressions, play is often conceptualized as occurring in five stages: (a) onlooker, (b) solitary, (c) parallel, (d) associative, and (e) cooperative play (Brotherson, 2009). Onlooker play is defined as passive play and not engaging with others playing. Solitary play consists of independent play. Parallel play consists of playing alongside others but without active interactive engagement. Associative play consists of two or more individuals working toward independent goals but interacting and playing together. Cooperative play requires the players to work together to achieve a common goal (Brotherson, 2009).

Although the stages of play are conceptualized from a child perspective, these stages can be conceptualized in terms of adolescent play as well. For example, in considering team sports, such as, football, players work toward common goals (e.g., scoring a touchdown; preventing the other team from doing so). In contemporary society, the nature of play influencing children and adolescents' experiences is replete with the presence of electronic media and technology use (e.g., video games, smart phones, television). Thus, technology is a major influence on the lives of children and adolescents in play and other aspects of daily life.

The development of play-based technology has not only created a new medium

for learning in all children through video games but also for their parents as well. As reported by the Entertainment Software Association (ESA), an estimated 59 percent of Americans play video games with approximately 30 percent who are 18 years and younger (ESA, 2014). The ESA further reports that within the 30 percent of youth who are playing video games, 42 percent of parents play video and computer games at least weekly. A majority of parents (75%) report they believe video game play with their children provides an opportunity to interact with them (ESA*)*. As compared with study compiled by the ESA, Lenhart and colleagues (Lenhart et al., 2008) found a higher number of reported video game use. These researchers (Lenhart et al.) found that 97 percent of 1102 male and female adolescents played video games, with genre distributions relatively equal among males and females. However, 50 percent of the male participants preferred more extreme and violent games, compared to only 14 percent of females (ESA, 2014).

In addition to the studies compiled by the ESA (2014) and Lenhart et al. (2008) a more general collection of video game and media use was conducted by the Kaiser Family Foundation (Rideout et al., 2010) using qualitative and quantitative methods. Children were required to report their daily video game and media use, as well as, complete a journal entry describing their media usage. The findings from this study (Rideout et al.) demonstrated a significant media use from 2004 to 2009, with daily national video game rates at an average of 1 hour and 13 minutes. While it is clear that children and adolescents are widely engaged in technology-based play, there remain many questions about the potential benefits and drawbacks for cognition, behaviors, and interventions.

Potential benefits and drawbacks of video games

As video game research became a focus of scientific research, so did the potential benefits and drawbacks of such games. In a review of video games, (Granic, Lobel, & Engels, 2014) reported that early video game research focused on the damaging effects that violent themed video games pose on developing youth. Conversely, Granic et al. described a more recent movement toward evaluating the positive benefits for video game play within cognitive, motivational, emotional, and social domains (Granic et al.). In addition, Granic et al. recognized an important limitation within the literature such that the majority of video game research has focused on cognitive domains versus motivational, emotional, and social domains. This discrepancy in research foci may be due to the nature of recording and interpreting observable cognitive responses as easier relative to motivational, emotional, and social information. Therefore we are currently limited in describing the potential benefits and drawbacks of video games within psychological and social domains.

Given the literature regarding the potential benefits and drawbacks of video games has primarily focused on cognition, and within the area of cognition has concentrated on the domain of executive functions, this is explored further. Executive functioning skills, as defined as a person's ability to attend and process relevant environmental stimuli while inhibiting irrelevant stimuli to achieving a desired outcome (Carlson & Meltzoff, 2008; Carlson, Moses, & Breton, 2002; Zelazo & Frye, 1998), is critical not only for daily functioning but as well as video game play. Executive functioning can be explained by the outcomes involved in particular

situations. For example, when a child is asked to search for a toy, he or she has to attend to given instructions and then process a plan without interference – all while using working memory to hold this goal in mind (Zelazo & Frye, 1998). Specific executive functions that are often discussed in the literature are, for example, attention, inhibition, planning, and working memory.

Many video game studies have studied dimensions of executive functioning to understand the potential cognitive benefits of video game play. For example, studies on attention demonstrate that gamers outperformed non-gamers on tasks requiring attention to target stimuli, and inhibition of attention to irrelevant stimuli (Dye, Green, & Bavelier, 2009; Green & Bavelier, 2012). Similar to Dye et al. (2009), Boot, Kramer, Simons, Fabiani, and Gratton (2008) found that expert gamers performed better at tracking objects, were more accurate in recalling visual items in short-term memory, better at switching between tasks, and mentally rotating objects more quickly and accurately than non-expert gamers. In addition, Karle, Watter, and Shedden (2010) found that gamers were better able to control attention at the initial stages of stimuli presentation, which facilitated quicker and more accurate task switching than non-gamers. Video game expertise thus appears to promote differences between gamers and non-gamers (Bavelier et al., 2011; Boot et al., 2008; Green & Bavelier, 2012).

Moreover, Boot, Blakely, and Simons (2011) reviewed executive functioning and action video games in a college population across 14 cross-sectional studies (e.g., different age cohorts at one time point) for expert versus non-expert gamers. They (Boot et al.) reported differences in favor of gamers for measures, such as: (a) task

switching, (b) response time, (c) decision-making, (d) visual-motor skills, (e) enumeration, (f) visual acuity, (g) mental rotation, (h) temporal judgment, search, and (i) resistance to masking. However, four studies did not find differences in visual searching (e.g., responding to a targets following alternating cues and delay), attention cuing, and visual attention (Boot et al.). Eight studies using randomized control designs found training benefits in mental rotation, enumeration (e.g., participants have to determine the number of squares presented briefly on a computer screen), object tracking, visual acuity, decision-making, contrast sensitivity, and resistance to masking (Boot et al., 2011). Only one study did not demonstrate significant training effects (Boot et al.). In addition to the existing evidence to support that playing video games may enhance cognition, there is some evidence to suggest that video games may serve to influence development in a detrimental way (e.g., addictive tendencies; attention).

Whereas there are cognitive benefits in video game play, there are potential drawbacks related to attention and problematic video game use. For instance, a potential drawback of video game play is the potential to either cause or exacerbate attention problems. For example, Swing, Gentile, Anderson, and Walsh (2010) assessed 1323 children (6-12 years-old) to examine exposure to both television and video games and its association to attention problems. Teachers reported on children's classroom behaviors, including ability to stay on task, pay attention, and not interrupt the classroom. Children who had exceeded the American Academy of Pediatrics' recommendation of no more than two hours of daily video game and television exposure were more likely to display above average teacher rated attention problems.

Specific to video game play, teachers rated children as displaying more attention problems in class when video games were played on average for one hour and thirty-four minutes per day.

Similarly, Gentile, Swing, Lim, and Khoo (2012) reported comparable results regarding rates of attentional problems in relation to video game use. A total of 3,034 children and adolescents (8-17 years-old), from Singapore, were surveyed over a three-year period to assess daily and weekly video game use. After controlling for gender, age, race, and socio-economic status (SES) variables, Gentile et al. found that time spent playing video games was a robust predictor of attention problems. This study also addressed the directionality of the relationship between video games and attention problems to determine whether children with attention problems were more attracted to video games, or did video game play produce children with more attention problems? Support for a bidirectional relationship was found, such that children who played video games and had more attention problems presented with increased attention difficulties (Gentile et al.).

Parent perception

Another influence on youth's video game use is the perceptions of video games exhibited by parents. Across 536 parent-child dyads measured on video game use and parent perception, results found that on average parents monitored the types of video games played by children, restricted certain graphic video games, evaluated the games selected by their children, and parents played video games with their children (Nikken & Jansz, 2003). In addition, when parents perceived certain video games as potentially harmful, then parents were more apt to restrict video games. However,

families from a low socio-economic status (SES) restricted video games more often and evaluated the negative and positive aspects of the video games. No difference between frequency of video game play for low SES and high SES parents was found.

Taken together, the research on the potential benefits and drawbacks of using video games, as well as parent perception, highlights the need to further explore how video games are used by Attention Deficit Hyperactivity Disorder (ADHD) youth. Furthermore, this research aims to extend the current knowledge and literature regarding individuals with attention problems who play video games, and in turn, may hold promise for intervention development and implementation and effective parenting practices.

Children and adolescents with ADHD

In addition to exploring potential benefits and drawbacks of video game use among the general population recent research has explored potential benefits and drawbacks for children and adolescents with developmental disabilities, for example, youth with ADHD (e.g., Nikkelen, Valkenburg, Huizinga, & Bushman, 2014). According to the Diagnostic Statistical Manual – Fifth Edition (DSM – V; American Psychiatric Association, 2013), ADHD is a neurodevelopmental disorder that impairs performance of daily tasks and development. Individuals with ADHD have difficulty managing tasks, low attention skills, poor working memory, and difficulty switching between tasks. ADHD is categorized into three subtypes: (1) primarily inattentive; (2) primarily hyperactive-impulsive; and (3) combined: inattentive and hyperactive-impulsive. For example, an individual diagnosed with a predominantly inattentive subtype (ADHD-I) will have difficulty with sustaining attention, following

instructions, and organization. Secondly, an individual with a hyperactive-impulsive subtype (ADHD-H) diagnosis may appear to fidget their hands or feet or squirm in their chair, have difficulty remaining seated, and act as if a motor drives them. Lastly, a combined subtype (ADHC-C) diagnosis is a mixture of both inattentive and hyperactive-impulsive characteristics (American Psychiatric Association, 2013). Overall, an individual with ADHD is likely to experience difficulty with managing and switching between tasks, attention skills, and working memory (DuPaul & Weyandt, 2006).

ADHD video game use and concerns

It is well documented that there is a great deal of variability among children with ADHD, both in terms of presenting difficulties, and in terms of day-to-day behavior (DuPaul & Stoner, 2014). Children and adolescents without disabilities vary in their level of video game use; for instance between 42 percent (ESA, 2014) and 97 percent (Lenhart et al., 2008) of youth play video games. With respect to studies comparing video game play among youth with ADHD and typically developing (TD) controls, there are no significant differences reported (Bioulac, Arfi, & Bouvard, 2008; Durkin, 2010; Mazurek & Engelhardt, 2013). Children who are typically developing are defined as individuals without a clinically diagnosed developmental disability.

Thus, whereas video game use of ADHD youth is similar to TD youth, the breakdown of ADHD sub-type characteristics might suggest different levels and interests of video game use. For example, in a meta-analysis conducted by Nikkelen et al. (2014) positive correlations were reported for the studies that focused on inattention ($r_+ = .32$) and impulsivity ($r_+ = .11$) ADHD related behaviors with media

use. Across 29 cross-sectional, 12 longitudinal, and four experimental studies a significant positive correlation ($r_+ = .12$) between general media use (i.e., television and video games) and a composite score (i.e., attention, impulsive, and hyperactive problems) was found. The largest effect size was found by studies that described inattention problems versus studies that reported composite ADHD scores. This distinction is in line with previous research (Milich, Balentine, & Lynam, 2001), supporting the notion that ADHD-C and ADHD-I are possibly two distinct and unrelated disorders.

While Nikkelen et al.'s (2014) meta-analysis illustrated a positive relationship between ADHD sub-types and general media use, television viewing included as a variable confounds the relationship between video game usage and ADHD youth. Therefore in a study that isolated video game use among ADHD youth (e.g., Bioulac, Arfi, & Bouvard, 2008), 29 French children (M = 12.1-years-old) self-reported more addictive tendencies (e.g., preoccupation, loss of control, etc.) during video game play compared to 21 TD children (M = 10.8-years-old). However, Bioulac et al. did not find frequency and duration differences between children with and without ADHD. The small sample size, translated scale (i.e., English to French translation), and child self-reported video game use warrants future research on larger populations. Therefore, Bioulac et al.'s findings suggest children with ADHD may have the potential to exhibit video game addiction compared to TD children but indicates a need to further explore video game use and interests.

Further, a longitudinal study conducted by Fischer and Barkley (2006) followed a group of adolescents with ADHD (N = 149) and TD controls (N = 76) until

adulthood (19-25 years of age), and recorded weekly amount of time spent engaging in social, financial, and recreational activities. Results indicated no significant differences between the adolescents with ADHD and TD controls in time spent playing video games, although mean differences illustrated that self-reported weekly video game hours were higher for ADHD adolescents (ADHD adolescents $M = 4.0$; TD controls $M = 1.9$). Within this sample, television watching, talking on the telephone, and hobby engagement were reported as longer significant durations for the ADHD adolescents than for TD controls. Albeit not significant the two weekly activities with lowest means were reading for pleasure and working out. Across all leisure activities combined, ADHD adolescents ($M = 145.7$) displayed significantly longer hours per week than TD controls ($M = 100.2$).

ADHD and technology intervention

Whereas limited research has suggested that video game use and duration among youth with ADHD is similar to TD controls, there has been research on the positive effects of technology-mediated interventions for ADHD youth within behavioral and academic domains. In a review paper on video games for children and adolescents with developmental disabilities, Durkin, Boyle, Hunter, and Conti-Ramsden (2013) reported that technology interventions demonstrated efficacy in increasing working memory. For example, Green et al. (2012) conducted a study to determine the extent that training working memory would improve on-task behaviors in the classroom. Using a randomized double-blind placebo, control design, Green et al. found that for 26 children with ADHD (17 males, 9 females; Mean age = 9.7 years), training working memory significantly produced more on-task classroom

behaviors. Similar to Green et al. findings, working memory research (Holmes, Gathercole, & Dunning, 2009; Klingberg, Forssberg, & Westerberg, 2002) reinforces the concept that improvement in cognitive control can lead to improved behavioral functioning.

Other research utilizing technology has assessed computerized intervention effects on academic functioning. For example, (Clarfield & Stoner, 2005) conducted a multiple-baseline study with three male students in special education with an ADHD diagnosis to compare the efficacy of a computerized reading instruction program to teacher-directed instruction at increasing oral reading fluency. Clarfield and Stoner reported that not only did the computerized reading instruction program produce more words read correctly by students but also regression estimates of weekly growth rates during the intervention phase for two participants were similar to those of general education students. Their findings (Clarfield & Stoner) illustrated that computerized instruction is effective and may serve to assist teachers with managing classrooms and individuals who present with attention difficulties.

In summary, as of 2011, there are 6.4 million in the USA children and adolescents with ADHD in schools (CDC/NCHS, 2013) and ADHD is estimated to have a monetary impact of 36 to 52 billion dollars in the US each year (Pelham, Foster, & Robb, 2007). Given the prevalence and financial societal burden of ADHD, there is a need to be able to effectively discern the most time and cost effective ADHD interventions – potentially including electronically mediated interventions. Thus, the general findings from this study are intended to inform future research and practice with children with ADHD, particularly in the areas of effective parenting, intervention

development, and the use of technology based learning strategies.

Research questions and hypotheses

Question 1: To what extent is the amount of time spent playing video games and other types of activities (e.g., homework, watching TV) by children and adolescents with ADHD, as reported by parents, similar to or different from that of the general population of children and adolescents?

Hypothesis: Children and adolescents with ADHD will display similar video game and activity duration than that of the general population of children and adolescents.

Question 2: Are there gender differences in the amount of time spent playing video games by children and adolescents with ADHD in the study sample, as reported by parents?

Hypothesis: Males will demonstrate significantly higher rates of video game play than females.

Question 3: Are there differences in the amount of time spent playing video games between younger and older participants?

Hypothesis: Younger children will display significantly higher rates of video game use than older participants.

Question 4: To what extent are there differences in the amount of time spent playing video games and other types of activities, as reported by parents, as a function of ADHD diagnosis (ADHD combined-type [ADHD-C] compared with ADHD primarily inattentive-type [ADHD-I]).

Hypothesis: Children and adolescents with an ADHD-I subtype diagnosis will

demonstrate significantly more technology and/or non-technology use than children and adolescents with an ADHD-C subtype diagnosis.

Chapter II: Methods

Study Procedure

For the purposes of the present study, information was gleaned from all participating parents and children, to include only those questionnaires completed by parents of children and adolescents whose evaluation resulted in a diagnosis of ADHD. Demographic information reported include: age, gender, and a proxy of socio-economic status of parents and children. Based on the racial/ethnic demographics of Southern Rhode Island, this sample is likely not representative of US racial/ethnic demographics.

Participants. A total of 131 parents of children and adolescents were seen within a clinical psychology practice for the purposes of completing a diagnostic evaluation and concomitant recommendations for support with their children's presenting problems. Parents completed the Children's Use of Video Games and Digital Media (Kulman, n.d.) as part of a diagnostic evaluation. This questionnaire is routinely completed as part of a clinical evaluation process for children and adolescents at a clinic in Southern Rhode Island. Parents completed the questionnaire while at the clinic in a quiet room.

Measure. The Children's Use of Video Games and Digital Media (see Appendix A) is comprised of 13 questions that assessed characteristics and time spent across different activities, parent involvement, perceptions, and parent use of video games, and an open-ended question that then asks about further concerns about their children's video games and media use.

Parents reported ADHD sub-type characteristics across different activities on a four-item scale (Never, Sometimes, Often, Always). For instance, parents were asked,

How often does your child lose focus, become inattentive, and easily distracted when: (a) playing video games, (b) doing homework, (c) watching TV, or (d) playing with Legos or blocks. Parents then reported the minutes their child spent daily on various activities (e.g., watching TV, reading, playing outside, video games, texting, playing with toys) selecting between five different boxes (None, <30, 30-60, 60-120, >120).

Parents were further asked about limit settings surround video game use. Next, parents reported their concerns surrounding video game use on five-point scale (Not at all, Mildly, Somewhat, Concerned, Extremely). Then, parents were asked how much they believe video games can help their children in a various academic, cognitive, and behavioral areas on a five-point scale (Not at all, A little bit, Somewhat, Quite a bit, A great deal). Parents marked the amount of minutes (None to <30, 30-60, 60-120, >120) spent in various activities (e.g., watching TV, using the internet, playing video games, using cell phones). Parents were then asked to rank their interest and expertise with video games, apps, and other digital technologies (e.g., cell phones, IPods, Internet, etc.).

Data Analysis. Extant data was utilized to answer the proposed research questions. To answer the first research questions descriptive statistics were reported that included the mean, median, and standard deviations. Next, an Analysis of Variance (ANOVA) assessed group mean video game use differences between male and female gamers. The independent variable (IV) was gender and dependent variable (DV) was amount of time spent playing video games. Next, a series of ANOVAs were used to assess group differences across age variables. The IV was age and the DV was amount of time spent playing video games and other activities.

Lastly, to test between group differences exist between ADHD combined-type and ADHD primarily inattentive-type children and adolescents, a series of ANOVAs were run. The IV was ADHD sub-type (ADHD combined vs. ADHD inattentive type) and DVs were activity types (e.g., technology, academic, non-academic, non-technology). All data were checked for assumptions of normality before performing parametric statistical analyses (i.e., ANOVAs). A macro-level effect size value (e.g., Eta-squared) was used as an indication of the magnitude of the relationship between independent and dependent variables. The following effect size guidelines were used: small ($\eta^2 = 0.02$), medium ($\eta^2 = 0.13$), and large ($\eta^2 = 0.26$) (Miles & Shevlin, 2001). Micro-level effect size values (e.g., Cohen's *d*) provided an indication of the magnitude of relationship between means. The following mean effect size guidelines were used: small ($d = 0.2$), medium ($d = .0.5$), and large ($d = 0.8$) (Cohen, 1988).

Chapter III: Results

A total of 102 children and adolescents with ADHD-C and 29 children and adolescents with ADHD-I were included in this study's sample. Within this sample of 131, there were 96 males and 35 females with a mean age of 9.36 (*SD* = 3.26). There were a total of 131 parents. Including 115 females and 16 males, with a mean age of 40.07 (*SD* = 8.59). As a proxy of social-economic status (due to limited information on parents) we are reporting whether parents were on state versus private health insurance. There were 64 (49%) parents on state funded health insurance plans and 61 (47%) parents on privately funded health insurance plans. Parent education level could not be obtained from the sample.

Research question 1

To what extent is the amount of time spent playing video games and other types of activities (e.g., homework, watching TV) by children and adolescents with ADHD, as reported by parents, similar to or different from that of the general population of children and adolescents?

Hypothesis: Children and adolescents with ADHD will display similar video game and activity duration than that of the general population of children and adolescents.

Tech Activities

The average weekday time spent playing videos games for children and adolescents with ADHD was between 30-60 minutes (*n* = 128, *M* = 2.32, *SD* = 1.09). As reported by parents, 27 percent of the sample did not play video games, 30 percent played less than 30 minutes, 28 percent play between 30-60 minutes, and 13 percent

played longer than 1 hour during each weekday. During the weekend days and vacation days, parental reports indicate video games were played, on average, between 60-120 minutes per day (n = 128, M = 3.34, SD = 1.28). As reported by parents, 9 percent of the sample did not play video games on the weekend days and vacation days, whereas 18 percent played less than 30 minutes, 25 percent played between 30-60 minutes, and 47 percent played longer than one hour. Time of video game play during the weekday and weekend was significantly correlated (r = .52, p < .000). Therefore, it appears that those who played video games for longer periods of time during the weekdays also played more during the weekends. A previous national sample of self-reported activities ages 8-18 years-old (e.g., Rideout et al., 2010) reported average daily video game play as 1 hour and 13 minutes. Our sample during the weekdays played videogames for less time than the national daily average, however, participants in our sample played more than the national average on the weekend.

Average weekday Internet use was approximately 30 minutes (n = 127, M = 2.08, SD = 1.03). As reported by parents, 32 percent of the sample did not use the Internet, 37 percent used the Internet less than 30 minutes, 18 percent used the Internet between 30-60 minutes, and 9 percent used the Internet more than 1 hour during the weekday. During weekends and vacation days, the average Internet use was between 30-60 minutes (n = 127, M = 2.53, SD = 1.32). As reported by parents, 28 percent of the sample did not use the Internet, whereas 25 percent used the Internet less than 30 minutes, 21 percent used the Internet between 30-60 minutes, and 24 percent used the Internet more than one hour on weekend and vacation days. Compared to the

previously reported youth national Internet use of 30 minutes a day (e.g., Rideout et al., 2010), the study's sample used the Internet at approximately the same rate during the week, but during weekend/vacation days Internet use was engaged in more frequently by this sample compared to the national sample.

The average weekday time completing schoolwork on a computer was approximately less than 30 minutes (n = 128, M = 1.68, SD = 0.80). As reported by parents, 47 percent of the sample did not use a computer to complete schoolwork, 35 percent completed schoolwork on a computer for less than 30 minutes, 12 percent completed schoolwork on a computer between 30-60 minutes, and 3 percent completed schoolwork on a computer for longer than 1 hour during the weekday. During the weekend days and vacation days, the average time spent completing homework on a computer was approximately less than 30 minutes (n = 128, M = 1.41, SD = 0.69). As reported by parents, 66 percent of the sample used a computer to complete schoolwork, whereas 25 percent used a computer to complete schoolwork for less than 30 minutes, 5 percent used a computer to complete schoolwork between 30-60 minutes, and 2 percent used a computer to complete schoolwork for longer than one hour on weekend and vacation days. No national data (i.e., Rideout et al., 2010) was reported for completing schoolwork on a computer, thus, no qualitative comparison is applicable.

The average weekday time spent on a cell phone was approximately less than 30 minutes (n = 127, M = 1.48, SD = 0.95). As reported by parents, 70 percent of the sample did not use a cell phone, 16 percent used a cellphone for less than 30 minutes, 3 percent used a cell phone between 30-60 minutes, and 8 percent used a cell phone

for longer than 1 hour during the weekday. During weekend and vacation days, the average time spent on a cell phone was approximately less than 30 minutes (n = 128, M = 1.64, SD = 1.18). As reported by parents, 66 percent of the sample did not use a cell phone, whereas 18 percent used a cellphone for less than 30 minutes, 3 percent used a cell phone between 30-60 minutes, and 11 percent used a cell phone for longer than one hour on the weekend and vacation days. Compared to a previous national sample of self-reported activities among children and adolescents ages 8-18 years-old (i.e., Rideout et al., 2010) cell phone use was on average 32 minutes. This sample used cell phones less than the national population on both weekdays and weekends/vacations.

The average weekday time spent listening to music was approximately 30 minutes (n = 127, M = 2.35, SD = 1.10). As reported by parents, 21 percent of the sample did not listen to music, 41 percent listened to music for less than 30 minutes, 24 percent listened to music between 30-60 minutes, and 12 percent listened to music for longer than 1 hour during the weekday. During weekend and vacation days, the average time spent listening to music was approximately less than 30 minutes (n = 128, M = 2.81, SD = 1.20). As reported by parents, 12 percent did not listen to music, whereas 34 percent listened to music for less than 30 minutes, 23 percent listened to music 30-60 minutes, and 29 percent listened to music for longer than one hour on the weekend and vacation days. Compared to a national sample (i.e., Rideout et al., 2010) that listened to music for 2 hours and 31 minutes on average per day, this sample listened to music less frequently during weekdays and weekends/vacations.

The average weekday time spent watching TV was approximately 30-60

minutes (n = 128, M = 3.04, SD = 0.86). As reported by parents, 4 percent of the sample did not watch TV, 18 percent watched TV for less than 30 minutes, 50 percent watched TV between 30-60 minutes, and 26 percent watched TV for longer than 1 hour during the weekday. During weekend and vacation days, the average time spent watching TV was approximately between 60-120 minutes (n = 127, M = 3.88, SD = 0.88). As reported by parents, 8 percent watched TV for less than 30 minutes, 21 percent watched TV for 30-60 minutes, and 61 percent watched TV for longer than one hour on the weekend and vacation days. Compared to the national reported average of 2 hours and 39 minutes for live TV watching, this sample watched TV less frequently on both weekdays and weekends/vacations.

In sum, across tech activities (i.e., video games, Internet, cell phone, listening to music, and TV) children and adolescents with ADHD engaged less during weekdays and weekends/vacation compared to a national sample (i.e., Rideout et al., 2010). Weekend/vacation video game play among youth with ADHD was more frequent than the national sample collected by Rideout and colleagues (see Table 1).

Table 1

Average weekday and weekend/vacation time (minutes) spent in tech activities compared to a national sample (Rideout et al., 2010)

	ADHD Sample			Comparisons	
	Weekday	Weekend/ Vacation Days	National Sample	Weekday	Weekend/ Vacation
Video Games	30-60	60-120	73	<	>
Internet	30	30-60	102	<	<
Schoolwork on Computer*	1-30	1-30	.	.	.
Cell Phone	30	1-30	32	<	<
Music	30	1-30	122	<	<
TV	30-60	60-120	159	<	<
Total Time	150-240	152-360	489		

*Schoolwork on computer was not computed by national sample.

Table 2

Frequencies and percentages across tech and non-tech activities in minutes (1 = None, 2 = <30, 3 = 30-60, 4= 60-120, 5= >120)

	Weekday	Frequency	%	Weekend	Frequency	%
Video Games	None	35	26.7	None	12	9.2
	<30	39	29.8	<30	23	17.6
	30-60	37	28.2	30-60	32	24.4
	60-120	12	9.2	60-120	31	23.7
	>120	5	3.8	>120	30	22.9
Internet	None	42	32.1	None	36	27.5
	<30	49	37.4	<30	32	24.4
	30-60	24	18.3	30-60	28	21.4
	60-120	8	6.1	60-120	18	13.7
	>120	4	3.1	>120	13	9.9
HW on Computer	None	61	46.6	None	87	66.4
	<30	46	35.1	<30	33	25.2
	30-60	15	11.5	30-60	6	4.6
	60-120	4	3.1	60-120	1	0.8
	>120	61	46.6	>120	1	0.8
Cell phone	None	92	70.2	None	87	66.4
	<30	21	16	<30	23	17.6
	30-60	4	3.1	30-60	4	3.1
	60-120	8	6.1	60-120	5	3.8
	>120	2	1.5	>120	9	6.9
Listening to music	None	27	20.6	None	16	12.2
	<30	53	40.5	<30	44	33.6
	30-60	31	23.7	30-60	30	22.9
	60-120	7	5.3	60-120	24	18.3
	>120	9	6.9	>120	14	10.7
TV	None	5	3.8	None	10	7.6
	<30	24	18.3	<30	27	20.6
	30-60	65	49.6	30-60	58	44.3
	60-120	29	22.1	60-120	32	24.4
	>120	5	3.8	>120	10	7.6
Toys	None	25	19.1	None	20	15.3
	<30	47	35.9	<30	26	19.8
	30-60	35	26.7	30-60	29	22.1
	60-120	17	13	60-120	28	21.4
	>120	3	2.3	>120	23	17.6
Organized sports	None	69	52.7	None	72	55
	<30	10	7.6	<30	11	8.4
	30-60	26	19.8	30-60	22	16.8
	60-120	16	12.2	60-120	10	7.6

	>120	6	4.6	>120	12	9.2
Outdoor sports	None	14	10.7	None	14	10.7
	<30	33	25.2	<30	13	9.9
	30-60	43	32.8	30-60	24	18.3
	60-120	26	19.8	60-120	33	25.2
	>120	12	9.2	>120	42	32.1
HW	None	3	2.3	None	37	28.2
	<30	40	30.5	<30	50	38.2
	30-60	56	42.7	30-60	28	21.4
	60-120	23	17.6	60-120	10	7.6
	>120	5	3.8	>120	3	2.3

Non-Tech Activities

In addition to time spent with technology, parents were asked to report about their children's engagement in activities that were not technology mediated or related. The average weekday time spent playing with toys or board games was approximately 30-60 minutes (n = 127, M = 2.42, SD = 1.03). As reported by parents, 19 percent of the sample did not play with toys or board games, 36 percent played with toys or board games for less than 30 minutes, 27 percent played with toys or board games between 30-60 minutes, and 15 percent played with toys or board games for longer than 1 hour during the weekday. During weekend and vacation days, the average time spent playing with toys or board games was approximately 30-60 minutes (n = 126, M = 3.06, SD = 1.34). As reported by parents, 15 percent did not play with toys or board games, whereas 20 percent played with toys or board games for less than 30 minutes, 22 percent played with toys or board games for 30-60 minutes, and 39 percent played with toys or board games for longer than one hour on weekend and vacation days.

The average weekday time spent playing organized sports was approximately 30-60 minutes (n = 127, M = 2.05, SD = 1.30). As reported by parents, 53 percent of the sample did not play organized sports, 8 percent played organized sports for less

than 30 minutes, 20 percent played organized sports between 30-60 minutes, and 17 percent played organized sports for longer than 1 hour during the weekday. During weekend and vacation days, the average time spent playing organized sports was approximately less than 30 minutes (n = 127, M = 2.05, SD = 1.39). As reported by parents, 55 percent did not play organized sports, whereas 8 percent played organized sports for less than 30 minutes, 17 percent played organized sports for 30-60 minutes, and 17 percent played organized sports for longer than one hour on the weekend and vacation days.

The average weekday time spent playing outdoor sports was approximately 30-60 minutes (n = 128, M = 2.91, SD = 1.13). As reported by parents, 11 percent of the sample did not play outdoor sports, 25 percent played outdoor sports for less than 30 minutes, 33 percent played outdoor sports between 30-60 minutes, and 29 percent played outdoor sports for longer than 1 hour during the weekday. During weekend and vacation days, the average time spent playing outdoor sports was approximately less than 30 minutes (n = 126, M = 3.60, SD = 1.34). As reported by parents, 11 percent did not play outdoor sports, whereas 10 percent played outdoor sports for less than 30 minutes, 18 percent played outdoor sports for 30-60 minutes, and 57 percent played outdoor sports for longer than one hour on the weekend and vacation days.

The average weekday time completing homework was approximately 30-60 minutes (n = 127, M = 2.90, SD = 0.88). As reported by parents, 2 percent of the sample did not complete homework, 31 percent completed homework for less than 30 minutes, 43 percent completed homework between 30-60 minutes, and 21 percent completed homework for longer than 1 hour during the weekday. During weekend

and vacation days, the average time spent completing homework on a computer was approximately less than 30 minutes (n = 128, M = 2.16, SD = 1.01). As reported by parents, 28 percent of the sample did not complete homework, whereas 38 percent completed homework for less than 30 minutes, 21 percent completed homework between 30-60 minutes, and 10 percent used completed homework for longer than one hour on the weekend and vacation days.

Table 3

Descriptive statistics including none responses in minutes (1 = None, 2 = <30, 3 = 30-60, 4= 60-120, 5= >120)

		n	*M*	*Mdn*	*SD*	Skewness	Kurtosis	Min	Max
Video Games	Weekday	128	2.32	2	1.09	0.51	-0.37	1	5
	Weekend	128	3.34	3	1.28	-0.26	-0.99	1	5
Internet	Weekday	127	2.08	2	1.03	0.91	0.46	1	5
	Weekend	127	2.53	2	1.31	0.44	-0.92	1	5
Schoolwork on Computer	Weekday	126	1.70	2	0.80	0.98	0.37	1	4
	Weekend	128	1.41	1	0.69	2.15	6.17	1	5
Cell phone	Weekday	127	1.48	1	0.94	2.14	3.89	1	5
	Weekend	128	1.64	1	1.18	1.95	2.68	1	5
Listening to music	Weekday	127	2.35	2	1.09	0.84	0.34	1	5
	Weekend	128	2.81	3	1.20	0.31	-0.86	1	5
TV	Weekday	128	3.04	3	0.85	-0.08	0.22	1	5
	Weekend	127	3.88	4	0.88	-0.48	-0.39	2	5
Toys	Weekday	127	2.42	2	1.03	0.38	-0.48	1	5
	Weekend	126	3.06	3	1.34	-0.06	-1.16	1	5
Organized Sports	Weekday	127	2.06	1	1.30	0.78	-0.77	1	5
	Weekend	127	2.05	1	1.39	0.97	-0.44	1	5
Outdoor Sports	Weekday	128	2.91	3	1.13	0.11	-0.67	1	5
	Weekend	126	3.60	4	1.34	-0.64	-0.74	1	5
Homework	Weekday	127	2.90	3	0.86	0.35	-0.11	1	5
	Weekend	128	2.16	2	1.01	0.71	0.07	1	5

Table 4

Descriptive statistics excluding none responses in minutes (1 = None, 2 = <30, 3 = 30-60, 4= 60-120, 5= >120)

		n	*M*	*Mdn*	*SD*	Skewness	Kurtosis	Min	Max
Video Games	Weekday	93	2.82	3	0.86	0.89	0.19	2	5
	Weekend	116	3.59	4	1.08	-0.08	-1.26	2	5
Internet	Weekday	85	2.61	2	0.85	1.33	1.06	2	5
	Weekend	91	3.13	3	1.06	0.48	-0.99	2	5
HW on Computer	Weekday	65	2.35	2	0.60	1.50	1.25	2	4
	Weekend	41	2.27	2	0.63	2.82	8.77	2	5
Cell phone	Weekday	35	2.74	2	1.01	0.92	-0.64	2	5
	Weekend	41	3.00	2	1.26	0.70	-1.29	2	5
Listening to music	Weekday	100	2.72	2	0.94	1.25	0.65	2	5
	Weekend	112	3.07	3	1.05	0.51	-1.01	2	5
TV	Weekday	123	3.12	3	0.76	0.35	-0.10	2	5
	Weekend	127	3.88	4	0.88	-0.48	-0.39	2	5
Toys	Weekday	102	2.77	3	0.83	0.78	-0.26	2	5
	Weekend	106	3.45	3	1.09	0.06	-1.28	2	5
Organized Sports	Weekday	58	3.31	3	0.88	0.29	-0.52	2	5
	Weekend	55	3.42	3	1.05	0.28	-1.10	2	5
Outdoor Sports	Weekday	114	3.15	3	0.96	0.42	-0.77	2	5
	Weekend	112	3.93	4	1.03	-0.51	-0.93	2	5
HW	Weekday	124	2.94	3	0.82	0.56	-0.24	2	5
	Weekend	91	2.63	2	0.81	1.17	0.70	2	5

Research question 2

Are there gender differences in the amount of time spent playing video games and other types of activities by children and adolescents with ADHD in the study sample, as reported by parents?

Hypothesis: Male participants will demonstrate significantly higher rates of video game play than female participants.

The average frequency of weekday video game play for males with ADHD was between 30-60 minutes (n = 94, M= 2.46, SD = 1.09). As reported by parents, 22 percent did not play video games, 28 percent played less than 30 minutes, 34 percent played between 30-60 minutes, and 14 percent played longer than 1 hour during each weekday. During weekend days and vacation days, parents reported video games were played, on average, between 60-120 minutes (n = 94, M = 3.60, SD = 1.17). As reported by parents, 4 percent of the sample did not play video games on weekend days and vacation days, whereas 15 percent played less than 30 minutes, 25 percent played between 30-60 minutes, and 54 percent played longer than one hour.

Table 5

Descriptive statistics for video game play by gender in minutes (1 = None, 2 = <30, 3 = 30-60, 4= 60-120, 5= >120)

	Male			Female		
	n	*M*	*SD*	*n*	*M*	*SD*
Weekday	94	2.46	1.09	34	1.94	1.01
Weekend/Vacation		3.60	1.17		2.65	1.32

With respect to female gamers, parents reported that female gamers played video games for approximately 30 minutes or less during the weekday (n = 34, M = 1.94, SD = 1.01). As reported by parents, 40 percent did not play video games, 34 percent played less than 30 minutes, 11 percent played between 30-60 minutes, and 11 percent played longer than 1 hour during the weekdays. During weekend days and vacation days, parents reported video games were played, on average, between 30-60 minutes per day (n = 34, M = 2.65, SD = 1.33). Parents reported that 23 percent did not play video games on the weekend days and vacation days, whereas 26 percent played less than 30 minutes, 23 percent played between 30-60 minutes, and 26 percent

played longer than one hour (see Tables 5 & 6).

Table 6

Frequency statistics for video game play by gender on weekdays and weekend/vacation days in minutes

	Weekday				Weekend/Vacation			
	None	*<30*	*30-60*	*>60*	*None*	*<30*	*30-60*	*>60*
Male (*n =94)*	22(21)	28(27)	34(33)	14(13)	4(4)	15(14)	25(24)	54(52)
Female (*n = 34)*	40(14)	34(12)	11(4)	11(4)	23(8)	26(9)	23(8)	26(9)

Note. Frequencies are listed in percent. Inside parentheses are the total counts for each time interval. Due to rounding error and missing data, percentages may not add up to 100.

In a previous national sample of self-reported video game play of youth ages 8-18 years-old (e.g., Rideout et al., 2010) video games were played on average among male gamers for 1 hour and 37 minutes, whereas female gamers played on average for 49 minutes. Compared to our sample, males played video games less during the week, but played video games more on the weekend. With respect to female video game play, compared to national female video game play, female gamers played video games less during the week, but had higher rates of video game play on weekends and vacations.

To test for differences between video game play between male and female gamers a one-way Analysis of Variance (ANOVA) was conducted, with gender as the independent variable and time spent playing video games during the week and weekends/vacations as dependent variables. Data met the assumptions of homogeneity of variances (weekday, $F[1, 126] = 1.31$, $p > .05$; weekend, $F[1, 126] = .903$, $p > .05$) and a normal distribution (weekday, Skewness = 0.50; Kurtosis = -0.37; weekends/vacations, Skewness = -0.25; Kurtosis = -0.99). There was a significant

effect of gender on time spent playing video games during the week, $F(1, 127) = 5.78$, $MSE = 6.68$, $p = .018$. Child and adolescent males ($M = 2.44$, $SD = 1.09$, 95% CI [2.23, 2.68]) played video games significantly more often than child and adolescent females ($M = 1.94$, $SD = 1.01$, 95% CI [1.59, 2.30]). The effect size of gender was small to medium, $\eta^2 = .04$, during weekday video game play. As for video game play during weekends and vacations, a significant effect of gender on time spent playing video games was found, $F(1, 127) = 15.36$, $MSE = 22.47$, $p < .001$. Child and adolescent males ($M = 3.60$, $SD = 1.17$, 95% CI [3.36, 3.84]) played video games more often than child and adolescent females ($M = 2.65$, $SD = 1.32$, 95% CI [2.19, 3.11]). The effect of gender was large, $\eta^2 = .11$, during weekend/vacation video game play.

In sum, there is statistical support for the second research hypothesis, such that male children and adolescents with ADHD engage in video game play significantly more than female children and adolescents with ADHD.

Research question 3

Are there differences in the amount of time spent playing video games, as reported by parents, between younger and older participants?

Hypothesis: Younger children will display significantly higher rates of video game use than older participants.

To examine whether there were differences in amounts of video game play across ages, first participants were divided into four age categories based on the distribution of scores and developmental age. The groups' years were 5-7, 8-10, 11-14, and 15-18.

Children between 5-7 years of age played video games during the weekday for approximately 30 minutes or less (n = 46, M = 2.09, SD = .812). As reported by parents, 26 percent did not play video games, 40 percent played less than 30 minutes, 30 percent played between 30-60 minutes, and 2 percent played longer than 1 hour during each weekday. During weekend days and vacation days, parents reported video games were played for approximately 30-60 minutes (n = 46, M = 2.93, SD = 1.12). As reported by parents, 6 percent of the sample did not play video games on weekend days and vacation days, whereas 34 percent played fewer than 30 minutes, 28 percent played between 30-60 minutes, and 30 percent played longer than one hour.

Children between 8-10 years of age played video games for approximately 30 minutes each day (n = 41, M = 2.46, SD = 1.08). As reported by parents, 21 percent did not play video games, 28 percent played fewer than 30 minutes, 30 percent played between 30-60 minutes, and 16 percent played more than 1 hour during each weekday. During weekend days and vacation days, parents reported video games were played for approximately 60 minutes (n = 41, M = 3.59, SD = 1.22). As reported by parents, 9 percent of the sample did not play video games on weekend and vacation days, whereas 7 percent played less than 30 minutes, 21 percent played between 30-60 minutes, and 58 percent played longer than one hour.

Children and adolescents between 11-14 years of age played video games for approximately 30 minutes on weekdays (n = 30, M = 2.37, SD = 1.30). As reported by parents, 33 percent did not play video games, 23 percent played less than 30 minutes, 27 percent played between 30-60 minutes, and 17 percent played longer than 1 hour during each weekday. During weekend and vacation days, parents reported video

games were played for approximately 60 minutes (n = 30, M = 3.77, SD = 1.22). As reported by parents, 3 percent of the sample did not play video games on weekend and vacation days, whereas 13 percent played less than 30 minutes, 27 percent played between 30-60 minutes, and 57 percent played longer than one hour.

Adolescents between 15-17 years of age played video games for approximately 30 minutes on weekdays (n = 11, M = 2.64, SD = 1.50). As reported by parents, 36 percent did not play video games, 9 percent played less than 30 minutes, 18 percent played between 30-60 minutes, and 36 percent played longer than 1 hour during each weekday. During weekend days and vacation days, parents reported video games were played for approximately 30-60 minutes (n = 11, M = 3.00, SD = 1.73). As reported by parents, 36 percent of the sample did not play video games on weekend and vacation days, whereas 18 percent played between 30-60 minutes, and 46 percent played longer than one hour.

To determine the effect of age, a one-way ANOVA was conducted, with age as the independent variable and time spent playing video games on the weekday and weekends/vacations as the dependent variable. The assumption of equal variances was violated for the weekday (F[3] = 6.06, $p < .001$) but not for the weekend/vacation days (F[3] = 2.11, p = .103). For the weekday analysis the Welch Robust Test of Equality Means was not significant (F[3, 36.84) = 1.429, p = .250) and post-hoc analyses were not warranted. The overall omnibus test for weekend and vacation day video game play was significant, F[3, 124] = 3.64, p = .015, η^2 = .08. According to post-hoc analyses, there was a significant difference in weekend/vacation video game play between the 5-7 and 11-14 year-old groups, (t[74] = -3.05, p = .003, [95% CI [-

1.38, -.288], d = -.26). Weekend/vacation video game play was significantly more by children and adolescents between the ages of 11-14 years (M = 3.77, SD = 1.22, [95% CI [3.31, 4.22]) than for children 5-7 years of age (M = 2.94, SD = 1.12, [95% CI [2.60, 3.27]).

Overall the data did not support the third hypothesis. Older participants significantly played more video games than younger participants on weekend/vacation days but not during weekdays among this sample.

Research question 4

To what extent are there differences in the amount of time spent playing video games and other types of activities, as reported by parents, as a function of ADHD diagnosis (ADHD combined-subtype [ADHD-C] compared with ADHD primarily inattentive-subtype [ADHD-I]).

Hypothesis: Children and adolescents with an ADHD-I subtype diagnosis will demonstrate significantly more technology and/or non-technology use than children and adolescents with an ADHD-C subtype diagnosis.

A series of independent ANOVAs were utilized to test group differences between ADHD subtype diagnosis (i.e., ADHD-C vs. ADHD-I) and technology and non-technology media use (i.e., video games, computers, Internet use, sports, homework, etc.). All variables met parametric assumptions for ANOVAs, except schoolwork completed on the weekend and cell phone use on both the weekday and weekends/vacations. No statistically significant differences were found between groups, $F < 1$. The only variable to approach significance was video game play on the weekday, $F(1, 127) = 3.86$, $p = .051$, $n^2 = .029$. On average, children with ADHD-

C played videos games for approximately 30-60 minutes (M = 2.42, SD = 1.06), while children with ADHD-I played video games for fewer than 30 minutes (M = 1.96, SD = 1.17).

With regards to the three variables (schoolwork on weekends/vacations; cell phone use on weekdays and weekends/vacations) that did not meet parametric assumptions a non-parametric test (e.g., Mann-Whitney) was used. Schoolwork completed on weekends/vacations differed significantly for children with ADHD-C (Mdn = 1) compared to children with ADHD-I (Mdn = 1), U = 1149.00, z = -1.994, p = .046, r = -.02. Children in the ADHD-C group demonstrated a lower mean rank (61.61) compared to children in the ADHD-I group (mean rank = 74.38). In addition, weekday cell phone use for children with ADHD-C (Mdn = 1) compared to children with ADHD-I (Mdn = 1) differed significantly, U = 1046.00, z = -2.521, p = .012, r = -.02, with children in the ADHD-C group demonstrating a lower mean rank (60.57) compared to children in the ADHD-I group (mean rank = 76.14). Cell phone use on the weekend was not significant, p > .05.

Table 7

Descriptive statistics for digital media use by ADHD-C diagnosis in minutes (1 = None, 2 = <30, 3 = 30-60, 4= 60-120, 5= >120)

	n	*M*	*SD*	Skewness	Kurtosis	Min	Max
Video Games Weekdays	100	2.42	1.06	0.35	-0.49	1	5
Video Games Weekends/Vacations	99	3.37	1.25	-0.33	-0.87	1	5
Internet Use Weekdays	99	2.04	1.07	1.05	0.66	1	5
Internet Use Weekends/Vacations	98	2.44	1.30	0.54	-0.81	1	5
TV Weekdays	100	2.84	0.84	0.31	0.06	1	5

TV Weekends/Vacations	99	2.08	1.01	0.75	0.08	1	5
HW on Computer Weekdays	99	1.65	0.79	1.11	0.73	1	4
HW on Computer Weekends/Vacations	99	1.33	0.62	2.73	11.48	1	5
Cell phone Weekdays	99	1.32	0.68	2.44	6.01	1	4
Cell Phone Weekends/Vacations	99	1.48	0.93	2.38	5.60	1	5
Listening to music Weekdays	99	2.36	1.02	0.84	0.70	1	5
Listening to music Weekends/Vacations	99	3.91	0.88	-0.55	-0.29	2	5

Table 8

Descriptive statistics for digital media use by ADHD-I diagnosis in minutes (1 = None, 2 = <30, 3 = 30-60, 4= 60-120, 5= >120)

	n	*M*	SD	Skewness	Kurtosis	Min	Max
Video Games Weekdays	28	1.96	1.17	1.27	1.28	1	5
Video Games Weekends/Vacations	29	3.24	1.38	-0.03	-1.27	1	5
Internet Use Weekdays	28	2.21	0.88	0.26	-0.50	1	4
Internet Use Weekends/Vacations	29	2.83	1.34	0.15	-1.03	1	5
TV Weekdays	27	3.11	0.93	0.38	-0.70	2	5
TV Weekends/Vacations	29	2.41	0.98	0.74	0.49	1	5
HW on Computer Weekdays	27	1.89	0.85	0.63	-0.21	1	4
HW on Computer Weekends/Vacations	29	1.66	0.86	1.13	0.46	1	4
Cell phone Weekdays	28	2.04	1.43	1.00	-0.59	1	5

Cell Phone Weekends/Vacations	29	2.17	1.69	0.95	-0.97	1	5
Listening to music Weekdays	28	2.32	1.33	0.87	-0.36	1	5
Listening to music Weekends/Vacations	28	3.79	0.88	-0.26	-0.50	2	5

Next, non-technology use across ADHD subtype diagnosis was examined via a series of independent ANOVAs among non-digital media use variables (e.g., homework, sports, playing with toys). All variables met parametric assumptions for completing ANOVAs, except for playing with toys on weekends and vacations. Playing with toys was analyzed using a non-parametric test (e.g., Mann-Whitney). Across ANOVAs, there was a significant effect of ADHD subtype diagnosis and playing outdoor sports on weekdays (F[1, 127] = 5.90, MSE = 7.25, p = .017, n^2 = .05) and weekends/vacations (F[1, 125] = 4.07, MSE = 7.12, p = .046, n^2 = .03). Indicating that children with ADHD-C (M = 3.04, SD = 1.12, 95% CI [2.82, 3.26]) played outdoors sports significantly more than children with ADHD-I (M = 2.46, SD = 1.07, 95% CI [2.05, 2.88]) on weekdays. This pattern was consistent on weekend and vacation days as well, for instance, children with ADHD-C (M = 3.73, SD = 1.28, 95% CI [3.47, 3.98]) played outdoors sports significantly more than children with ADHD-I (M = 3.15, SD = 1.49, 95% CI [2.56, 3.73]). All other ANOVAs, and remaining non-parametric test, did not approach significance, $F < 1$ and $p > .05$, respectively.

In sum, the data do not support the research hypothesis, there was no statistical evidence to the support the notion that children and adolescents with an ADHD-I subtype diagnosis were significantly more engaged in more technology and non-technology use than children and adolescents with an ADHD-C subtype diagnosis.

Table 9

Statistics for non-digital media use by ADHD-C diagnosis in minutes (1 = None, 2 = <30, 3 = 30-60, 4= 60-120, 5= >120)

	n	*M*	*SD*	Skewness	Kurtosis	Min	Max
Homework Weekdays	99	2.85	1.16	0.26	-0.77	1	5
Homework Weekends/Vacations	100	3.10	0.85	0.11	0.02	1	5
Toys Weekdays	99	2.46	1.00	0.32	-0.49	1	5
Toys Weekends/Vacations	97	3.12	1.27	-0.05	-1.03	1	5
Organized Sports Weekdays	99	1.96	1.25	0.90	-0.51	1	5
Organized Sports Weekends/Vacations	98	1.94	1.31	1.12	-0.07	1	5
Outdoor Sports Weekdays	100	3.04	1.12	-0.04	-0.52	1	5
Outdoor Sports Weekends/Vacations	99	3.73	1.28	-0.79	-0.37	1	5

Table 10

Statistics for non-digital media use by ADHD-I diagnosis in minutes (1 = None, 2 = <30, 3 = 30-60, 4= 60-120, 5= >120)

	N	*M*	SD	Skewness	Kurtosis	Min	Max
Homework Weekdays	29	2.69	1.34	0.52	-0.98	1	5
Homework Weekends/Vacations	28	2.82	0.86	-0.75	0.35	1	4
Toys Weekdays	28	2.25	1.11	0.69	-0.11	1	5
Toys Weekends/Vacations	29	2.86	1.57	0.07	-1.58	1	5
Organized Sports Weekends/Vacations	29	2.41	1.57	0.56	-1.22	1	5
Organized Sports Weekdays	28	2.39	1.42	0.40	-1.35	1	5

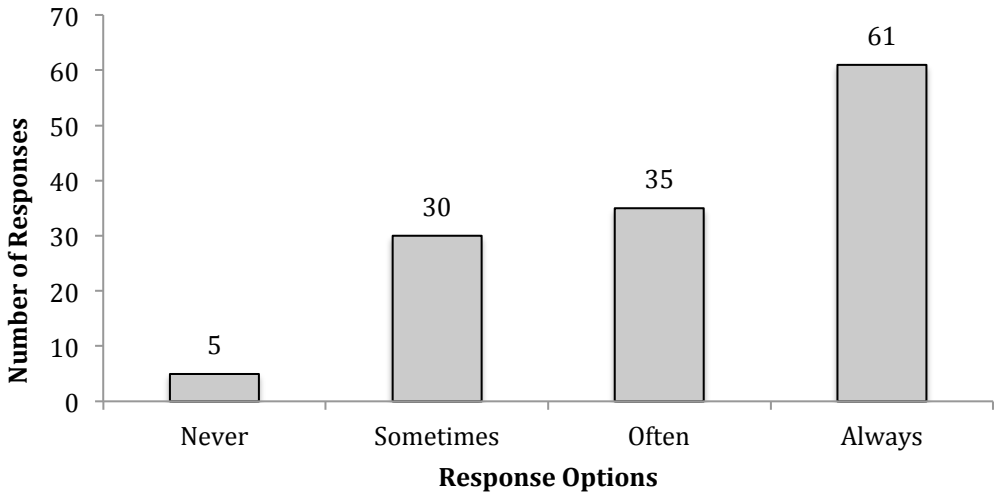
Outdoor Sports Weekdays	28	2.46	1.07	0.68	-0.25	1	5
Outdoor Sports Weekends/Vacations	27	3.15	1.49	-0.12	-1.39	1	5

Parents' monitoring, limit setting, and engagement with digital media.

As a supplementary analysis, parent responses and perceptions to questions regarding parental engagement, monitoring, and limit setting of children with ADHD and digital media were analyzed. First, parents were asked to what extent they monitor the length of time their child plays video games and goes on the computer on a 4-point scale (i.e., Never, Sometimes, Often, Always). The modal response was "Always" (n = 61, 47%). Other responses showed that there were 35 (27%) parents who endorsed "Often", 30 (23%) who endorsed "Sometimes", and 5 (4%) parents who did not report monitoring video game and computer use (see Figure 1).

Figure 1

Parent response to the following question: *Do you monitor the length of time your child plays video games and goes on the computer?*



Next, parents were asked to report on their limit setting practices surrounding their children's digital media use. Approximately one-third of parents (37%, n = 49)

said digital media is only allowed after homework is completed, 26 (20%) parents reported that there are no rules surrounding digital media, 10 (8%) parents reported children could play as long as they desired, and 25 (19%) parents restricted digital media use based on hours per day. Lastly, there were 17 (13%) parents who reported only allowing digital media on weekends and vacations and 4 (3%) parents who did not allow digital media use.

With respect to parental engagement, parents were asked to endorse how many times per week they spent together with their child playing video games, the amount of time parents watched their child play video games, and the amount of time spent going online with their child. First, there were 84 (64%) of parents who did not endorse playing video games with their child, however, there were 27 (21%) parents who endorsed once a week video game play with their child, and 19 (16%) parents who endorsed playing video games more than once a week. Second, there were a total of 47 (36%) who did not watch their child play video games, 29 (22%) parents who watched their child play video games at least once a week, and 54 (41%) parents who watched their child play video games more than once a week. Lastly, there were a total of 46 (35%) parents who reported not going online with their child, 32 (24%) parents who reported going online with their child at least once a week, and 53 (41%) parents who reported going online with their child more than once a week.

Perception of ADHD behaviors and level of concern regarding video game play

Parents were asked to report to what extent their child displayed inattention, hyperactivity, and disorganization while playing video games. Specifically, parents were asked to endorse the following questions as either “Never”, “Sometimes”,

"Often", or "Always": *How often does your child lose focus, become inattentive, and easily distracted when playing video games; How often d*oes *your child* fidget*, squirm, and appear restless when playing video games;* and *How often does your child appear disorganized, forgetful, and scattered when playing video games.* First, 70 (53%) parents who reported that their child does not display inattentive behaviors while playing video games, whereas 38 (29%) parents endorsed "Sometimes", 19 (15%) parents endorsed "Often", and 4 (3%) parents endorsed "Always" for inattentive behaviors during their child's video game play. Second, there were a total of 74 (57%) of parents who reported that their child does not appear hyperactive while playing video games, whereas 34 (26%) parents endorsed "Sometimes", 17 (13%) parents endorsed "Often", and 6 (5%) parents endorsed "Always" for child hyperactivity during video game play. Third, there were 91 (70%) parents who reported that there child does not appear disorganized while playing video games, whereas 25 (19%) parents endorsed "Sometimes", 9 (7%) parents endorsed "Often", and 2 (2%) parents endorsed "Always" for their child's disorganized behaviors during video game play.

Next, parents were asked to endorse their level of concern surrounding video game use on a 5-point scale (i.e., Not at all, Mildly, Somewhat, Concerned, Extremely). With respect to concern around time spent playing video games, 42 (32%) parents reported "Not at all", while 62 (47%) reported "Mildly" to "Somewhat", and 20 (15%) parents reported "Concerned" to Extremely". Regarding concern of lack of physical activity, 58 (44%) parents reported "Not at all", whereas 45 (34%) reported "Mildly" to "Somewhat", and 22 (17%) parents endorsed

"Concerned" to Extremely". With respect to stopping video game play when asked by a parent, 48 (37%) parents reported "Not at all", while 46 (35%) parents reported "Mildly" to "Somewhat", and 30 (23%) parents endorsed "Concerned" to Extremely". Next, parents reported their level of concern surrounding violent video games played by their children. Forty-eight (37%) parents endorsed "Not at all", while 40 (31%) reported "Mildly" to "Somewhat", and 34 (26%) parents endorsed "Concerned" to Extremely". Following, parents endorsed their level of concern for video games addiction. Forty-nine (37%) parents reported "Not at all", while 41 (31%) parents reported "Mildly" to "Somewhat", and 34 (26%) parents endorsed "Concerned" to Extremely". Next, parents endorsed to what extent video games would cause lack of interest in other activities. Here, 49 (37%) parents reported "Not at all", while 46 (35%) parents reported "Mildly" to "Somewhat", and 30 (23%) parents endorsed "Concerned" to Extremely". Finally, parents were asked if video games were a distraction to homework or other chores. Forty seven (36%) parents reported "Not at all", while 49 (37%) reported "Mildly" to "Somewhat", and 28 (21%) parents endorsed "Concerned" to Extremely".

Parents' beliefs about how much video games help their children

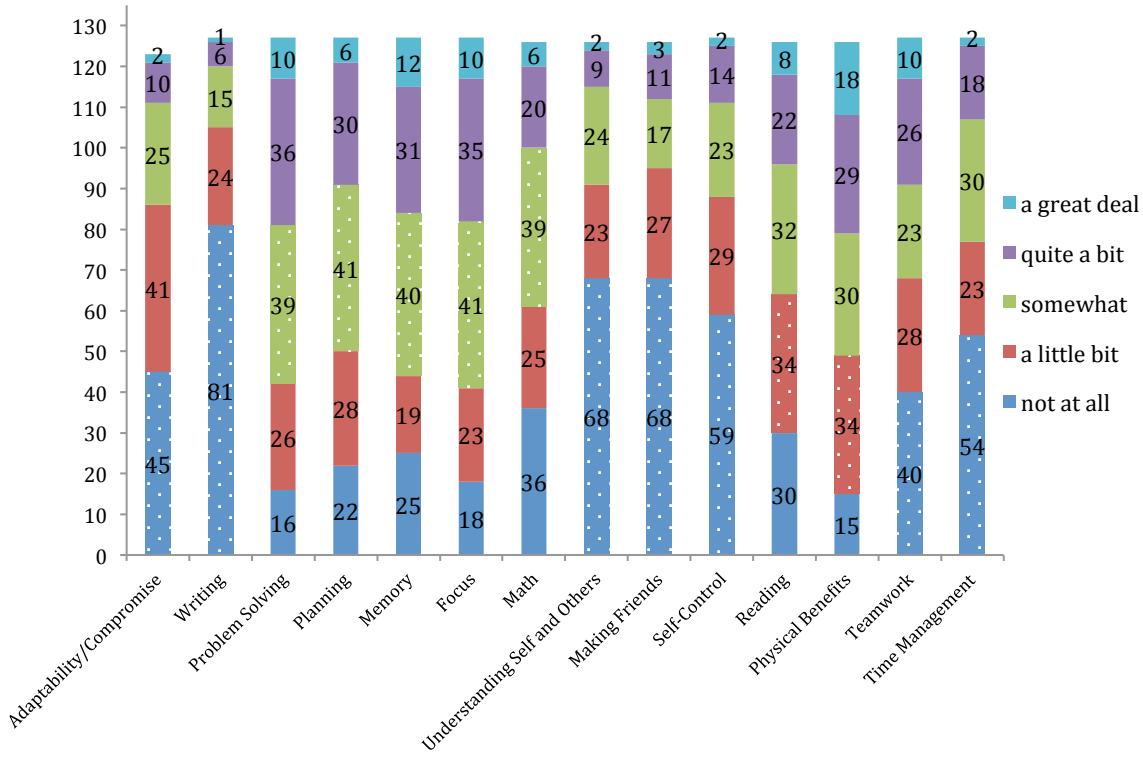
Parents were further asked to report their personal beliefs regarding whether video games can serve to help their children across a variety of activities. Items were rated on a 5-point scale (i.e., Not at all, A little bit, Somewhat, Quite a bit, A great deal). Below modal responses are reported for each response category (see Figure 2 for complete frequencies). Seven areas of functioning were queried (i.e., Adaptability/Compromise, Writing, Understanding Self and Others, Making Friends,

Self-Control, Teamwork, Time Management) with the majority of parents reporting that video games did not serve to help their child. For example, 45 (34%) parents endorsed that video games did not help their child in adaptability and compromise; 81 (62%) parents endorsed that video games did not help their child's writing; 68 (52%) parents endorsed that video games did not help their child understand themselves or others; 68 (52%) parents endorsed that video games did not help their child make friends; 59 (45%) parents endorsed that video games did not help their child with self-control; 40 (31%) parents endorsed that video games did not help their child with team work; and, 54 (41%) parents endorsed that video games do not help their child with time management.

Next, 68 parents endorsed that video games could help "A little bit" with reading (n = 34, 26%) and physical benefits (e.g., hand-eye coordination; n = 34, 26%). Lastly, there were a total of five areas that had a modal "Somewhat" response; specifically, 39 (30%) parents endorsed that video games could "Somewhat" help their child's problem solving, 41 (31%) parents endorsed that video games can "Somewhat" help their child's planning abilities; 40 (31%) parents endorsed that video games can "Somewhat" help their child's memory, 41 (31%) parents endorsed that video games can "Somewhat" help their child's focus, and 39 (30%) parents endorsed that video games can "Somewhat" help their child's math skills.

Figure 2

Count of parent responses to the following question: *How much do you believe video games can help your child in the following areas?*



Note. Mode response denoted by dotted pattern

Chapter IV: Discussion

The primary purpose of this study was to examine video game use among children and adolescents with a clinical diagnosis of ADHD and to compare this study's data with that of a national youth media use survey (i.e., Rideout et al., 2010). Along with video game activity, other technology and non-technology activities were compared to a national sample collected by Rideout and colleagues. A secondary aim of this study was to assess whether there were statistical differences between video game use across gender and age variables, as well as, determine technology and non-technology differences as a function of an ADHD subtype diagnosis. Finally, information was gleaned from parent responses, regarding limit setting, monitoring, and beliefs about whether video games can augment children's academic, social, and behavioral skills in order to provide a better understanding of parental perception of video game use by their children.

With respect to the first research question, children and adolescents with ADHD, as compared with a national sample of children (i.e., Rideout et al., 2010), engaged in less frequent technology activity use, such as, video game play, Internet use, cell phone use, listening to music, and watching TV. However, video game play for youth with ADHD on weekend/vacation days was reported to be more frequent than video game play for the national sample reported by Rideout and colleagues. This finding suggests that when youth with ADHD are not in school, and not bound to weekday constraints, then video game play exceeds national norms as reported by Rideout et al. Overall, children and adolescents with ADHD displayed less frequent technology use across media activities relative to the general population of children

and adolescents. Aside from video game play on weekend/vacation days, there were no other notable differences.

The second research question examined gender differences across video game use. Both male and female youth with ADHD played video games at lower rates during weekdays compared to national samples, but during weekends/vacations both males and females displayed higher rates of video game play compared to the national average (Rideout et al., 2010). Moreover, statistical analyses between male and female children and adolescents with ADHD indicate males significantly engaged in more video game play compared to females across weekdays and weekend/vacation days. Effect sizes demonstrated a small to medium (η^2 = .04) effect during weekday video game play, and a large effect size gender was large (η^2 = .11) during weekend/vacation video game play. This finding indicates that gender plays a significant role in influencing video game use, whereby male children and adolescents with ADHD more often engage in video game play than female children and adolescents with ADHD.

The third research question addressed age differences in video game play by comparing younger and older participants with ADHD. Although video game play did not approach significance on weekdays, age differences were found between 5-7 and 11-14 year-olds during video game play on weekends/vacation days. The effect size of this statistically significant finding was small (d = -.26), with the older 11-14 year age group playing significantly more video games on weekends/vacations compared to the 5-7 year age group. Overall these findings indicate no age differences were found during weekday activities, and that small differences across age groups of children

with ADHD were found for weekend/vacation days, with older children playing more.

Finally, the fourth research question sought to examine technology and non-technology use across differing ADHD subtypes. Within the sample, there were children and adolescents with ADHD-C and ADHD-I subtypes. Contrary to the research hypothesis, there was no statistical evidence to the support the notion that children and adolescents with an ADHD-I subtype diagnosis significantly engaged in more technology and non-technology activities than children and adolescents with an ADHD-C subtype diagnosis. Across the technology variables there was a non-significant but small effect size (n^2 = .03) for video game play on weekdays, indicating that children with ADHD-C play slightly more video games than children with ADHD-I. Although, video game use across both groups was descriptively below the national average. As for schoolwork completed on weekend/vacation days and weekday cell phone use, these were engaged in more frequently by youth with ADHD-I compared to youth with ADHD-C. Additionally, children and adolescents with ADHD-C engaged in significantly more outdoor sport play compared to children and adolescents with ADHD-I.

How is data similar to and different to that of previous research?

In a similar study to the present one, Mazurek and Engelhardt (2013) examined parent reported video game use among boys with Autism Spectrum Disorder (ASD), ADHD, and children typically developing, and found that children with ADHD displayed similar results to children who were typically developing. In their sample, 44 boys with ADHD (M = 11.1 years) and 41 boys who were typically developing (M = 12.2 years) played video games on average 1.7 and 1.2 hours per day, respectively.

These results differ from the present study's findings on weekday video game use, because the average weekday time spent playing videos games for children and adolescents with ADHD was less than one hour per day. However, similar to Mazurek and Engelhart on weekend and vacation days video game use ranged between 1-2 hours in the present study. Lastly, Mazurek and Engelhart found that male youth played video games an average of 1.7 hours per day, while the boys in the present study played video games less on weekdays (approximately 30-60 minutes) but played at similar rates during weekday/vacation days (1-2 hours).

Parent information. The majority of parents in the present sample endorsed that their children demonstrated fewer ADHD behaviors during video game play. This endorsement aligns with previous research that indicates when children with ADHD are highly motivated in a subject or activity then they may demonstrate less impulsive, inattentive, and hyperactive behaviors (DuPaul & Stoner, 2014). Thus, the thought of capitalizing on times when youth with ADHD appear more attentive and behaviorally regulated may appear useful for intervention development. A majority of parents in this study however, do not feel that the types of video games their children are engaged in contribute much in the way of academic and behavioral improvements. Therefore, two questions outline the difficulty presented in understanding parent and child interactions, when considering video game play. First, if games were developed specifically targeted for ADHD populations, would these games be as effective in holding the attention of a person with ADHD or could games currently used by youth with ADHD be modified to reinforce behavioral and learning principles? Second, to what extent can parents assist in guiding the video game play, to ensure youth with

ADHD are engaged with these teachable moments? Much like when a parent who is playing with their child, a parent can serve as an effective model and guide, while provide encouragements for desired behaviors (Bodrova & Leong, 2003).

Implications and Future Research. A significant contribution of the present study is the inclusion of female participants with ADHD (n = 34). This provides a basis for beginning to understand the patterns of video game play exhibited by female youth with ADHD. Moreover, relative to previous research on video game frequency among populations with ADHD, the present study's sample size is relatively larger. Further research in this area is needed to ensure appropriate development programs for youth with developmental disabilities, as well as female youth with ADHD.

Due to the high risk for academic, social, and behavioral difficulties exhibited by individuals with ADHD, compensatory treatment options, aside from pharmaceuticals, are needed. For example, psychotropic medication (e.g., stimulants) is often a primary and efficacious treatment for reducing ADHD behaviors (DuPaul & Stoner, 2014; MTA Cooperative Group, 1999; Trout, Lienemann, Reid, & Epstein, 2007), but 70-75% of ADHD youth who take stimulant medication do not exhibit positive behavioral outcomes (Rapport & Denney, 2000; van de Loo-Neus, Rommelse, & Buitelaar, 2011). Thus, behavior modification is a second type of treatment often used to treat ADHD specific behaviors (Barkley, 2014; DuPaul & Stoner, 2014), which utilizes principles of operant conditioning to increase a desire behavior and reduce difficult to manage behaviors across variety of settings (see Dupaul, Guevremont, & Barkley, 1992). Although there is evidence based treatment options for ADHD, the attempt to find additional non-pharmaceutical treatments may

be achieved through a better understanding of technology and non-technology interests exhibited by youth with ADHD. In other words, the use of video game interventions may prove effective with ADHD youth but should be further explored within the context of parenting practices and intervention development in collaboration with schools and other settings.

As described by previous video game and technology research (e.g., Bavelier et al., 2011; Durkin, 2010; Granic et al., 2014) video games are likely to have the potential to improve behavioral and cognitive outcomes for populations with developmental disabilities. However, most of this early research has been examined populations with ASD in an attempt to better understand the potential influence/use of video games. Pertaining to this study's findings, video game and media use patterns across male and female youth with ADHD extend and add to previous research. For example, the results of this study illustrate that there were different patterns across individuals with the same diagnosis, different patterns of video game play on weekdays compared to weekend/vacation days, and indicate the need to individualize technology interventions for parents and teachers.

Future research should track video game and technology use by activity monitors, surveys, and focus groups. The combination of understanding motivating and engaging activities among ADHD populations can help practitioners, teachers, and parents make informed decisions about integration of technology in classroom and home interventions. Researchers may also align with gaming companies and software designers to possibly integrate mindfulness or behavioral strategies within the gaming environment (Young et al., 2012).

Limitations. As there are important findings taken from the present study, there are limitations to consider when interpreting results. Parents reported the findings regarding the level of play and perceptions of behaviors during technology and non-technology engagement; thus, findings should be interpreted within the context of parent perceptions. Also, while the sample collected represents a relatively large population, compared to previous ADHD and media research, the sample is comprised primarily of a homogenous population (i.e., Southern Rhode Island) and generalization to diverse populations is cautioned. In addition, the present study did not provide data on children and adolescents with ADHD-H subtype; therefore, generalizations to this ADHD subtype are not possible. Lastly, the type of survey utilized ranges as potential estimates, whereas previous research has asked parents to estimate the exact time or even ask the youth to report using a combination of quantitative and qualitative methods.

Summary and Conclusion

The current study provides a focus on video game use among youths with ADHD population, including both male and female participants and ADHD subtypes. Both gender and subtype diagnosis have not been a prior focus in previous ADHD and video gaming research. Findings suggest that gender may play a significant role in influencing video game use among ADHD youth, with male youth playing more than female youth. As for age, there is some indication that older children and adolescents may play video games more often than their younger counterparts. Additionally, there is a need to further examine possible differences in subtype diagnoses.

In conclusion, the use of video games not only in the home but also in the

classroom, will require further controlled studies to better understand this possible educational tool (Young et al., 2012). While the current education research on video gaming utility is ongoing, the results from the present study nevertheless demonstrate parents endorse their children as exhibiting fewer ADHD behaviors (i.e., inattention, hyperactivity, and disorganization) during video game play as compared to other times. The combination of understanding these motivating and engaging activities among ADHD populations can guide practitioners, teachers, and parents to make informed decisions about the integration of technology across interventions with classroom and home environments.

Appendix A
CHILDREN'S USE OF VIDEO GAMES AND DIGITAL MEDIA

Child's Name: _____ **Child's Age:** _____

Your Name: _____ **Your Age:** _____

The purpose of this survey is to learn more about how parents view their children's use of video games and other digital technologies. In addition to asking about your child's digital habits, we will also ask about your own technology use. Please complete this survey for only one child, since many of the questions may have age-specific responses. Thank you for taking the time to complete this survey.

Questions about YOUR CHILD'S use of video games and technology.

1. How often does your child lose focus, become inattentive, and easily distracted when:

Key: N **- Never** S - **Sometimes** O - **Often** A- **Always**

Playing video games	N	S	O	A
Doing homework	N	S	O	A
Having a conversation with you or others	N	S	O	A
Cleaning their room or doing chores	N	S	O	A
Watching TV	N	S	O	A
Reading	N	S	O	A
Playing with Legos or blocks	N	S	O	A
Playing with dolls or action figures	N	S	O	A
Playing on the computer, using the Internet	N	S	O	A

2. How often does your child fidget, squirm, and appear restless when:

Key: N **- Never** S - **Sometimes** O - **Often** A- **Always**

Playing video games	N	S	O	A
Doing homework	N	S	O	A
Having a conversation with you or others	N	S	O	A
Cleaning their room or doing chores	N	S	O	A
Watching TV	N	S	O	A
Reading	N	S	O	A
Playing with Legos or blocks	N	S	O	A
Playing with dolls or action figures	N	S	O	A
Playing on the computer, using the Internet	N	S	O	A

3. How often does your child appear disorganized, forgetful, and scattered when:

Key: N **- Never** S - **Sometimes** O - **Often** A- **Always**

Playing video games	N	S	O	A
Doing homework	N	S	O	A
Having a conversation with you or others	N	S	O	A
Cleaning their room or doing chores	N	S	O	A
Watching TV	N	S	O	A
Reading	N	S	O	A
Playing with Legos or blocks	N	S	O	A
Playing with dolls or action figures	N	S	O	A
Playing on the computer, using the Internet	N	S	O	A

Appendix A cont.…

4. On a typical SCHOOL DAY, about how much time does your CHILD spend with each of the following technologies and activities? Please try to be as accurate as possible.

	None	< 30 mins.	30-60 mins.	60-120 mins.	> 120 mins.
Watching TV	☐	☐	☐	☐	☐
Reading or doing homework	☐	☐	☐	☐	☐
Playing outdoor sports	☐	☐	☐	☐	☐
Texting/Talking on a cell phone	☐	☐	☐	☐	☐
Doing schoolwork on a computer	☐	☐	☐	☐	☐
Listening to music	☐	☐	☐	☐	☐
Using the Internet	☐	☐	☐	☐	☐
Playing organized sports	☐	☐	☐	☐	☐
Playing video games	☐	☐	☐	☐	☐
Playing with toys or board games	☐	☐	☐	☐	☐

5. On a typical WEEKEND or VACATION, about how much time does your CHILD spend with each of the following technologies and activities? Please try to be as accurate as possible.

	None	< 30 mins.	30-60 mins.	60-120 mins.	> 120 mins.
Watching TV	☐	☐	☐	☐	☐
Reading or doing homework	☐	☐	☐	☐	☐
Playing outdoor sports	☐	☐	☐	☐	☐
Texting/Talking on a cell phone	☐	☐	☐	☐	☐
Doing schoolwork on a computer	☐	☐	☐	☐	☐
Listening to music	☐	☐	☐	☐	☐
Using the Internet	☐	☐	☐	☐	☐
Playing organized sports	☐	☐	☐	☐	☐
Playing video games	☐	☐	☐	☐	☐
Playing with toys or board games	☐	☐	☐	☐	☐

6. On a typical SCHOOL DAY, about how much time do you spend observing or interacting with your child during the following:

	None	< 30 mins.	30-60 mins.	60-120 mins.	> 120 mins.
Watching TV	☐	☐	☐	☐	☐
Reading or doing homework	☐	☐	☐	☐	☐
Playing outdoor sports	☐	☐	☐	☐	☐
Texting/Talking on a cell phone	☐	☐	☐	☐	☐
Doing schoolwork on a computer	☐	☐	☐	☐	☐
Listening to music	☐	☐	☐	☐	☐
Using the Internet	☐	☐	☐	☐	☐
Playing organized sports	☐	☐	☐	☐	☐
Playing video games	☐	☐	☐	☐	☐
Playing with toys or board games	☐	☐	☐	☐	☐

7. Do you monitor the length of time your child plays video games and goes on the computer?

☐ **Never** ☐ **Sometimes** ☐ **Often** ☐ **Always**

Appendix A cont…

8. What best describes your approach to setting limits on your child's time spent with digital media?

- ☐ I do not allow my child to play video games or use the Internet
- ☐ My child is allowed to play video games and use the Internet only on weekends and vacations.
- ☐ My child is allowed to play video games and use the Internet after their homework is completed.
- ☐ My child is allowed to play video games and use the Internet for ___ hours per day.
- ☐ My child is allowed to play video games and use the Internet whenever they want, as long as they are doing well in school.
- ☐ We do not have any specific rules about my child's use of video games and digital media.

9. How many times per week do you:

	0	1	2-4	5-10	10+
Play video games with your child	☐	☐	☐	☐	☐
Ask your child to help you with digital devices	☐	☐	☐	☐	☐
Watch your child play video games	☐	☐	☐	☐	☐
Go online together with your child	☐	☐	☐	☐	☐

10. If your child plays video games, describe the level of concern you have about the following issues:

	Not at all	Mildly	Somewhat	Concerned	Extremely
Amount of time playing video games	☐	☐	☐	☐	☐
Lack of physical activity due to video game play	☐	☐	☐	☐	☐
Willingness to stop playing when told	☐	☐	☐	☐	☐
Violence in video games	☐	☐	☐	☐	☐
"Addiction" to video game play	☐	☐	☐	☐	☐
Lack of interest in other activities due to video game play	☐	☐	☐	☐	☐
Distraction from homework or chores due to video game play	☐	☐	☐	☐	☐

11. How much do you believe video games can help your child in the following areas:

	Not at all	A little bit	Somewhat	Quite a bit	A great deal
Adaptability and compromise	☐	☐	☐	☐	☐
Writing skills	☐	☐	☐	☐	☐
Problem solving	☐	☐	☐	☐	☐
Planning skills	☐	☐	☐	☐	☐
Sustaining focus	☐	☐	☐	☐	☐
Memory	☐	☐	☐	☐	☐
Mathematics	☐	☐	☐	☐	☐
Understanding of self and others	☐	☐	☐	☐	☐
Making friends	☐	☐	☐	☐	☐
Self-control	☐	☐	☐	☐	☐
Reading	☐	☐	☐	☐	☐
Physical benefits (hand/eye coordination)	☐	☐	☐	☐	☐

Teamwork and collaboration	☐	☐	☐	☐	☐
Time management	☐	☐	☐	☐	☐

12. How many minutes do YOU spend on a typical day (including work time):

	None	< 30 mins.	30-60 mins.	60-120 mins.	> 120 mins.
Watching TV	☐	☐	☐	☐	☐
Using the Internet (at home and work)	☐	☐	☐	☐	☐
Using your cell phone to talk and text	☐	☐	☐	☐	☐
Playing video games	☐	☐	☐	☐	☐
Using computer software or mobile apps	☐	☐	☐	☐	☐

13. Which statement best describes your interest and expertise with video games, apps and other digital technologies (cell phones, IPods, the internet):

☐ I am not routinely interested in technology and do not play video games and use a cell phone only occasionally

☐ I occasionally play with games and apps, use my phone and text, and use the Internet

☐ I use the computer and Internet regularly at home and work and use games and apps on mobile devices

☐ I use technologies in all aspects of my life, enjoy games and apps, and am comfortable with technology

☐ I am an avid gamer, always have my cell phone or tablet with me, regularly text, Facebook, and tweet

Do you have any further thoughts or concerns about your child's use of video games and digital media that you would like to share? Please write in the space below. (Optional)

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