Video Game Play
Myths and Benefits

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Patrick M. Markey, Christopher J. Ferguson, and Lauren I. Hopkins

Whether kids should be encouraged to play video games remains a topic of debate among many parents, who often entertain some of the myths associated with video game play. The authors review the latest scientific evidence to dispel worries that video game play contributes to obesity, desensitizes players to real-world violence, and causes aggressive behavior. They also discuss research that demonstrates video game play helps improve social skills and visuospatial cognitive abilities, aids in mood management, and even appears to decrease real-world violence. They conclude that playing video games can be a worthwhile activity for most children when balanced with other life responsibilities. **Key words**: learning and video games; obesity and video games; play and video games; violence and video games

Video games are a waste of time for men with nothing else to do.
—Ray Bradbury, writer (2001)

Like the belief expressed by author Ray Bradbury, three out of every five adults in the United States feel that video game play is a "waste of time" for both men and women (Duggan 2015). Overlooking the benefits of play is nothing new, whether it is hide-and-seek, checkers, or a video game. Adults often view such game play as a fruitless activity that does little more than temporarily improve the mood of the player. And it is not just a belief that video game play is simply a useless recreation: Parents, politicians, and some researchers have blamed gaming for numerous social ills, including social isolation, desensitization to the pain of others, depression, obesity, learning problems, bullying, fighting, and even homicides (see Markey et al. 2015 for a review). Dozens of laws have been passed in the United States, federal hearings have been held, presidents have expressed their concern, and cases have been presented before the U.S. Supreme Court and the U.S. School Safety Commission, all in an effort

to protect our society from the alleged threats of playing video games (Bella 2019; Timm 2019; U.S. Supreme Court 2011). To this end, we review the latest scientific evidence that dispels many of the myths prevalent in the United States and other countries surrounding the play of video games, evidence that elucidates some of the benefits afforded both to children and adults when they play in this pixelated playground.

Video Game Play and Social Skills

> The excessive use of video games . . . is creating a generation of risk-averse guys who are unable (and unwilling) to navigate the complexities and risks inherent to real-life relationships.
> —Philp Zimbardo and Nikita D. Coulombe, psychologists (2012)

There is a considerable discrepancy between the common stereotype that people who play video games are antisocial loners who have difficulty maintaining social relationships and the reality that most games are played in very functional social networks (Kowert, Festl, and Quandt 2014). The overwhelming majority of gamers report they play games with friends, both in-person (83 percent) and online (75 percent) (Lenhart et al. 2015). Beyond the actual play of video games, there exists an active video game subculture. Gamers have conversations about games, share games, have gaming get-togethers, strategize with one another, and participate in video streams of others playing games (Grooten and Kowert 2015; Taylor 2018). For example, it is not unusual to find youths who play the popular game *Minecraft* discussing plans about what to build next, the best way to defeat an enemy, or how to craft a particular item, even when they are not actively playing the game (Markey and Ferguson 2017). Gamers interact with their friends in the real world just as frequently as nongamers and report that gaming provides them an opportunity to create new friendships (Domahidi et al. 2018; Kowert and Kaye 2018).

The immense popularity of video games affords gamers numerous chances to engage in social interactions, which whether virtual or real world help build social competence by providing opportunities to practice initiating, building, and maintaining social relationships (La Greca and Santogrossi 1980). Video game play gives gamers the chance to develop techniques for dealing with conflict, working out various resolutions, interacting with their friends, and experiencing different emotions (Granic, Lobel, and Engels 2014; Kowert and Kaye 2018). These opportunities help explain why gamers tend to be more satisfied with

their lives and experience fewer conduct problems, peer troubles, and emotional issues than youths who do not regularly play video games (Przybylski 2014).

Working together with another human player to accomplish a shared objective in a video game (i.e., cooperative game play) provides benefits whether the gamers are building a structure in *MineCraft* or collaborating to kill an opposing army during death match in *Call of Duty. A*lthough the images presented in violent games like *Call of Duty* or *Grand Theft Auto* might be disturbing, people who play violent video games cooperatively display more helping behavior in the real world compared to those who play nonviolent games *(*Ewoldsen et al. 2012; Ferguson and Garza 2011). Such cooperative game play even fosters feelings of camaraderie and encourages altruistic behaviors and real-world teamwork (Adachi et al. 2015; Badatala et al. 2016; Velez et al.2014). The good news for game players is this: any video game, regardless of its content, that rewards players who work together to achieve a common goal will teach social skills that generalize to family and friendships in the real world (Granic et al. 2014).

Another unique social advantage afforded by online gaming is anonymity, because it can offer those who are socially withdrawn an opportunity to interact (Shepherd and Edelmann 2005; Tateno et al. 2016). For instance, emotionally sensitive teens (i.e., those who are overly sensitive to the nonverbal and emotional cues of others) often turn to games to expand their social network and maintain their real-world friendships (Kowert, Domahidi, and Quandt 2014). For these socially timid youths, games provide a life-enhancing outlet for social experiences without the fear or difficulty associated with face-to-face interactions. Other studies have found that introverts similarly experience much less anxiety when interacting in a virtual world than interacting at school, work, or other social situations (Kowert 2016). Video games even provide children with developmental disabilities, such as autism spectrum disorders, a controllable environment to practice their social skills (Durkin 2010). For many, the connections formed through games blossom into real friendships just as meaningful as those developed in real life (Kutner and Olson 2008; Grooten and Kowert 2015).

Video Game Play and Obesity

Across this country, on couches in front of televisions and video game consoles, a silent killer called obesity is stalking America's youngsters in epidemic numbers.

—Ron Wyden, U.S. Senator (2004)

More than 75 percent of parents believe that video game play and television are the primary cause of obesity among children and teens, ranking games above other causes, such as junk food, fast food marketing, and lack of exercise (Lake Research Partners 2006). Contrary to this notion, a study of over forty-four thousand children, found no relationship between how much time children play video games and their body size (Marshall et al. 2004; Kracht, Joseph, and Staiano 2020). It appears that the stereotypical image of an overweight gamer who sits for hours on end in a dark room with a bottle of Mountain Dew and a bag of Doritos within reach is not accurate.

Given that video game play has no relation to weight, it is not too surprising that limiting children's gaming time has minimal impact on their weight. This effect was dramatically demonstrated when a school in California tested a program designed to fight childhood obesity by decreasing the amount of screen time (television and video game play) students had at home (Robinson 1999). After a year, the program had successfully reduced students' screen time by 43 percent. However, this dramatic change in television and video game play resulted in children losing an average of only one pound. Losing one pound may be better than losing no pounds, but such a change is trivial given how intensively the children's media habits changed. For example, had the students simply made the minor change from drinking soda and juice to drinking water, they would have lost about fifteen pounds within the same period (Markey 2014).

The reason that reducing screen time has little to no effect on an individual's weight seems straightforward: Because a child or adult frees up time by not playing a video game does not mean he or she will spend this time exercising. Numerous studies have found no relation between screen time and physical activity (Sallis, Prochaska, and Taylor 2000). Even when parents have banned screens from their homes, it appears to have no clinical impact on children's general physical activity (Pearce et al. 2012). Overall, very little evidence suggests that sedentary youths suddenly become active when their video game play is limited or removed, nor is there clear evidence that video game play contributes to childhood obesity in any meaningful way (Kracht, Joseph, and Staiano 2020).

Although limiting game play does not seem to increase or decrease an individual's weight or physical activity, video games can positively impact physical health through "exergaming." Exergaming, which can be traced back to 1982 when Atari released the Joyboard, combines video games with physical activity. The Joyboard allowed players to connect a balance board to an Atari 2600 to move their bodies and virtually ski down a mountain. The Joyboard was not

a commercial success, but more recent attempts, such as Microsoft's Kinect, Nintendo Wii, *Dance Dance Revolution, Ring Fit Adventure,* and *Pokemon Go!,* have proven much more popular. Exergaming does not appear to be as impactful as traditional exercise (McDonough et al. 2018). However, researchers have found that, by providing a fun and enjoyable activity, exergaming constitutes an effective method for increasing physical activity and decreasing weight for individuals who might not normally engage in regular exercise (O'Loughlin et al. 2019; Staiano, et al. 2017)

Video Game Play and Mood Management

> A game is an opportunity to focus our energy, with relentless optimism, at something we're good at (or getting better at) and enjoy. In other words, game play is the direct emotional opposite of depression.
> —Jane McGonigal, game designer (2011)

Research, and common sense, indicate that video games can be fun and rewarding (Kaye, Kowert, and Quinn 2017; Ryan, Rigby, and Przybylski 2006; Bowman, Kowert, and Cohen 2015). The interactive nature of games generally promotes more enjoyment than passive media, such as watching television (Rieger et al. 2015). This increased enjoyment partially occurs because video games foster a mental state called "flow." Flow is a positive feeling that occurs when a person becomes fully absorbed and focused on an activity (in everyday parlance, this is often referred to as "being in the zone"). The elements that encourage a feeling of flow are present during video game play: clear goals, intrinsic reward, focused attention, immediate feedback, and a balance between skill level and challenge (Chen 2007; Csikszentmihalyi 1975). Achieving a state of flow is not only pleasurable but is related to various positive outcomes, including reduced stress, work satisfaction, cognitive engagement, academic success, and lower levels of delinquency (Nakamura and Csikszentmihalyi 2009).

Of course, not everyone will find video games enjoyable. To help understand why video games improve the mood of some people and not others, a variety of theories have been created, including mood management theory (Reinecke, Klatt, and Krämer 2011) and uses and gratifications theory (Sherry et al. 2006). In another example, self-determination theory suggests that video games seem appealing and encourage well-being when they satisfy the player's psychological needs of autonomy, competence, and relatedness (Przybylski,

Rigby, and Ryan 2010). One element shared by all such theories is that video game play will elevate an individual's mood only when he or she is interested in gaming. Therefore, for some people, playing video games lifts their mood, while, for others, it may be stressful. The match between media type and the individual is more important than the actual content. Those who do enjoy video games find gaming to be an effective way to deal with acute stress or feelings of sadness. For example, research has found that, for many people, video game play increases psychological recovery (relaxation and control) after engaging in tedious tasks and reduces feelings of depression and stress (Ferguson and Rueda 2010; Reinecke, Klatt, and Krämer 2011).

Video game play has been used effectively as a mood management tool to help children deal with a variety of medical issues. Children who are pre-scribed video game play during cancer treatment experience a greater quality of life, higher levels of physical activity, and less fatigue than children who do not play games (Fazelniya et al. 2017; Kato 2010; Kauhanen et al. 2014). Game play has also been found effective in enhancing self-management skills and improving health outcomes (fewer hospitalizations, fewer symptoms, and greater functioning) of children who have asthma (Bartholomew et al. 2000). Game play appears to be generally effective at reducing the pain and fear of children undergoing various medical procedures as well (Gold and Mahrer 2018). Video games regulate mood during these stressful events by providing a mechanism through which players can assert control over a virtual environment, offsetting negative feelings of helplessness or lack of control (Ferguson and Rueda 2010).

Video Game Play and Visuospatial Cognition Abilities

> I recently learned something quite interesting about video games. Many young people have developed incredible hand, eye, and brain coordination in playing these games. The Air Force believes these kids will be our outstanding pilots should they fly our jets.
> —Ronald Reagan, U.S. President (1987)

Some of the most active research about the benefits of video game play concerns what most people call hand-eye coordination and what scholars call visuospatial cognition. This research examines the notion that games can train specific abili-ties that might be useful in real life. Those who play action video games exhibit greater visual ability (i.e., the ability to see smaller fonts on a computer screen),

greater contrast sensitivity, greater spatial cognition (i.e., the ability to acquire information about one's environment), better attentional control, and greater mental rotation abilities (Bejjanki et al. 2014; Green and Bavelier 2012; Li et al. 2009). Video games can improve spatial thinking just as effectively as formal training courses (some of which last for months) specifically designed to do so (Uttal et al. 2013). Neuroscience research suggests that video games might be able to reverse some adverse effects of various neurodegenerative diseases (Kühn et al. 2014; Nahum and Bavelier 2020). Some research even suggests that, for women, game play can erase traditional gender gaps in spatial cognitive skills (men usually perform better than women at tasks requiring the use of spatial cognition) (Feng, Spence, and Pratt 2007).

Although video game play appears to improve some real-world abilities, its power is limited by transfer of learning (Simons et al. 2016). Transfer of learning holds that learning in one context can carry over to new, but similar, circumstances. Learning how to swing a tennis racket might also improve your badminton skills, but it will not make you a better swimmer. The importance of transference of visuospatial skills to real-world skills appears most evident in the realm of surgery. Surgeons who play video games make fewer mistakes, perform their operations more quickly, and have better surgical skills than their colleagues who do not play video games. Given the significance of transference, not surprisingly the surgeons who benefit the most from game play are those who use computers while operating, such as laparoscopic surgeons (Jalink et al. 2014; Rosser et al. 2012).

The limitation associated with transfer of learning also sheds light on a common myth about video game play—that video games can train players to use a gun to shoot others. No research exists that demonstrates video game play increases real firearm accuracy or knowledge. Interestingly, one study briefly suggested such a link might exist (Whitaker and Bushman 2014) but was later retracted when irregularities appeared in the researchers' data (McCook 2017). As we discussed with transfer of learning, video games likely do not teach gamers how to use real guns effectively because the skills learned in a typical first-person shooter game bear almost no relationship to real-world handgun shooting (see figure 1) (Markey and Ferguson 2017). Similarly, regardless how often individuals play *Street Fighter,* they will not learn how to perform flying kicks; playing *Tony Hawk: Pro Skater* will not teach them to skateboard and logging hours into *Donkey Kong* will never show them how to jump safely over flaming barrels.

Figure 1. How to fire a handgun in a typical first-person shooter video game versus in the real world

Steps for firing a virtual gun	Steps for firing a real gun
1. Pull left trigger to aim gun. 2. Pull right trigger to fire gun.	1. A two-handed grip is best. 2. Four fingers of the nondominant hand should be under the trigger guard. 3. Point the thumb of the dominant hand forward while placing this hand as high as possible on the grip. 4. Make sure fingers are clear of the slide or hammer. 5. Stand with feet and hips shoulder width apart. 6. Slightly bend the knees. 7. Bring the gun up to the target. 8. Using the dominant eye, align the sights on the gun. 9. Develop a sight picture by focusing on the target after the gun is leveled. 10. Control breathing and keep body calm. 11. Do not pull the trigger – instead press it by applying constant pressure. 12. After shooting, "follow-through," just as a golfer might do after striking a ball.

Video Game Play and Desensitization

> These are quote-unquote video games, and they're forced down our throats under the guise of protected speech. It's garbage. They have desensitized people to the value of human life
> —Matt Bevin, governor of Kentucky (2018)

A common belief exists that playing violent video games repeatedly causes children and adults to become detached and emotionless in response to horrific acts of violence. Consistent with this worry, researchers have found that repetitive viewing of violent movies leads individuals to experience less empathy for the characters portrayed in these films (Fanti et al. 2009). Similarly, the more exposure people have to violent media, the less they respond emotionally to violent media in the future (Cline, Croft, and Courrier 1973). There seems little

doubt that, as individuals consume more and more violent media, they become desensitized to the violence depicted in such media.

However, this research has primarily examined how violent media desensitizes media consumers to other forms of violent media rather than to real-life acts of horrific violence. This is a crucial distinction, because most of us worry that violent video game play makes players numb to the suffering of real people, instead of to the violent video game itself. Contrary to the concern that media violence desensitizes individuals to real-world violence, research has found that viewing violent media has no effect on how individuals empathize when they witness real people—not fictional actors or virtual characters—suffering injury or death (Ramos et al. 2013; Krause, Smyth, and Jansen 2020). Similarly, research demonstrates that gamers can differentiate between real and virtual violence effectively, and their neural responses to actual violence are no different than those of nongamers (Szycik et al. 2017). It appears that no matter how many headshots players have seen in *Call of Duty* or how many hours gamers have spent causing virtual violence in *Grand Theft Auto,* almost everyone becomes disturbed when they witness violence perpetrated on someone else in the real world.

Video Game Play and Real-World Violence

> We must stop the glorification of violence in our society. This includes the gruesome and grisly video games that are now commonplace. It is too easy today for troubled youth to surround themselves with a culture that celebrates violence.
> —Donald Trump, U.S. President (2019)

The tendency to link violent crimes to the playing of violent video games is so prevalent that a term exists to describe it: "the Grand Theft Fallacy." As one might guess from the word fallacy, this tendency is not only flawed, it gets matters entirely backward. Countries that consume more video games have lower levels of violent crime than those devoid of this media (Markey and Ferguson 2017). Months when people play violent video games the most tend to be safer than months they play them less (Markey, Markey, and French 2015). Even when violent video games, like *Grand Theft Auto,* were first released, there tends to be a decrease in violent crimes *(*Beerthuizen, Weijters, and van der Laan 2017). These findings have been replicated by psychologists, economists, and sociologists at

various universities considering numerous other variables (cf. Cunningham, Engelstätter, and Ward 2016; Ward 2011).

Most strikingly, these findings are not unique to violent video game play—other forms of violent media have also been linked to decreases in violent crime. Contrary to the fear that violent television poses a threat to our society, violent assaults, rapes, and murders all decrease when people are watching extremely violent television shows (Messner 1986). Even violent movies have been linked to declines in real-world violence. As with violent video games, years in which the most violent films were released saw decreases in violent crime, and crime consistently decreases in the days following the release of popular violent movies (Dahl and DellaVigna 2009; Markey, French, and Markey 2015). Regardless of the type of violent media—games, movies, or television shows—the research is consistent. When society is exposed to violent media, there is a reliable reduction in real-world violence.

The reason why violent video game play (and other violent media) seems to reduce crime can be traced back to what criminologists call "routine activity theory" (Felson 1994). The simple notion behind this theory is this: For a violent crime to occur, a perpetrator must be in the same location as the victim, and this location tends to be free of those who would likely prevent the crime. Now, consider how playing many hours of video games may keep these potential criminals and victims entertained and off the streets. Male gamers in the United States spend a total of 468 million hours each month playing video games (Snider 2014). These hours constitute time during which at-risk individuals remain inside their homes, instead of being out on the streets. In this manner, video game play could serve as an effective crime-reduction strategy. No taxpayer money is needed. It naturally targets those individuals who are at the highest risk for committing violence or being victims of violence, and it appears to be working.

Video Game Play and Aggression

If you shoot somebody in one of these games, you don't go to jail, you don't get penalized in some way—you get extra points! This doesn't mean that your child will go out into the world and shoot someone. But they do use more aggressive language, they do use more aggressive images, they have less ability to control their anger, and they externalize things in these violent ways. It's absolutely not good.
—"Dr. Phil" McGraw, television personality (2005)

As illustrated by Dr. Phil's quote, although some might not think video games cause violent homicides, they are still willing to believe that video game play, especially violent video game play, causes aggressive behaviors like punching others, fighting, or bullying. In this context, aggressive behaviors are actions committed by an individual intending to harm another individual. Although similar to violent behaviors like homicides, aggressive acts tend not to cause such extreme physical harm (Bushman et al. 2016). Much of the research purporting to support the claim that video games cause more minor forms of aggression has done little more than establish associations between self-reports of video game play and self-reports of feelings. Figure 2 provides some examples researchers have used to examine whether video games cause aggression. As we can see from these items, these studies do not examine real acts of aggression. Instead, these questionnaires attempt to measure aggression by using items that assess whether an individual might be "jerky" (that is, believing that to say something nasty about an individual behind his or her back is acceptable), antisocial, (as in, "I feel

Figure 2. Example items that have been used by researchers to measure aggression in video game studies

1. I tell my friends openly when I disagree with them.

2. To say nasty things about a person behind his/her back is ok.

3. When people annoy me, I may tell them what I think of them.

4. I am suspicious of overly friendly strangers.

5. Children should be spanked for temper tantrums.

6. Our country has the right to protect its borders forcefully.

7. I feel unsociable.

8. Any nation should be ready with a strong military at all times.

9. War in self-defense is perfectly all right.

10. I feel willful.

11. I have spread gossip about people I don't like.

12. To show someone up in front of others is totally ok.

13. War is often necessary.

14. The person running the study was not very courteous.

15. To tell lies about people is totally ok.

unsociable"), gossipy (as in "I have spread gossip about people I do not like"), or—oddly enough—conservative (like someone who might say, "Any nation should be ready with a strong military at all times") (Krahé and Möller 2004; Anderson and Dill 2000; Greitemeyer 2019; Anderson et al. 2004). Thus, the meaning and importance one can draw from such studies are extremely suspect.

When video game researchers have conducted experiments, these studies have typically involved one group of participants who play a violent video game and another group who plays a nonviolent video game. After a short play session, participants' aggressive thoughts or behaviors are assessed. Some researchers who have used this methodology found that individuals who play violent video games are more likely to expose others to loud irritating noises (Bushman and Gibson 2011), report feeling more hostile on a questionnaire (Anderson and Dill 2000), give longer prison sentences to hypothetical criminals (Deselms and Altman 2003), and even give hot sauce to people who do not like spicy food (Yang, Huesmann, and Bushman 2014). Importantly, many other researchers cannot replicate these effects (Kühn et al. 2019). So, even if these various experimental outcomes might be related to disagreeable thoughts, it is extremely questionable how well these responses translate to real-world aggressive behavior such as fighting, hitting, and bullying.

Other scholars have raised both methodological and measurement concerns with studies examining aggression. For instance, one popular method, the competitive reaction time task (CRTT), measures how aggressive a person becomes after playing a violent video game by giving the player a chance to "blast" another person with an irritating noise. Specifically, participants are allowed to select both the duration and the intensity level (on a scale of zero to ten) of a white noise burst administered to another person. Unfortunately, no standardized scoring method exists for this measurement of aggression. Some researchers have scored aggression as the sum of the intensity and duration (Bushman and Gibson 2011), the product of the intensity and duration (Bartholow, Sestir, and Davis 2005), the log-transformation of duration, ignoring the intensity (Anderson and Dill 2000), and even the square root of the duration score multiplied by the intensity score (Carnagey and Anderson 2005). Collectively, there are at least 147 different ways researchers have scored this measurement. Given all these permutations, one can make it appear as if video games increase aggression, decrease aggression, or have no effect on aggression even within the same sample (Elson et al. 2014).

Looking past such methodical problems, numerous scholars have con-

ducted meta-analyses to try to understand better how big an effect video games have on these mundane aggressive outcomes. On average, only 0.4 percent to 4 percent of the variance in minor forms of aggression can be explained by violent video games (Ferguson 2015b; Hilgard, Engelhardt, and Rouder 2017). Keep in mind that this small effect is in reference to the effect of video game play on aggressive outcomes with minimal repercussions (e.g., giving hot sauce to another person who does not like spicy foods) that often have methodical issues (e.g., the CRTT) and are not direct measurements of real-world aggressive acts. Thus, the extremely small effect sizes linking violent video games to questionable proxy measurements of aggression found in many studies likely constitute an overestimate of any true effect video game play has on real-world aggressive behaviors.

Conclusion

Growing empirical research suggests that video games do not contribute to poor social skills, desensitize players from real-world violence, contribute to mood issues, cause obesity, insight severe acts of aggression, or influence real-world violence. Just as in past unfounded panics, such as those caused by heavy metal music, comic books, and Harry Potter, many of the myths and fears surrounding video game play are beginning to diminish. The U.S. Supreme Court concluded there is no compelling evidence that video games are harmful, the Smithsonian has acknowledged games as a form of art, and the vast majority of scientists (as high as 89 percent) no longer endorse the notion that video game play is a problem for society (Ferguson 2015a; Quandt et al. 2015). The pixelated playground afforded by video games appears to be a safe place for children and adults to play, explore, learn, make friends, and have fun.

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