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Technology Addiction: Concern, Controversy, and Finding Balance

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TECHNOLOGY ADDICTION

Concern, Controversy, and Finding Balance

Common Sense is grateful for the generous support and underwriting of this report.

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TECHNOLOGY ADDICTION:
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FINDING BALANCE

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1

Internet addiction is potentially serious and needs clarification and additional study for people to understand the impact on children's physical, cognitive, social, and emotional development.

One systematic review of studies on American adolescents and college students reported a range of prevalence estimates between 0 and 26 percent (Moreno, Jelenchick, Cox, Young, & Christakis, 2011). "Internet addiction" refers to a swath of excessive and compulsive technology-related behaviors resulting in negative outcomes. There remains substantial disagreement about whether Internet addiction is a new psychological disorder or the manifestation of another disorder, how it is measured, and how prevalent it is. There is also some ambiguity about what Internet addiction is, given the many things that can be done on the Internet (such as watching videos, playing games, or using social media). Focusing on amount of time online is controversial, given that children and adults alike are connected all the time and given how many activities take place in online environments.

There is also ongoing controversy over whether Internet addiction can be considered an addiction in the same sense as substance abuse or a behavioral disorder, in which individuals pathologically seek out "rewarding stimuli" despite negative outcomes. Internet addiction is not currently included as a diagnosis in the *Diagnostic and Statistical Manual of Mental Disorders* (the *DSM-V*), the medical resource that classifies and provides diagnostic criteria for mental disorders and provides comprehensive diagnostic criteria for all psychiatric disorders.

However, Internet gaming disorder (IGD), which recognizes unhealthy patterns of engagement with games, is a condition of interest identified by the American Psychiatric Association. Mostly diagnosed in male adolescents and young adults, IGD is currently being considered for inclusion within the next version of the *DSM-V*. Individuals with IGD experience extreme negative consequences as a result of their gameplay, such as exhaustion and loss of relationships. There is also evidence that the brains of IGD patients resemble the brains of substance users and patho-

logical gamblers. Cultural differences may underlie differences in IGD prevalence across countries.

Even though it is unclear whether or how teens are addicted to the Internet, problematic media use is a concern. "Problematic media use" is a term that describes dysfunctional ways of engaging with media and encompasses many related terms, including Internet addiction, technology addiction, Internet gaming disorder, and others. Media users' problematic relationships with media and devices, such as smartphones, could be characterized as compulsive, obsessive, or unhealthy.

However, there are substantial gaps in research on problematic media use, especially as it pertains to children.

2

Our digital lifestyles, which include frequent multitasking, may be harming our ability to remain focused.

Part of the concern around being constantly connected through technology and media revolves around how we multitask among different forms of media and between media and real life. Media multitasking is very common among children and adults, even though there is ongoing concern over how it affects our abilities to pay attention and avoid distraction. A 2010 study of 8- to 18-year-olds found that young people were engaging in media multitasking for 29 percent of their overall media use, fitting over 10 hours of media use into 7.5 hours of their days (Rideout, Foehr, & Roberts, 2010). Another study of 263 middle school, high school, and university students found that students studied for fewer than six minutes before switching to another technological distraction, such as texting or social media (Rosen, Carrier, & Cheever, 2013).

Some young people don't believe media multitasking is harming their ability to get things done. For example, the *Common Sense Census* (2015) found that high percentages of teens watched TV (51 percent), used social media (50 percent), and texted (60 percent) while doing homework, but most of the teens did not feel that their multitasking harmed the quality of their work.

However, multitasking may decrease productivity because users take time to reorient after a transition to a different activity and become cognitively fatigued from the effort, which slows their rate of work. Additionally, multitasking makes it more difficult to create memories that can be accurately retrieved later (Fernandes & Moscovitch, 2000). In terms of real-world performance, a study of laptop users in university classrooms found that students who multitasked on a laptop during a lecture performed worse on a test than students who were not multitasking (Sana, Weston, & Cepeda, 2013).

A seminal research study involving 262 college students found that heavy media multitaskers have a harder time filtering out irrelevant information (Ophir, Nass, & Wagner, 2009), but it is possible that they have other attention issues that result in poor performance. Additional research with younger populations is needed to illuminate the impacts of low, medium, and high levels of media multitasking on developing children.

3

Media and technology use is a source of tension for many families.

In an environment where people are frequently using and checking devices, research has pointed to conflicts that arise in families when people are distracted by media and technology use. For example, in a survey of 8- to 13-year-olds and their parents, 54 percent of children felt that their parents checked their devices too often, and 32 percent of children felt unimportant when their parents were distracted by their phones (AVG Technologies, 2015). Another study with 803 American parents of 8- to 17-year-olds found that about one-third of all participating parents struggled with limiting their children's use of media and technology (Rich, Bickham, & Shrier, 2015). And, an observational study of 55 caregivers eating with young children in fast food restaurants found that parents who were highly absorbed in their devices tended to be more harsh when dealing with children's misbehavior (Radesky, et al., 2014).

However, not all studies find that media and technology are causing family conflicts. A study of 2,326 parents of 0- to 8-year-olds found that almost 80 percent of parents disagreed that negotiating media use causes conflict in the home, and 59 percent said they were not worried about their children becoming addicted to new interactive technologies (Wartella, Rideout, Lauricella, & Connell, 2013). It is unclear whether the frequency of media and

technology use for adults and children is becoming a new social norm or whether parents are underestimating the impact of media and technology on family life.

4

Problematic media use may be related to lower empathy and social well-being.

Many researchers have noted that narcissism seems to be increasing, while empathic traits have been on the decline, and have pointed to social media as a driver for that change (Konrath, 2012). Arguments for why this would be the case are compelling: Time spent with media could subtract from face-to-face time, so heavy media users would forfeit opportunities to deepen empathy by conversing and learning from human facial and vocal cues. However, when it comes to evidence linking social media use to empathy, the results are limited and difficult to interpret. One study of adults between the ages of 18 and 50 found that commenting, viewing photos, and posting status updates on Facebook was related to narcissism but that higher levels of chatting on the site were positively related to perspective-taking, a key component of empathy (Alloway, Runac, Qureshi, & Kemp, 2014). But, another study of 1,726 adults found that going online did not have any impact on face-to-face communication and did not reduce empathy (Carrier, Spradlin, Bunce, & Rosen, 2015).

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It should be noted that teens still place high value on face-to-face communication and don't see social networking as harming their personal relationships. Common Sense Media (2012) found that children between the ages of 13 and 17 preferred face-to-face communication over all technological means of communication, because it was perceived to be more fun and because they could understand people better in person. In addition, 52 percent of teen social media users felt that social networking had mainly helped their relationships with friends, as compared to 4 percent who felt it hurt their relationships. Because it is correlational, current research makes it difficult to know whether people who engage in problematic media use become less empathetic, whether people with less empathy or low levels of social well-being choose to engage more online, or both.

5

Technology may facilitate new ways of expressing typical adolescent developmental needs, such as the need for connection and validation from peer groups.

What is different about teens' experiences in the digital age is the extent to which technology can narrow or expand the ways in which teens interact with their friends and the wider world. Engaging with peers on social networks such as Facebook, Instagram, or Snapchat, or playing immersive role-playing games with friends and people from around the world, are ways in which youth may feel socially connected. In this framing, the seemingly constant use of tech, evidenced by teens immediately responding to texts, social-networking posts, and other notifications, is actually a reflection of teens' need to connect with others. What looks like excessive use and distraction may actually be a reflection of new ways of maintaining peer relations and engaging in communities that are relevant to them. Some research suggests that what appears to be teens' addiction to technology is actually just an expression of their desire to interact with friends in a society that does not allow children as much freedom as earlier generations (boyd, 2014).

Online activities also allow youth to dive deeply into a topic or talent and participate in communities that share their interests. In extensive qualitative fieldwork with young people, which included 5,194 hours of observation, 659 semistructured inter-

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views, and 28 diary studies, Ito and colleagues (2010) observed that youth spent time with and around media in order to socialize with peers and pursue personal interests. While youth could spend many hours engaging with their passions, and potentially displace other hobbies, the researchers noted that this intensity was not perceived negatively or practiced pathologically.

6

Embracing a balanced approach to media and technology, and supporting adult role-modeling, is recommended to prevent problematic media use.

A balanced approach includes fostering awareness of media and self, embracing quality media usage, selective single-tasking, carving out times and places to disconnect, and nurturing relationships and face-to-face conversation. Gardner and Davis (2013) point out that media and technology can be especially beneficial when used to form deeper relationships, to allow for creativity and exploration, and to explore identity. There is a difference between spending hours using technology to create digital worlds, hone photography or music skills, or engage in meaningful discussions of important issues and being a passive consumer of content or using tech as a way to distance oneself from social relationships. A healthy digital lifestyle could and should include thoughtful and intentional uses of media and technology.

A balanced approach also prioritizes focusing on a single task when called for and not multitasking in educational, work, or social contexts. It also recognizes the importance of face-to-face communication, in addition to online communication, in supporting rich social relationships.

Additionally, parents and other caring adults can help youth to manage media. By modeling balanced media habits themselves as well as co-engaging with media, discussing media-related best practices, strategies, and ethical dilemmas, and setting limits around how, when, and where to use media, parents can act as “media mentors” (Samuel, 2015). Samuel’s research suggests that children of technology limiters, who focus mostly on minimizing their children’s use of technology, are most likely to engage in problematic behaviors such as posting hostile comments or impersonating others online, whereas children of media mentors are much less likely to engage in problematic online behaviors.

Understanding that adults are role models, parents should be conscious of how they engage with technology and media, given how they want their children to engage with technology and media. If children observe parents being frequently distracted by their phones, they may be more apt to internalize that behavior. Modeling sets an example and establishes a social norm.

INTRODUCTION

“Social networking is engineered to be as habit-forming as crack cocaine,” declared a recent article in *Computerworld* (Elgan, 2015). A 2015 book review considering four tomes on media and society concludes, “[W]e are hopelessly hooked” (Weisberg, 2015). Users of the Huffington Post can search the site by keywords such as “smartphone addiction,” “social media addiction,” and “teens social media addiction.” And one of the latest installments of *Time*’s “You Asked” column unpacks the reader question “Am I Addicted to My Phone?” (Heid, 2016).

Over the past decade, society has witnessed massive changes in the way media and technology intersect with the ways we work and live. Devices are more mobile, functional, and seemingly indispensable. Accordingly, we’ve integrated media and technology into more and more of our lives, bringing devices with us everywhere and depending on them for a range of work, school, play, and social functions.

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Recent studies point to the high rates of media and technology access and usage among American adults:

- Internet use: 84 percent (Pew Research Center, 2015a)
- Social media use: 65 percent (Pew Research Center, 2015b)
- Smartphone ownership among adults: 68 percent (Pew Research Center, 2015c)
- Smartphone ownership among teens: 67 percent (Common Sense Media, 2015)

Not only are media widely embraced by adults around the world, but they also are pervasive in the lives of young people. The *Common Sense Census* (Common Sense Media, 2015), a representative survey of American tweens (8- to 12-year-olds) and teens (13- to 18-year-olds), documented that outside of school and homework, tweens spend almost six hours per day (5:55 hours) and teens spend almost nine hours per day (8:56 hours) using media, including watching TV, playing video games, using social media, using the Internet, reading, and listening to music. Interpreting time spent with media poses a challenge—some would point to the sheer number of hours as evidence of an addiction.

In this context of high media usage, there is a rising tide of concern that children have met—or surpassed—the cutoff point of “too much.” The word “addicted” is commonly used to describe people’s, particularly young people’s, engagement with media. Yet it is unclear if the “addiction” talk is indicative of a moral panic that historically accompanies the emergence of new media forms (e.g., literary novels, penny arcades, jazz music, comic books, television, and so on) (Cohen, 1972; Wartella & Robb, 2008).

Interestingly, new technologies such as smartphones and tablets are often used to access traditional media content. Looking closer at the nine hours a day that teens spend with media (Common Sense Media, 2015) reveals that the majority of that time is spent watching TV or videos and listening to music. Is there societal concern over addictions to video or music, or is it something about how we use new technologies to access media and interact with the world?

And, even if children aren’t actually addicted, how should we understand unhealthy engagement with media? Parents and

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other concerned adults increasingly wonder, what are the human costs of this “always connected” lifestyle, especially for our children?

It is the purpose of this brief to review the latest scientific research about problematic media use, articulating its pervasiveness, forms, and possible impacts on youths’ well-being and development. It asks, to what extent are young people addicted to media and technology (such as the Internet or video games), and if people aren’t actually addicted, what are the risks associated with problematic media use in regard to children’s development, including attentional and empathic abilities? The paper also highlights where research is limited and suggests behaviors that support a healthy digital lifestyle.

This brief considers over 180 journal articles, press articles, interviews, industry papers, and books. Data were collected from global populations; studies with people living in the United States were the most frequently cited, and studies with people living in China were the second most frequently cited. The literature search covered several primary areas:

- Behavioral and technologic addiction (e.g., theory and rhetoric, empirical observation, and experiments)
- Media use habits (e.g., time spent with and frequency of engaging with media)

- Family approaches to media management
- Prevalence of, attitudes toward, and impacts of media multitasking
- Developmental implications of media use, particularly with respect to empathy and social well-being
- Strategies for mitigating problematic media use

It is important to note that much of the research reviewed here was conducted with college students and adult populations, not specifically with children. There is some limited work on adolescents but very little on young children or preteens (or “tweens”). Given the many physical, cognitive, social, and emotional changes that occur from early childhood through adolescence and beyond, it is appropriate to treat findings with caution, as research on adults may not always generalize to younger populations and phenomena of interest may be more or less pronounced in those groups. It is also worth noting that much of the research to date is correlational, making it difficult to know whether problematic use is actually causing negative outcomes.

What Is Addiction?

The American Society of Addiction Medicine (2016) defines “addiction” this way:

“Addiction is a primary, chronic disease of brain reward, motivation, memory and related circuitry. Dysfunction in these circuits leads to characteristic biological, psychological, social and spiritual manifestations. This is reflected in an individual pathologically pursuing reward and/or relief by substance use and other behaviors.

“Addiction is characterized by inability to consistently abstain, impairment in behavioral control, craving, diminished recognition of significant problems with one’s behaviors and interpersonal relationships, and a dysfunctional emotional response. Like other chronic diseases, addiction often involves cycles of relapse and remission. Without treatment or engagement in recovery activities, addiction is progressive and can result in disability or premature death.”

How Does Addiction Rewire the Brain?

Let’s use a hypothetical teenager named Sue to examine how addiction rewires the brain.

1. First, Sue interacts with a “rewarding stimulus.” A rewarding stimulus is something that stimulates, or kicks into action, the brain’s “reward pathway.” Rewarding stimuli include natural rewards such as food, water, and sex. They also include synthetic, more harmful addictive substances, such as cocaine, heroin, and amphetamines. Sue could interact with a rewarding stimulus by ingesting it (such as drinking alcohol), although sometimes just looking at something that reminds Sue of a reward is enough to cause a reaction (Brookshire, 2013).
2. When the reward pathway (the “mesolimbic dopaminergic pathway”) is stimulated, it triggers the release of dopamine. Dopamine is a neurotransmitter, or a messenger chemical. Dopamine tells the brain to pay attention: Something is about to happen.
3. Sue’s brain heeds dopamine’s message, shifting into a state of wanting, expecting, and desiring pleasure (Adinoff, 2004, p. 5)*. Certain stimuli, such as addictive drugs, can trigger the release of two to 10 times more dopamine than natural rewards (National Institute on Drug Abuse, 2014). That means that their message comes through that much louder or stronger, flooding the brain with an acute sense of craving. When Sue is in this heightened state, receiving the reward (e.g., drinking alcohol) feels that much more pleasurable (the “reinforcing effect”). Conversely, not receiving the reward feels that much more disappointing.
4. Over time, the brain adjusts and becomes less sensitive to dopamine, meaning that Sue physically cannot experience as much pleasure as she did before. She’ll need more of the rewarding stimulus (alcohol) to feel the same effect (a phenomenon known as “tolerance”). Natural rewards may not even register anymore (National Institute on Drug Abuse, 2014). Eventually, Sue will need to interact with rewarding stimuli just to feel normal.
5. The brain’s adjustment to dopamine sets off a chain reaction. Tolerance can lead to increased cravings for the rewarding stimulus (Horvath, Misra, Epner, & Cooper, 2015a). Rather than pleasure seeking, Sue may become drug seeking, acting compulsively, despite adverse consequences, to alleviate the discomfort of craving (a process called “withdrawal”).
6. The reward pathway then hijacks other regions of the brain—specifically, the executive function regions of the brain that are responsible for judgment, decision-making, learning, and memory.

* A 2012 meta-analysis of brain-scan research found that substance users display enhanced electrophysiological processing of substance stimuli as compared to neutral stimuli and control participants (Littel, Euser, Munafò, & Franken, 2012). Across 29 studies, diverse substance users (males and females, younger and older, abusers of stimulants and depressants) across user conditions (e.g., currently using or abstinent for at least 10 days) reacted similarly to each other and differently from people who had never been addicted. When substance users saw something substance-related—a picture of their drug of abuse or an actual artifact related to their drug of abuse—their brains paid more attention. This held constant across different kinds of tasks, when participants were asked to notice the substance-related items and when their attention was focused elsewhere. This indicates the “education” of users’ brains. Their brains have learned what the substance-related stimulus means, they know that it’s associated with pleasure, and they release dopamine (or, if you will, send the “pay attention” message) accordingly.

Thus, addiction is a brain disease and is sometimes said to “rewire” the brain such that addicts need more of a given stimulus (such as alcohol or nicotine) to get a desired effect. Neuroimaging has been used to show differences between the brains of addicted persons and the brains of non-addicted persons. The American Psychiatric Association (APA) currently recognizes substance-use disorders (such as drug or alcohol addiction) and non-substance-based addictive disorders (such as gambling disorder).

Most addiction experts agree that negative consequences, such as depression, anxiety, job loss, poor academic outcomes, or damage to relationships, are a central feature of addiction.

Most addiction experts agree that negative consequences, such as depression, anxiety, job loss, poor academic outcomes, or damage to relationships, are a central feature of addiction. Despite substantial harm, addicted persons repeatedly engage with their “drug of abuse” (Horvath, Misra, Epner, & Cooper, 2015b).

What Is “Internet Addiction”?

The term “Internet addiction” is commonly used to refer to “excessive or poorly controlled preoccupations, urges or behaviors regarding computer use and internet access that lead to impairment or distress” (Shaw & Black, 2008). Other terms commonly used to describe the phenomena include “problematic media use,” “problematic Internet use,” “technology addiction,” “compulsive Internet use,” and “Internet dependency.” When discussed by researchers, journalists, and others, it is common to describe Internet addiction using terms adapted from traditional addiction medicine, using criteria that correspond to addiction criteria such as compulsive use that continues despite negative

consequences, tolerance, and withdrawal (Kuss, Griffiths, Karila, & Billieux, 2013).

Internet addiction is commonly measured using the Internet Addiction Test, which is adapted from criteria and questions used to identify problem gamblers (Young, 1996). Subsequent research has repurposed or modified the gambling-originated tool to measure Internet addiction (Tao et al., 2010). As pointed out elsewhere, attempts to substitute “Internet” for “substance” or “gambling” or other addictive disorders have met with criticism for a lack of understanding about the unique underlying phenomena of each of these disorders (Wallace, 2014).

Researchers have struggled to determine how prevalent Internet addiction is, a task made more difficult by the different terminology used to describe Internet addiction and the many different measures used to try to measure the phenomena. One systematic review of studies on American adolescents and college students reported a range of prevalence estimates between 0 and 26 percent (Moreno, Jelenchick, Cox, Young, & Christakis, 2011). The wide range in estimates may be because of the many ways Internet addiction was conceptualized (i.e., is it more like a gambling disorder or more like an impulse-control disorder?) and differences in how to determine the line between problematic and non-problematic use. Many of the studies were also from before 2006, a time before widespread smartphone adoption and when Internet access and use may have been substantially different from current conditions. Lastly, many studies were limited in scope, focusing on college students at a single university with limited sample sizes.

Another effort to determine global Internet addiction prevalence estimated the rate of Internet addiction at 6 percent (Cheng and Li, 2014). The study found wide differences in Internet addiction across the globe: The highest prevalence was in the Middle East with nearly 11 percent, and the lowest was in Northern and Western Europe at almost 3 percent. Prevalence in the United States was slightly higher than the global average, at 8 percent. It is difficult to tell how that addiction rate applies specifically to children under the age of 18, as the study included children and adults. With global Internet use at 46 percent and global smartphone use at 51 percent (Kemp, 2016), these estimates would certainly be cause for concern.

There is controversy over the cultural differences revealed by differing prevalence estimates. Research has indicated that the Internet Addiction Test is more reliable for college students and in parts of Asia and that more studies are needed to examine the reliability of the test for young children and people on other con-

tinents (Frangos, Frangos, & Sotiropoulos, 2012). It has also been noted that most of the neuroimaging studies used to identify brain differences between addicts and non-addicts were conducted in Asia, making it difficult to disentangle cultural effects (Brand, Young, & Laier, 2014). Additionally, diagnoses may change from country to country because of cultural differences; for example, in countries where excessive Internet gaming is viewed especially harshly and is heavily stigmatized, gamers may experience more stress when engaging in the activity, increasing the likelihood of negative outcomes (Kuss, 2013).

There is also considerable debate about whether Internet addiction is a real phenomenon or not. For example, it has been noted that it is easily possible for an individual to be classified as an addict by one measure and as normally functioning by another (Wallace, 2014). There is also some ambiguity about what Internet addiction is, given the many things that can be done on the Internet (such as watching videos, playing games, and using social media). Internet activities are often social and interactive, in contrast with pathological gambling, which is commonly antisocial (Rosner, 2012). Focusing on amount of time online is controversial, given that children and adults alike are connected all the time and given how many activities take place in online environments.

In sum, it is difficult to conclude with certainty whether “Internet addiction” is an addiction in the same way we understand and classify other addictions. However, even if some believe that “Internet addiction” is not the right terminology or is misleading, there does seem to be at least one area of “Internet addiction” where evidence suggests especially problematic behaviors and outcomes.

Internet Gaming Disorder

The American Psychiatric Association (APA) publishes the *Diagnostic and Statistical Manual of Mental Disorders*, or the *DSM*, a medical resource that classifies and provides diagnostic criteria for mental disorders and provides comprehensive diagnostic criteria for psychiatric disorders (American Psychiatric Association, 2014).

New entries in the *DSM* result from multiple, well-respected scholars reviewing extensive, credible research and agreeing by consensus to the existence of a novel or undiagnosed malady. In 2013, the fifth edition of the *DSM* introduced Internet gaming disorder as an addictive disorder warranting additional clinical research and experience (American Psychiatric Association, 2013, para. 3).

To understand why the APA labeled this particular form of media addiction as “Internet gaming disorder” (IGD) as opposed to “Internet addiction,” “technology addiction,” or similar terms, consider the research. APA scholars reviewed numerous studies on excessive media use. These studies used many instruments to measure and diagnose participants’ media-related conditions, and many of them looked specifically at Internet addiction (Young, 1996). However, participation in Internet gaming was largely responsible for explaining Internet addiction. In other words, it was particularly problematic. The APA did not rule out the possibility of other media and technological addictions but could not justify defining generalized Internet addiction; instead, the APA identified IGD as a condition warranting more research and clinical experience.

How Is IGD Observed?

Given the limitations and ambiguities around labeling and measurement, why did the APA note IGD in the first place? One reason is neuroimaging, which allows researchers to produce images of the structure or activities of the brain. When investigators compare brain scans¹ of individuals who satisfy the criteria for Internet addiction² against those who don’t (i.e., members of a control group), they can observe differences. Structurally, addicted persons’ brains look different; functionally, addicted persons’ brains act differently. The brains of the identified Internet addicts within several studies resembled those of substance abusers and pathological gamblers.

For example, some studies have found gray matter density in parts of the brain to be significantly lower in youths addicted to the Internet than in non-addicts (Zhou, et al., 2011). The gray matter areas are often associated with executive functioning, such as planning, decision making, and impulse control. Another study

-
1. Via functional magnetic resonance imaging (fMRI), event-related brain potentials (ERP), voxel-based morphometry (VBM) analysis, pseudocontinuous arterial spin-labeling (ASL) perfusion, and the amplitude of low-frequency fluctuation (ALFF) method
 2. Since the APA didn’t publish its IGD entry until 2013, researchers used different terms and instruments to identify media addicts, including (but not exclusive to) Chen and colleagues’ Internet addiction scale (Chen, Weng, Su, Wu, & Yang, 2003), Young’s Internet Addiction Test (K. Young, 2009), Tao and colleagues’ scale for pathological Internet use (Tao et al., 2010; Wang et al., 2009), and Wolfling and colleagues’ scale for the assessment of pathological computer-gaming (Wolfling, Muller, & Beutel, 2011).

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found cortical thickness differences between adolescents with online gaming addiction and healthy peers in a control group, which could also have negative implications for executive functioning (Yuan, Cheng, et al., 2013; Yuan, Jin, et al., 2013). Other work suggests that Internet addicts have impaired executive functioning (Dong, Shen, Huang, & Du, 2013; Dong, Zhou, & Zhao, 2011), show increased tolerance (Düven, Müller, Beutel, & Wolfling, 2015), and demonstrate more enhanced reward sensitivity than non-addicts, a hallmark of impulsivity (Dong, Huang, & Du, 2011).

However, since IGD lacks a standard definition, it is difficult to know if the structural brain differences that have been observed are significant for diagnosing IGD. Interpreting brain scans is complicated. For example, having less gray matter could be interpreted as evidence of optimization, reflecting specialization as a good video game player (Friston, cited in Mosher, 2011). It is also not known whether obsessive gaming is causing changes in the brain or whether people with different brain structures are more prone to IGD. And, as noted above, many of the neuroimaging studies used to diagnose IGD were conducted in Asia and would benefit from replication in other countries to separate out effects of culture (Brand, Young, & Laier, 2014).

At least one research study has suggested there may be a genetic component associated with Internet addiction (Montag et al., 2012), although it is likely that the gene in question is associated with addictive behaviors more generally rather than Internet addiction specifically. For example, individuals with this gene were more likely to be addicted to nicotine as well. Complicating the issue, other conditions such as hyperactivity, depression, and attention disorders (which often co-occur in individuals diagnosed with Internet addiction) have genetic components as well (Cross-Disorder Group of the Psychiatric Genomics Consortium, 2013).

Questions to Assess IGD

1. Do you spend a lot of time thinking about games even when you are not playing or planning when you can play next? (*preoccupation*)
2. Do you feel restless, irritable, moody, angry, anxious, or sad when attempting to cut down or stop gaming or when you are unable to play? (*withdrawal*)
3. Do you feel the need to play for increasing amounts of time, play more exciting games, or use more powerful equipment to get the same amount of excitement you used to get? (*tolerance*)
4. Do you feel that you should play less but are unable to cut back on the amount of time you spend playing games? (*unsuccessful attempts to stop or reduce*)
5. Do you lose interest in or reduce participation in other recreational activities (hobbies, meetings with friends) due to gaming? (*loss of interest in other hobbies or activities*)
6. Do you continue to play games even though you are aware of negative consequences, such as not getting enough sleep, being late to school/work, spending too much money, having arguments with others, or neglecting important duties? (*excessive gaming despite problems*)
7. Do you lie to family, friends, or others about how much you game or try to keep your family or friends from knowing how much you game? (*deception*)
8. Do you game to escape from or forget about personal problems or to relieve uncomfortable feelings such as guilt, anxiety, helplessness, or depression? (*escape or relief from a negative mood*)
9. Do you risk or lose significant relationships or job, educational, or career opportunities because of gaming? (*the jeopardizing or loss of a relationship, job, or educational or career opportunity*)

Petry et al., 2014

Understanding that observing IGD neurologically and genetically is difficult, what about understanding IGD from a behavioral perspective? The *DSM-5* lists the following criteria associated with IGD: preoccupation, withdrawal, tolerance, unsuccessful attempts to stop or reduce, loss of interest in other hobbies or activities, excessive gaming despite problems, deception, escape or relief from a negative mood, and the jeopardizing or loss of a relationship, job, or educational or career opportunity (Petry et al., 2014). Individuals who display five or more of these criteria within one year are likely to be diagnosed with IGD.

These criteria are neither unchallenged (Griffiths et al., 2015) nor solitary. Brown (1993), Griffiths (1996), Beard and Wolf (2001), and

Charlton and Danforth (2007), among other researchers, have conducted investigations that yielded their own set of IGD-sensitive criteria. Some items, such as withdrawal, appear across every set; other items, such as deception, appear more sporadically.

Kardefelt-Winther (2015a, 2015b, 2015c) argues that there are significant problems with the criteria currently being used to identify IGD. For example, classic addiction symptoms that have been carried over from criteria for other addiction disorders may be insufficient or less applicable in IGD. Deception, marked by lying or concealing the extent of behaviors, is situationally, socially, and culturally subjective. Consider that the children of parents who do not approve of their gaming habits may go out of their way to hide their gaming to avoid punishment. In this case, deception relates more to the fact that the parents do not support gaming rather than to a particular problem with a player. A loss of interest in other activities implies that time spent on gaming results in less time being social with friends but makes the assumption that meeting friends online is less valuable than meeting them in real life, even though much research points to the value of online social interactions and community building. Other criteria are problematic as well, resulting in unresolved issues around how valid and useful diagnostic criteria for IGD currently are.

Other concerns with including IGD in the *DSM* include the possibility that it may pathologize behaviors that are developmentally normal but frowned upon by society (Pies, 2009). There are also significant concerns that many people who present as having IGD may have one or more underlying issues, such as attention-deficit/hyperactivity disorder or depression, making it difficult to ascertain whether IGD is a distinct disease (Kratzer and Hegerl, 2008). A depressed teen might find relief in being able to control an online gaming persona and seek out games, or depression might be related to a sense that online gaming is out of control.

It's also possible that the relationship between excessive video game use and attention problems goes both ways: A longitudinal study of 3,034 children and adolescents from Singapore found that individuals who are more impulsive or have more attention problems spend more time playing video games, and those who spend more time playing video games subsequently have more attention problems (Gentile et al., 2012). This rigorous study provides a strong basis for concluding that video games both attract "the distract-able" and exacerbate distraction. Another study showed that attention problems may precede excessive gaming behaviors, but the reverse did not occur (Ferguson & Ceranoglu, 2014). For

now, IGD is identified as an intriguing condition for further research but is not in the *DSM* as a formal disorder.

Remaining Questions About Technology Addiction

As more research emerges (as do different media forms and technologies, and new ways of using them), the APA may identify more forms of technology- or media-related addictions and/or modify its labeling. Which labels it might select depends upon what we learn about these addictions in general and about IGD in particular.

First, more and better research on excessive engagement with digital media and technology (e.g., mobile devices and the Internet) and activities (e.g., gaming and social networking) might clarify the relative importance of each—or neither. One outcome may be that the "digital" component is the most important element. In such a case, broad terms such as "technologic addiction" would be appropriate (Lopez-Fernandez, 2015). At a colloquium convoked by the National Academy of Sciences, developmental psychologist and media effects expert Dr. Douglas Gentile suggested, "Let's think about the commonality among Internet addiction, game addiction, cell phone addiction ... Nothing distinct has emerged so far to show that they are clearly distinct taxons ... For right now, let's treat them [various media and technology addictions] as different manifestations of the same underlying disorder ... just as we call 'gambling addiction' the overarching phenomenon experienced by compulsive players of roulette, poker, and the ponies" (Gentile, 2015).

Alternatively, it may emerge that people are addicted "on the Internet" versus "to the Internet." In other words, people are addicted to particular activities online (such as viewing pornography, social networking, online gambling, and so on) but not to the Internet per se (Meerkerk, Van Den Eijnden, Vermulst, & Garretsen, 2009). Some research suggests that risk factors, personality and psychopathologic factors, and treatment solutions associated with each particular online activity are distinct and also differ from those associated with online gaming (for a review, see Lopez-Fernandez, 2015). However, whether and how each of these activities contrasts with its non-networked counterpart is yet unclear. For example, does online gambling addiction vary so significantly from offline gambling that it warrants its own designation?

Finally, more research may demonstrate that the essential, addictive element is "the world's largest slot machine" (Greenfield, cited in

Heid, 2016)³: the Internet. This would support the notion that people can be addicted to the Internet as opposed to addicted on the Internet.

Many notable scholars acknowledge that “the jury is still out” on “whether IGD is a behavioral addiction or even a mental disorder” (Petry et al., 2015, p. 175). APA members consciously decided to designate IGD as worthy of more research and experience, hoping this would inspire global scholars to conduct the studies needed to answer outstanding questions.

3. Dr. David Greenfield is assistant clinical professor of psychiatry at the University of Connecticut School of Medicine and founder of the Center for Internet and Technology Addiction.

PROBLEMATIC MEDIA USE

Given the lack of agreement about whether Internet addiction and IGD are unique conditions, and how they should be diagnosed, it may be more helpful to focus away from the addiction label and more on negative outcomes associated with problematic use of media and technology (Wallace, 2014). Parents and children alike may perceive that their use of technology and media is degrading their quality of life, reflecting significant concerns around negative outcomes and compulsive use. For this reason, the term “problematic media use” will be used to move away from discussing media-related problems in medical terms, while underscoring issues that go beyond minor, day-to-day annoyances.

Constant Connection

Concerns about problematic media use have arisen in an environment where new technologies are making huge inroads into families’ daily lives. Many studies have noted very high frequencies of use. For example, most teens now have their own smartphones, including 51 percent of teens from lower-income households, 69 percent of teens from middle-income households, and 78 percent of teens from higher-income households (Common Sense Media, 2015). This is a tremendous change since the introduction of the iPhone in 2007 and before smartphones were widely adopted.

But it is not only the availability of new technologies that is intriguing; the frequency and ways in which people use them also raise eyebrows. Consider that 38 percent of college students in a survey reported that they could not go more than 10 minutes without needing to check their devices (Kessler, 2011) or that 75 percent of college-age students checked in with their text messages every hour or less, and 35 percent checked their social networks equally often (Rosen, Whaling, Rab, Carrier, & Cheever, 2013). In a 2015 study with 2,000 Americans, 54 percent of people age 18 to 24 reported “I am constantly checking and using my phone,” a significantly higher proportion than all users (36 percent) (Braun Research Inc., 2015). Though there is less research on teens specifi-

cally, one recent study found that teens who use smartphones spend over 4.5 hours a day using them (Common Sense Media, 2015).

The ways in which users relate to their technology specifically—the relative importance of their smartphones in their lives—also has attracted significant research attention. A 2012 study surveyed 314 teens from lower- to middle-class backgrounds in Houston, Texas, and found that nearly one-quarter of participants (24 percent) agreed or strongly agreed that they were “nothing” without their cell phones, and nearly half said they could not do without their cell phones for a day (Lee, 2014). A 2014 Harris Interactive poll of adults found that 26 percent of respondents were unwilling to live without their phones (Murphy, 2014)⁴. One year later, when the Pew Research Center (2015d) asked a similar question, it collected nearly double the number of affirmations, documenting 46 percent of respondents who identified their smartphones as something “they couldn’t live without.”

Alternative Perspectives

Some would argue that the above data indicate problematic media use. But, it also could indicate the many roles that phones play in modern life, including: taking and sharing pictures and videos; playing videos, music, and games; exchanging messages with others; accessing social networks; emailing; and making purchases.

It is important to note that many of the behaviors exhibited by teens are expressions of developmental needs that existed long before the Internet. For example, teens’ need to be connected to others, and to be liked and validated, are hallmarks of the adolescent development period (Santrock, 2015; Steinberg & Morris, 2001). The importance of peer relations increases because peers give feedback about individuals and the world outside of what is received from the family.

What is different about teens’ experiences in the digital age is the extent to which technology can narrow or expand the ways in which teens interact with their friends and the wider world.

4. By a significant margin, technology emerged as more precious than sex, with 28 percent of respondents unwilling to forgo the Internet, 26 percent unwilling to forgo their mobile phones, 23 percent unwilling to forgo television, and 20 percent unwilling to forgo sex (Murphy, 2014).

Engaging with peers on social networks such as Facebook, Instagram, or Snapchat, or playing immersive role-playing games with friends and people from around the world, are ways in which youth may feel socially connected. In this framing, the seemingly constant use of tech, evidenced by teens' immediately responding to texts, social-networking posts, and other notifications, is actually a reflection of teens' need to connect with others. What looks like excessive use and distraction is actually a reflection of new ways of maintaining peer relations and engaging in communities that are relevant to them.

For example, after interviewing 166 teens across the United States, as well as traveling and observing across 18 states and speaking with dozens of parents, educators, and others, danah boyd concluded that most teens use media in functional ways, going online to connect to their communities, to connect with peers from the "real world," and to create a space of their own (2014). They extend conversations, make each other laugh, share news, and see and are seen, in much the same way that previous generations would socialize at football games and shopping malls. boyd points a finger at the rate at which youth are kept indoors, committed to hours of homework and structured activities, in the name of ensuring safety or courting success. This context contributes to youths' sense of stress and denies them an offline outlet for coping. Browsing Facebook or playing video games can help them to remain connected to their peer groups and to decompress (boyd, 2015).

Online activities also allow youth to dive deeply into a topic or talent and participate in communities that share their interests. In extensive qualitative fieldwork with young people, which included 5,194 hours of observation, 659 semistructured interviews, and 28 diary studies, Ito and colleagues (2010) observed that youth spent time with and around media in order to socialize with peers and pursue personal interests. While youth could spend many hours engaging with their passions, and potentially displace other hobbies, the researchers noted that this intensity was not perceived negatively or practiced pathologically.

So how can parents make the distinction between normal teen behavior and problematic media use? Concern tends to stem from the extent to which technology promotes frequent and sometimes unhealthy habits. Looking closely at several areas where public concern has emerged around the impacts of technology and media can help identify ways in which media use and technology may be problematic.

A Source of Tension for Parents and Children

In an environment where people are frequently using and checking devices, research has pointed to conflicts that arise in families when people are distracted by technology use. For example, in an international online survey of 6,117 8- to 13-year-olds and their parents, 54 percent of children felt that their parents checked their devices too often, and 32 percent of children felt unimportant when their parents were distracted by their phones (AVG Technologies, 2015). The same study found that more than half of parents thought they checked their devices too frequently, and more than one in four thought they did not set a good example for their children. Another study with 803 American parents of 8- to 17-year-olds found that approximately one-third of all participating parents struggled with limiting their children's use of media and technology (Rich, Bickham, & Shrier, 2015).

Another study observed 55 caregivers eating with young children in fast food restaurants and found that 40 of the caregivers used devices during their meals (Radesky, et al., 2014). The researchers examined how absorbed caregivers were with their devices, as determined by the frequency of their use as well as their children's responses to that use. Some children were able to entertain themselves, but others bid for attention more urgently. Parents who were highly absorbed in their devices tended to be more harsh when dealing with children's bids for attention and misbehavior.

However, not all studies find that technology is causing family conflict. A study of 2,326 parents of 0- to 8-year-olds found that almost 80 percent of parents disagreed that negotiating media use causes conflict in the home, and 59 percent said they were not worried about their children becoming addicted to new interactive technologies (Wartella, Rideout, Lauricella, & Connell, 2013). In a study of over 900 parents of 6- to 17-year-olds, 55 percent said that technology was having about equally positive and negative effects on their parenting, with another 39 percent saying it was having more of a positive effect (Family Online Safety Institute, 2015).

In this context, in which families are integrating new and evolving technologies into their lives, it is worth considering some of the areas where children and adults may be suffering negative repercussions.

MEDIA MULTITASKING

To the extent that multitasking is a kind of problematic media use, it is worth additional scrutiny. Multitasking is a term used to describe the performance of several tasks at the same time. “Media multitasking” describes at least three forms of multitasking: within medium (e.g., switching among multiple windows on a computer), between media (e.g., texting while watching television), and between media and human beings (e.g., taking a selfie while out to dinner with friends) (Wallis, 2010). A 2010 study of 8- to 18-year-olds found that young people were engaging in media multitasking for 29 percent of their overall media use time, fitting over 10 hours of media use into 7.5 hours of their days (Rideout, Foehr, & Roberts, 2010). Another study of 263 middle school, high school, and university students found that students studied for fewer than six minutes before switching to another technological distraction such as texting or social media (Rosen, Carrier, & Cheever, 2013). The *Common Sense Census* (2015) found that high percentages of teens watched TV (51 percent), used social media (50 percent), and texted (60 percent) while doing homework. Interestingly, most of the teens didn’t feel that their multitasking harmed the quality of their work.

A 2010 study of 8- to 18-year-olds found that young people were engaging in media multitasking for 29 percent of their overall media use time, fitting over 10 hours of media use into 7.5 hours of their days (Rideout, Foehr, & Roberts, 2010).

Some regard multitasking as a fact of life in the 21st century and perhaps even as a valuable skill for juggling multiple demands in fast-paced environments. Research has even pointed to video games as a tool for improving multitasking skills (Green, Sugarman, Medford, Klobusicky, & Bavelier, 2012). But, even if it’s possible, it may not be desirable. Many question whether it is actually possible to do two things at once and blame it for elevated stress and degraded productivity.

Consider a teen, such as one of those mentioned above, who texts or posts on social media while doing homework. Research suggests that she isn’t actually doing two things at the same time—she is doing tasks back to back, sequentially (Salvucci & Taatgen, 2011). If she switches rapidly between tasks, then it might seem to others and to herself that she is doing multiple tasks at once, but in actuality, these switches require shifting cognitive resources, or diverting attention, from one task to another.

Although many regard multitasking as a time-saving behavior, it often hinders productivity. This is due to cognitive fatigue, a type of mental exhaustion caused by the strain of switching between tasks and maintaining multiple trains of thought. This reduces work speed, both because people may think and move more slowly and because their resumption lag, or the time between tasks, may expand. For example, university students who participated in an instant-messaging conversation while reading an online passage took significantly longer to read the passage than students who were not messaging (Bowman, Levine, Waite, & Gendron, 2010). The same study found that performance on a comprehension test did not differ between the multitasking group and the no-multitasking group, suggesting that in some instances, the impact may be more about time spent than performance.

Additionally, multitasking makes it more difficult to create memories that can be accurately retrieved later (Fernandes & Moscovitch, 2000). When a student’s attention is distracted—for example, by texting with friends while taking notes in class—the student may not properly mentally encode what the teacher has said. As a result, the student would have greater difficulty retrieving the memory on a test.

A seminal research study involving 262 college students found that heavy media multitaskers have a harder time filtering out irrelevant information (Ophir, Nass, & Wagner, 2009).

Some might expect that a generation born into a world of digital devices may have more experience multitasking and thus be better at it, but research does not bear this out. Research with 262 college students found that students who multitasked the most (“heavy media multitaskers”) performed worse on tasks requiring them to switch between cognitively demanding tasks than students who multitasked the least (“light media multitaskers”) (Ophir, Nass, & Wagner, 2009). The researchers suggested that the heavy media multitaskers had a harder time filtering out irrelevant information. In other words, they may have developed a habit of treating all information they came across with equal attention instead of allotting steady attention to a particular task. However, it is possible that heavy media multitaskers may have other attention issues that result in poor performance, or that individuals who do a lot of multitasking have more control over what they direct their attention to, so additional research is necessary (Lin, 2009; Uhls, 2015).

In terms of real-world performance, a study of laptop users in university classrooms found that students who multitasked on a laptop during a lecture performed worse on a test than students who were not multitasking (Sana, Weston, & Cepeda, 2013). Additionally, students who could see others who were multitasking on a computer and were presumably distracted by it also scored lower on a test than those who were not able to view others’ laptops. Texting in class is also problematic: In an experiment with 185 undergraduate students, those who received 16 or more texts that required a response during a 30-minute lecture did significantly worse on a follow-up test than students who received fewer or no texts (Rosen, Lim, Carrier, & Cheever, 2011).

Table 1. How Prevalent Is Multitasking?

Teens who say they use another medium “most” or “some” of the time while: (Rideout, Foehr, & Roberts, 2010)	
• Listening to music:	73%
• Using a computer:	66%
• Watching TV:	68%
• Reading:	53%
• Playing video games:	48%
Teens who “often” or “sometimes” multitask with these forms of media while doing homework: (Common Sense Media, 2015, p. 17)	
• TV:	51%
• Social media:	50%
• Text:	60%
• Music:	76%
College students who multitask during classes using: (Lee, 2015, p. 54)	
• Social media: (specifically Facebook or Twitter)	49%
• Text:	70%
Adults who say multitasking is the only way they can get things done: (Microsoft Canada Consumer Insights, 2015, p. 37)	
• Age 18 to 24:	76%
• Age 65+:	38%
Adults who multitask on their phones in these spaces: (Braun Research Inc., 2015)	
• Work meetings:	24%
• Face-to-face conversations:	32%
Individuals by generation who report that mealtimes are not technology-free: (Nielsen, 2015)	
• Generation Z (age 15 to 20):	38%
• Millennials (age 21 to 34):	40%
• Generation X (age 35 to 49):	45%
• Boomers (age 50 to 64):	52%
• Silent generation (age 65+):	42%

Even multitasking that seems innocuous may have deleterious effects. Many children listen to music while doing homework (Common Sense Media, 2015), but research on 334 seventh- and eighth-graders found that students listening to popular music while taking a reading-comprehension test performed significantly worse than students who were not listening to any music (Anderson & Fuller, 2010). It is suggested that when music has lyrics, it can interfere with reading comprehension and information processing. Other research has found that relaxing, repetitive background music does not interfere with, and in some cases can enhance, performance on simple or repetitive tasks (Kiger, 1989; Schellenberg, Nakata, Hunter, & Tamoto, 2007).

Lastly, there is evidence that multitasking might be a unique risk factor for mental health problems. At least one study found that adults' media multitasking was associated with higher depression and social anxiety symptoms (Becker, Alzahabi, & Hopwood, 2013). Research has not yet shown whether multitasking is causing mental health problems, is a result of mental health problems, or is some combination of the two.

User Perceptions and Experiences of Multitasking's Effects

When it comes to multitasking's effects on their lives and the quality of their work, users' responses are mixed.

Some people regard media (such as email) as a "blessing" (Kelleher, 2013) and appreciate media's capacity to alleviate boredom and provide ways to spend short breaks (Gouveia, 2015). The American Psychological Association (2013) survey found that 56 percent of adult participants said that communication technology allows them to be more productive, and 53 percent said that it provides more flexibility. With regard to email, many people appreciate it as a way to exert control over work by choosing when to respond to others (Wacjman & Rose, 2011). Stress has been negatively associated with Facebook and social media use (Mark, Wang, & Niiya, 2014). Multitasking also can confer emotional, entertainment, and social benefits (David, Kim, Brickman, Ran, & Curtis, 2015). A 2014 survey by the

Pew Research Center found that 92 percent of working adults say the Internet has not hurt their productivity at work.

But many regard multitasking as harmful. More than three-quarters of surveyed English teachers (77 percent) said that students' attention spans in the classroom, upon those students starting secondary schools, were shorter than ever before (Pearson UK, 2012).⁵ In a study of college students, 57 percent agreed or strongly agreed that they were distracted during classroom lectures due to multitasking (Lee, 2015). One survey asked whether participants had a challenging or difficult situation balancing the use of digital devices and technology, with 44 percent of tweens, 33 percent of teens, and 25 percent of adults indicating they were distracted and it was hard to stay on task (Rich, Young, & Martin, 2015, p. 52). An in-depth, five-day study with 32 adults found that "the more time in email and face-to-face interaction, and the more total screen switches, the less productive people feel at the day's end" (Mark, Iqbal, Czerwinski, & Johns, 2015, p. 903). Similarly, a 2014 study with college students found that stress was positively associated with the amount of multitasking (Mark et al., 2014).

5. This perception of reduced attention spans may help to explain why a questionable statistic went viral. In May of 2015, several popular news outlets (e.g., *Time*, the *Telegraph*, the *New York Times*, the *New York Daily News*, CNet.com, etc.) circulated a statistic originally published by website StatisticBrain.com that claimed attention spans have decreased since the year 2000 from 12 seconds to eight seconds, which is less than a goldfish's nine-second attention span. StatisticBrain.com referenced the National Center for Biotechnology Information, the U.S. National Library of Medicine, and the Associated Press; however, technical writer Ken McCall found no corroborating data across any of these sites (2014) (and how one measures a goldfish's attention span in the first place is a legitimate methodological question). Drs. Dianne Dukette and David Cornish explain (2009) that continuous attention span can be as short as eight seconds, after which time one's eyes may shift or a stray thought may enter consciousness, neither of which impairs task performance (cited in McCall, 2014).

Empathy

It is unlikely that researchers two decades ago could have predicted the multiple ways in which people would use personal technology and media to regularly curate and distribute glimpses into their lives (e.g., status updates, tweets, selfies). But this shift has occurred. A 2013 online survey collected responses from 12,000 individuals from 24 countries (cited in Meeker & Wu, 2013, p. 28). To the prompt “Describe how much you share online (including status updates, feelings, photos, videos, links, etc.),” nearly one-quarter (24 percent) of global users replied, “Everything” or “Most things.” According to a 2013 study on global Internet trends, more than 500 million photos per day are uploaded and shared across Facebook, Instagram, Snapchat, and Flickr (Meeker & Wu, 2013).

Does the frequent sharing of personal feelings, thoughts, images, etc., impact empathy? Empathy is the ability to understand and share the feelings of another; as such, it comprises perspective-taking, or putting yourself in another person’s shoes, and affect match, or feeling what another person is feeling. Many scholars have identified associations between empathy and pro-social behavior (Miller & Eisenberg, 1988; Roberts & Strayer, 1996). In fact, empathy is thought to have played an important role in our species’ evolution, helping parent-child attachment and community bonding.

Many researchers have noted that narcissism seems to be increasing, while empathic traits have been on the decline, and have pointed to social media as a driver for that change (Konrath, 2012). From 1979 to 2009, American college students’ scores on two measures of empathy dropped sharply; the steepest decline occurred from 2000 onward (Konrath, O’Brien, & Hsing, 2011). The connection between narcissism and empathy is intriguing, because people with higher levels of narcissism are less likely to exhibit empathy for others (American Psychiatric Association, 2013). There are several possible suggestions for why social media use might lower empathy.

First, interacting with others through screens leaves out many social cues humans receive in person. For example, a teen who receives a text from a friend about his or her day will miss out on visual cues (eye contact or facial expressions), auditory cues

(tone of voice), and tactile cues (touch) (Konrath, 2012). Empathy may develop in the context of the many cues we get during face-to-face communication. Additionally, online environments that allow anonymity may make it easier for individuals to ignore others’ feelings and thus be more aggressive or insensitive than they would be in person.

But, when it comes to evidence linking social media use to empathy, the results are limited and somewhat difficult to interpret. For example, a small study of 100 college students found that those who scored high on measures of narcissism posted more frequently on Facebook and were more self-promotional (Mehdizadeh, 2010). It is possible that social media causes teens to be more narcissistic, but it is equally likely that narcissistic individuals are more likely to use sites that allow them to talk about and promote themselves. Another study of adults between the ages of 18 and 50 found that commenting, viewing photos, and posting status updates on Facebook was related to narcissism but that higher levels of chatting on the site was positively related to perspective-taking, a key component of empathy (Alloway, Runac, Qureshi, & Kemp, 2014).

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Findings from a 2014 study support the importance of face-to-face time. After 11- and 12-year-olds spent five media-free days at an outdoor educational camp, their recognition of nonverbal emotion cues improved significantly more than those of their peers who attended school and used media as usual (Uhls et al., 2014). The ability to pick up on nonverbal cues is important for maintaining healthy social interactions.

Small and Vorgan (2009) argue that spending time online reduces the amount of face-to-face time that people have with others and thus their capacity for empathy, but a study of 1,726 adults found that going online did not have any impact on face-to-face communication and did not reduce empathy (Carrier, Spradlin, Bunce, & Rosen, 2015). Additionally, the study by Carrier and colleagues (2015) found that communicating with people you know online could increase the chance that you see that person in the real world and increase the likelihood of face-to-face communications that allow individuals to exercise their empathy skills. However, there was also evidence from adults in the same sample that video gaming specifically (rather than time spent online generally) is negatively related with real-world empathy. The study was correlational, so establishing causation between video gaming and empathy decreases was not possible.

Other Social and Emotional Outcomes

With respect to well-being, from surveying 3,461 North American girls age 8 to 12, educational researcher Roy Pea and his colleagues (2012) found that high levels of media use (e.g., talking on the phone, communicating online, watching video, listening to music, and reading) were related to negative social well-being, while face-to-face communication was associated with positive social and emotional outcomes. Well-being in this study was conceptualized as feelings of social success, acceptance, and normalcy. However, the authors noted that it was impossible to tell whether media use was causing negative outcomes or whether children who were already experiencing difficulties were seeking out media (or both).

In looking at stress, in a survey of 1,801 adults, frequent Internet and social media users were not found to have higher levels of stress, and, in fact, women who used social media reported lower levels of stress (Hampton, Rainie, Lu, Shin, & Purcell, 2014). The primary way social media use was linked to stress was through higher levels of awareness of stressful events in other people's lives.

Social media use has also been linked to higher incidences of depression. A study of adults found evidence that people felt

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depressed after spending long periods of time on Facebook because they were socially comparing themselves to others and felt badly about themselves as a result. In other words, viewing posts that made others seem more attractive or as though they were having more enjoyable experiences made the viewer experience more depressive symptoms (Steers, Wickham, & Acitelli, 2014).

It should be noted that teens themselves don't tend to view their use of technology as problematic. Common Sense Media (2012) found that children between the ages of 13 and 17 preferred face-to-face communication over all technological means of communication, because it was perceived to be more fun and because they could understand people better in person. More than a quarter of teens also said that using social networking made them less shy and more outgoing, and one in five said it made them more confident and sympathetic to others. By comparison,

5 percent said social networking made them feel less outgoing, and 4 percent said it made them feel worse or less confident about themselves. In addition, 52 percent of teen social media users said that social networking had mainly helped their relationships with friends, as compared to 4 percent who said it hurt their relationships. Nevertheless, 41 percent of teens who owned cell phones still described themselves as “addicted.”

Chasing Conversation

The prospect of technology and media displacing or weakening in-person communication is a common and recurring concern. As noted in the research above, face-to-face communication was associated with 8- to 12-year-old girls’ social well-being (Pea et al., 2012).

Synthesizing five years of interviews with and observations of students, young adults, and members of the business community, sociologist and psychologist Sherry Turkle has identified a decrease in multiple types of conversations, and she argues why this contraction can be dangerous. The first type of conversation occurs with oneself in the form of self-reflection. Opportunities for such auto-dialogue once emerged organically, from contexts of boredom or idleness; but since people increasingly spend their spare moments with media, these spaces for solitude have become few and far between. The implications of this are considerable. Constant activity can compromise access to processing, sense making, and relaxing; challenge creativity (Cain, 2012; Mann & Cadman, 2014); and prevent us from learning how to be alone which, ironically, can make us more lonely (Winnicott, 1958, 1965).⁶

The second type of conversation is one-on-one: an exchange with family members, significant others, friends, or strangers. Turkle (2015) cites research participants, mostly undergraduate and graduate students, who prefer emailing to talking about emotional topics in order to avoid interruption, save face, and perfect word choice. A couple also extolled the benefits of fighting via text because it created an archive, allowing them to track who said what. While these strategies may be adaptive in certain situations, their universal practice means that people miss out on deep listening, which is tuning in not only to words but also to body language, voice, tone, and silences (p. 45).

Technology-mediated conversations also reduce emotional connection, according to research that found in-person conversation (compared to text, audio, and video chat) was associated with the greatest bonding between friends (Sherman, Michikyan, & Greenfield, 2013). The implications of this diminished rapport can be significant since good relationships confer health benefits. Dr. Robert Waldinger (2015), current director of the longest study of adult life that’s ever been done, the Harvard Study of Adult Development, reported three notable findings from their 75 years of research:

- Social connection is positively related to happiness, physical health, and longevity. The more socially connected you are, the happier, healthier, and longer-living you’ll be. Loneliness, meanwhile, is “toxic.”
- Relational satisfaction is negatively related to pain sensation. The more satisfied you are with your committed relationship, the less physical pain you’ll feel.
- Relational trust is positively related to memory function. People who felt that they could really count on their partners had memories that stayed sharper longer.

For the sake of productivity, some people sidestep conversations with strangers and near-strangers by texting at public “way stations” (e.g., lines at the grocery store, waiting rooms, sidewalks) or wearing headphones at the office. While these choices can help people accomplish tasks, they also can impose a cost. Turkle (2015) recounted an interview with a senior partner at a Boston law firm who believed that, by plugging into their devices and headphones, his firm’s young associates were missing out on ongoing, informal workplace conversations. This isolation, he felt, might degrade their collaborative effectiveness and, ultimately, harm the firm’s performance (pp. 28-29).

A third type of conversation is with groups, a multi-voiced negotiation that commonly occurs at school, work, and large social gatherings. As previously reviewed, media multitasking can exacerbate cognitive fatigue and, therefore, impair learning and productivity in academic and professional settings. Socially, media multitasking is becoming increasingly normative, especially among young adults (Rainie & Zickuhr, 2015). According to a nationally representative sample of 3,217 adults, 89 percent of all adults, and 98 percent of 18- to 29-year-olds⁷, have used their cell

6. As previously reviewed, the implications of loneliness can be significant, contributing to negative mental and physical health outcomes (Shulevitz, 2013).

7. Ninety-four percent of 30- to 49-year-olds, 87 percent of 50- to 64-year-olds, and 69 percent of those age 65 and older also used their phones during social gatherings.

phones during a get-together (p. 9). People tend to cite “group-contributing” reasons for this usage, such as sharing a picture or video of the gathering, posting an update about the gathering, or finding information they think would be interesting to the group.

Despite these well-meaning intentions, though, 82 percent of adults identify a downside to using media while socializing, saying that it frequently or occasionally hurts the conversation (p. 3). Interestingly, only 29 percent of 18- to 29-year-olds feel that cell phone use frequently hurts conversations. This may signal younger adults’ adaptation to interruption or their inexperience with the richer types of conversation whose absence elders mourn. According to Eleanor, a college student whom Turkle interviewed, media use tends to make group conversations “fragmented,” because “everybody is kind of in and out. Yeah, you have to say, ‘Wait, what ...,’ and sort of have people fill you in a bit when you drop out” (p. 20). Several studies have documented how media use is associated with lower-quality interactions (Brown, Manago, & Trimble, 2016; Misra, Cheng, Genevieve, & Yuan, 2016; Przybylski & Weinstein, 2013). Moreover, in Eleanor’s peer group, keeping conversations relatively trivial (e.g., “light,” not serious) is considered polite.

By making choices that degrade conversation, individuals may underestimate the value of conversation and, therefore, contribute to its decline. Over time, infrequent engagement in conversations may snowball, decreasing people’s willingness to initiate talk as they fall out of practice and, therefore, find computer-mediated conversations (e.g., texting, emailing) less awkward, less messy, less stressful, and less vulnerable (Turkle, 2015). This could exacerbate empathy deficits because it prevents observation of humans’ visual and aural cues, e.g., expressions on people’s faces and nuances in their tone of voice. The irony is that computer-mediated conversations often amplify the issues—the social dislocations and stress—that people have expressly sought to avoid. Pea and colleagues’ research (2012) with 8- to 12-year-old girls found that media multitasking was associated with negative social indicators (e.g., feeling judged, feeling stressed, having hurt feelings).

Overall, however, research on the impact of technology use on children’s social and emotional skills is limited. Future causal studies and large nationally representative correlational studies, in conjunction with small-scale cross-sectional and qualitative research, would help determine whether and how technology positively or negatively impacts empathy.

FINDING BALANCE

Research on strategies to mitigate problematic use is limited, but there are several promising approaches to developing a more balanced digital lifestyle. A balanced approach includes:

- Fostering awareness of media and self
- Embracing quality media usage
- Selective single-tasking
- Carving out times and places to disconnect
- Nurturing relationships and face-to-face conversation

Finding balance is achieved through self-regulation, which refers to people's managing themselves through monitoring their own thoughts and behaviors ("I am spending too much time browsing Facebook"), comparing and evaluating their actions against a perceived standard ("I'm texting when I should be studying without distractions"), and self-administering consequences when appropriate ("I will put away my smartphone at dinner because I can't stop myself from checking it") (Seay & Kraut, 2007). Limited self-regulation is a risk factor for IGD, while strong self-regulation is a protective factor, helping gamers to keep their play from devolving into a destructive preoccupation (Liau et al., 2015).

Balance does not mean eliminating media use; it doesn't necessarily mean reducing media use. Balance is about respecting quality of life, both online and offline.

According to Baumeister and colleagues (2006), self-regulation is like a muscle: Exercising it makes it stronger. Therefore, exercising self-regulation can improve self-regulation. Some research supports this, finding that strengthening self-regulation helped adolescents with media addiction (Du, Jiang, & Vance, 2010).

A balanced approach provides opportunities to exercise self-regulation, enhance social competence, and combat loneliness, each of which makes individuals less likely to use media pathologically (Lemmens, Valkenburg, & Peter, 2011; Liau et al., 2015; Rafla, Carson, & DeJong, 2014). Balance does not mean eliminating media use; it doesn't necessarily mean reducing media use. Balance is about respecting quality of life, both online and offline.

Fostering Awareness of Media and Self

Knowledge can be a powerful tool. Gaining awareness of your media habits by, for example, downloading a media-usage app on your phone "will give you a baseline and provide some insights into where you spend most of your time" (Greenfield, cited in Heid, 2016, para. 3). The logic for tracking one's media use is similar to that of using a pedometer, keeping a food log, or wearing an activity tracker such as a Fitbit: It can help people to be more intentional in their behaviors. They can reflect on whether the way they use time is in line with their values, identify if and when their habits change, compare and contrast with peers and mentors, and even keep a media time "budget." Increasing awareness of both behavioral patterns and important goals can positively impact behavioral intentions and behavior (Fishbein & Yzer, 2003).

For example, after observing minimal productivity during a late-night homework session, a teen might try to do homework immediately before dinner. Similarly, a student could reflect on her productivity when her phone is next to her and when her phone is in another room, then decide whether or how to adjust her homework habits. Experimenting with new ways of doing things and resisting the temptation of old habits requires people to exercise self-regulation, which, as mentioned above, takes practice.

Embracing Quality Media Usage

It is important to note that media and technology are not a monolith. Time spent with media is often less important than the content that is used or viewed. Gardner and Davis (2013) point out that technology can be especially beneficial when used to form deeper relationships, to allow for creativity and exploration, and to explore identity. There is a difference between spending hours using technology to create digital worlds, hone photography or music skills, or engage in meaningful discussions of important issues (the authors refer to this as “app-enabling”) and being a passive consumer of content, or using tech as a way to distance oneself from social relationships (“app-dependence”). A healthy digital lifestyle could and should include thoughtful and intentional uses of technology.

Also, since one of adolescents’ major developmental tasks is to individuate from their parents (Erikson, 1959), gaining peer group approval and spending time with friends is even more essential. Many youth lack the means to spend as much face-to-face time with their friends as they would desire (or even need). They may lack access to public transit, cars, or the money to pay for fares or gasoline. They may lack time due to after-school activities, homework, or household chores. In all of these cases, media solve the problem—they help youth connect to one another, bridging distance and time (boyd, 2014; Ito et al., 2010). Youth can learn some social skills from interacting in mediated contexts. Indeed, some social skills exclusively apply to mediated contexts (such as “netiquette”). Youth also can build meaningful friendships with peers they meet online (Brignall & Van Valey, 2007) and use mediated communication to deepen relationships with peers they meet offline (Sen, 2015). Therefore, going online can be a means to enhance social competence and combat loneliness.

Selective Single-Tasking

Once multitasking becomes a habit, doing one thing at a time, or “single-tasking,” can be difficult. People can facilitate their transitions from frequently multitasking to more judiciously multitasking by employing some aids. For example, to decrease interruptions, people can adjust the settings on their phones and computers to prohibit push notifications (e.g., pop-ups, sounds, and/or vibrations that signal “news”). If they do choose to keep these notifications on, people can assign discrete sounds to various types of correspondence; a chime, for example, might announce an incoming text from a family member, while a buzz might indicate an update to Facebook, Twitter, or Instagram.

People can decide whether to check their phones based on the type of sound instead of responding to every alert.

During key times when people know they need to focus, they might benefit from using software designed to limit distractions. Various software can “pause” incoming email, send “away messages” to would-be correspondents, prevent Internet access, and block specified websites.

Users can practice media-related discipline by setting personal boundaries. They can decide, for example, not to check their email before breakfast or only to bring a pad of paper and a pen into a meeting (research even indicates that taking notes by hand can help people process information better than taking notes on laptops, because they tend to paraphrase with paper and transcribe with keyboards [Mueller & Oppenheimer, 2014]). When spending time with family or friends, users can turn off their phones and put them away so neither a sound or vibration nor even the sight of a silent phone can distract them. These boundaries might have to be cultivated over time, gradually increasing so as not to overwhelm the user with anxiety (Rosen et al., 2013) or fear of missing out (FOMO) (Przybylski, Murayama, DeHaan, & Gladwell, 2013). One way to build this boundary is to take “tech breaks,” or short recesses, occurring at regular intervals, during which time people can engage with their devices and networks. One study found that tech breaks (occurring for one minute followed by a 15-minute lesson or study period) boosted attention and focus and enhanced learning for participating college students, perhaps because it alleviated any distraction from disconnection-related anxiety (Rosen, Cheever, & Carrier, 2012).

Again, these choices can challenge people to exercise their self-regulation and carve out spaces for lengthier or deeper interactions with others. Cumulatively, this can play a beneficial role in keeping media use healthy.

Carving out Times and Places to Disconnect

Unplugging for any quantity of time is rare for many people. In a study of 2,000 Canadians, 51 percent reported that they think it’s important to make time to switch off all their devices, but only 39 percent disconnect from personal technology monthly or more often (Microsoft Canada Consumer Insights, 2015, p. 28). Of 2,000 Americans surveyed, nearly four in 10 (38 percent) say they never disconnect from their mobile phones (Braun Research Inc, 2015, p. 4).

Users can establish media-free times (e.g., mealtimes, one hour before bedtime) and/or zones (e.g., bedrooms, cars) to restore some balance as well as support face-to-face conversation, healthy sleep, and safe driving. Some users also benefit from extended periods of unplugging, sometimes called a “digital detox.” These might occur regularly and for relatively modest periods of time—for example, a digital Sabbath, consisting of one weekend day that limits or eliminates media use. These also might happen less frequently—for example, during vacations. According to Braun Research Inc. (2015), only 7 percent of a survey’s participants said they unplug completely while on vacation (p. 4).

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Finally, some users enjoy taking a break from certain media—for example, swearing off Facebook for a period of time. Website 99daysoffreedom.com encourages users to leave Facebook permanently. Reversion is common, however (Baumer et al., 2013; Baumer, Guha, Quan, Mimno, & Gay, 2015; Portwood-Stacer, 2013), and, provided the user’s engagement is balanced, there may not be an issue. Selective, cyclical, and/or reversible (dis)engagements with media can help users to keep their usage in tune with their needs and desires.

Future research should examine the effectiveness of selectively unplugging, and whether and how children can prevent or mitigate negative outcomes by taking time away from devices.

Nurturing Relationships and Face-to-Face Conversation

Engagement with face-to-face conversation is also a feature of balanced media use. This not only ensures that screen time is less than 24/7 but also supports the cultivation and maintenance of meaningful relationships, as well as opportunities for conversation. Uhls and colleagues (Uhls et al., 2014) found that study participants benefited from unplugging and engaging in physical activities (e.g., hiking) in nature. Whether the lack of devices, the physical activity, or nature was responsible for the benefit—or whether it was a dynamic interaction affect between/among the variables—remains an open question. It has been suggested by Uhls and colleagues (2014) that the increased opportunities for face-to-face interactions in the absence of devices were most important. These intriguing findings lend themselves to future research to determine how long these effects last and in what other contexts screen time might be modified or reduced to improve social development.

Other research from the Netherlands (Lemmens et al., 2011) identified low social competence and loneliness as predictors of pathological media use; loneliness also was an effect of pathological media use. In fact, loneliness has emerged as a risk factor across the literature (Burnay, Billieux, Blairy, & Laroi, 2015; Rafla et al., 2014). This suggests that helping young people to deepen their social skills and to connect with rich social support might also prevent or mitigate problematic media use.

RECOMMENDATIONS

Multiple stakeholders have a responsibility when it comes to addressing problematic media use and promoting balance. Children in particular need the support of the many people in their lives to develop healthy digital lifestyles, including parents, educators, media makers, and others who have an influence on their development.

Parents

If parents observe significant negative problems with their children's use of media and technology (e.g., it is harming their mental health, disrupting their social relationships, hurting academic performance, etc.), and they do not feel equipped to address it themselves, they should consult a pediatrician, a psychologist, a social worker, or another professional for advice. However, most parents will likely not observe severe negative outcomes, although they're still struggling with their role in addressing problematic media use.

But it does seem clear that certain parenting approaches may be beneficial. Survey data from more than 10,000 North American parents supports this finding; researcher Alexandra Samuel (2015) identified three types of digital parents, two of which don't enforce nuanced media practices. She labels the first type "limiters," describing them as parents who "take every opportunity to switch off screens" (para. 4). The second type she labels "enablers," those who have "given in to their kids' expertise and allowed them to set the family's tech agenda" (para. 3). The third type of digital parents is "mentors," among whose distinguishing characteristics is their engagement in "guiding their kids onto the Internet" (para. 5).

When it comes to safety and citizenship, mentorship matters. Samuel's research suggests that children of limiters are most likely to engage in problematic behaviors such as accessing porn, posting hostile comments online, or impersonating others online, whereas children of media mentors are much less likely to engage in problematic behaviors.

Parents may also turn to technical solutions such as using programs or technologies that block access to the Internet for periods of the day or block access to specific content. For example, the recently introduced device Circle allows parents to

monitor their children's overall device usage and allow access only to specific websites or social networks when they're connected to a home Wi-Fi network.

Also, understanding that adults are role models, it would be prudent for them to be conscious of their own media habits, especially given how they want their children to engage with technology and media. If a child observes a parent being frequently distracted by his phone, she may be more apt to internalize that behavior. Additionally, to the extent that adult multitasking is related to work and economic pressures, there should be a larger discussion about the perceived necessity of engaging in work tasks (such as emailing or messaging) during non-work hours.

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Portraits in Practice

- In her article for *Fast Company*, parent Kristen A. Schmitt (2016) eloquently articulates a mentor's perspective: "[T]he challenge is less about how many minutes of screen time kids should have, and more about proactively building necessary tech skills while minimizing pointless digital time-wasters. In our home, we want to prepare our daughter for a high-tech world, but in a conscious way that establishes an interactive and educational environment with regard to her technology experience, instead of one that was wholly consumer-based, one-way entertainment" (para. 4).
- Developmental psychologist Howard Gardner (personal communication, February 12, 2016) outlines several ways that parents can mentor. One way is to model. Parents can showcase their own media balance by thoughtfully choosing when and how to engage with media. This sets an example as well as establishes a social norm (Bandura, 1977).
- Mentors also can share their media usage-related questions and challenges. "It's good that parents are wrestling with this too, and should express their concerns and desires to fix things in front of children," said Gardner (2016). This encourages kids to view media critically and normalizes negotiation and advocacy. This sort of practice may facilitate important family conversations, such as whether and how to post about relatives on social media. From their study with 249 parent-child⁸ pairs across 40 U.S. states, researchers found that children were twice as likely as parents to advocate for a parental rule that would prohibit posting about children without their permission, reporting feelings of embarrassment and frustration (Hiniker, Schoenebeck, & Kientz, 2016, p. 10). Family conversations about media also might inspire parents and children to "rise to the occasion" (Gardner, 2016) or take on big jobs that must be done, e.g., spearheading community initiatives, opening dialogues between/among parents, or supporting coordination of media policies between home and school and across the whole school.
- Mentors also can help children "to reflect on the ethical dimensions of their participation in new media environments" (the GoodPlay Project & Project New Media Literacies, 2011). For example, they can sit beside children as they manage a complicated media process, such as constructing an online

profile. Teachable moments and conversations could examine how to "balance accountability with security" (Samuel, 2015), explore identity, respect authorship and ownership, assess credibility, and participate meaningfully (the GoodPlay Project & Project New Media Literacies, 2011).

Educators

In a "constantly connected" society, media literacy may be more important than ever in developing a healthy digital lifestyle. That is, the acquisition of skills that allow children to more intentionally select, use, communicate with, and create media is critical for participating fully and successfully in 21st-century society (Hobbs, 2010). Media-literate students have the capacity to explore aspects of digital life such as privacy, safety, communication, and information literacy and learn how to better understand who made their media and why. Collectively, this can empower students to consciously choose which media they engage with and on what terms they engage with it (Ito et al., 2010; Lenhart et al., 2011; the GoodPlay Project & Project New Media Literacies, 2011). Therefore, formal media-literacy education may be a valuable tool for encouraging healthy media habits.

Additionally, since laptop multitasking can hinder classroom learning for both users and nearby peers (Sana, Weston, & Cepeda, 2013) and most students can't help themselves from texting during class (Lee, 2015; Rosen et al., 2013; Tindell & Bohlander, 2012), it's important to create and enforce norms around device use. Prohibiting texting during class and encouraging responsible laptop use are two steps that may be beneficial in the classroom.

Finally, educators can consider applying the design principles of connected learning (Ito et al., 2013), participatory learning (Reilly, Vartabedian, Felt, & Jenkins, 2012), or game-based learning (Tekinba, Torres, Wolozin, Rufo-Tepper, & Shapiro, 2010). All three of these frameworks offer practical strategies for increasing students' senses of engagement and community (which tend to improve learning outcomes) and preparing them for the challenges of the 21st century.

Portraits in Practice

- High-quality media-literacy curricula are available from such organizations as Common Sense Media, the National Association for Media Literacy Education, Media Education Lab, Center for Media Literacy, and Project LookSharp.

8. Children were age 10 to 17.

- Psychologist Larry D. Rosen and colleagues (2013) recommend “... technology breaks and metacognitive skills that will teach students focus and attention, delayed gratification and knowing when multitasking is appropriate and when it may interfere with the learning process” (p. 956).
- Common Sense Media has recently tagged hundreds of television shows and films according to the character strengths they model, allowing users to choose media that inspire empathy and other positive social-emotional themes, for example.

Media Makers

Media users did not arrive at this problematic place independently—media makers and designers thoughtfully leveraged persuasive strategies to “hook” them (Schulson, 2015; Singer, 2015). Since media can be addictive by design, media also can be less addictive by design.

Portraits in Practice

- Essayist Michael Schulson (2015) suggests banning certain features of “compulsive design,” such as auto-play (the mechanism that automatically plays videos back to back on YouTube and Netflix) and infinite scroll (the mechanism that creates endless Facebook and Twitter feeds).⁹
- Since 2011, South Korea has blocked players age 16 and younger from accessing online video games between the hours of 12 a.m. and 6 a.m. (Lee, 2011).¹⁰
- According to Young-Sam (2015), executive principal of South Korea’s Internet Addiction Counseling Center, “In China, anyone who plays an Internet game for more than five hours, the item levels or credits gets to be deleted.”
- Design ethicist Tristan Harris urges fellow media makers to facilitate “time well spent” (Harris, 2014), building modes of engagement that “prioritize the lives and relationships we really want” (Livable Tech, n.d.). The Time Well Spent movement (<http://timewellspent.io/>) also invites designers to establish guidelines for time-respectful products and to take a sort of “Hippocratic oath.”
- Television, film, and online video makers can incorporate relevant themes into their content, highlighting storytelling that models appropriate technology behaviors and focusing on socially desirable behaviors.

Researchers

Researchers need to conduct more studies—longitudinal, experimental, participatory, qualitative, archival, etc.—that help us to understand the implications of media use. This information is vital for shaping government initiatives and health care policies, both of which can have far-reaching implications. There is also a clear need for research on children specifically; so much of what we know about problematic media use and its repercussions is based on studies of adults and college students. In the midst of the onslaught of new media and technologies, it is important to know that children are still developing—physically, cognitively, socially, and emotionally. This raises concerns about whether results can be generalized across age groups.

There is also a clear need for research on children specifically; so much of what we know about problematic media use and its repercussions is based on studies of adults and college students.

9. Technologist Nir Eyal, whose book *Hooked: How to Build Habit-Forming Products* (2014) Schulson scrutinized, finds this idea of banning infinite scroll “hard to swallow” (Lake, 2015).

10. Media makers did not voluntarily implement this practice; it was mandated by South Korea’s Youth Protection Revision bill (more commonly known as the “shutdown law” or “Cinderella law”). This bill proved controversial and, in 2014, was modified so that parents could request that their children be excepted from the shut-out (Lee, 2014).

Additionally, researchers can embrace the privilege and responsibility of sharing their results for public consumption, using language and publication outlets that non-scholars can access. Technology addiction and problematic media use are often sensationalized in the media, but researchers can help others understand where and when concern is warranted and when concerns are unnecessarily alarmist.

Portraits in Practice

- Speaking at the National Academy of Science's Digital Media and Developing Minds colloquium, pediatrician and media investigator Megan A. Moreno (2015) stated that media-related addiction research has social justice implications: "[R]ight now, my patients that are rich and have Internet addiction can afford to go to the counselors and can afford to go to the treatment centers." This is because insurance companies currently won't pay to treat Internet addiction. And, according to Young-Sam (2015), treatment can be quite expensive. The price tag for reSTART Internet Addiction Recovery Program's 45-day treatment, for example, is \$170,000.¹¹ As a result, said Moreno (2015), "The patients that I have that are poor don't go [to treatment facilities]. And those are the patients that fail out of school and do poorly." With stronger and more extensive research to pin down valid and reliable diagnostic criteria, conditions such as IGD may become formal entries in the *DSM*, making it more likely that insurance companies would pay for treatment.

11. Young-Sam emphasized South Korea's widespread response to Internet addiction, as well as its government assumption of all related costs: "Eight different government bureaus are working together to correct this [Internet addiction]: Ministry of IT Planning, Ministry of Culture, Ministry of Education. In total, about 500 free counseling centers are in operation. In national park, have a special bootcamp to help people revive their mind and get free counseling. Many different churches are also involved in fixing/correcting Internet addiction. There are five major mental hospitals that also treat Internet addicted people with medication. National Information Society Agency, Internet Addiction Counseling Center, we provide preventative program, free counseling program, make many different articles/pamphlets to distribute, and every 3 years, work together with all sorts of government bureaus to work together. Striving to provide equal opportunity to adolescents, toddlers, grown-ups to get the help they need." (Ministry of Education, Gender Equality and Family, Ministry of Health and Welfare, Department of Defense, Department of Justice). In total, about 500 free counseling centers are in operation. In national park, have a special bootcamp to help people revive their mind and get free counseling. Many different churches are also involved in fixing/correcting Internet addiction. There are five major mental hospitals that also treat Internet addicted people with medication. National Information Society Agency, Internet Addiction Counseling Center, we provide preventative program, free counseling program, make many different articles/pamphlets to distribute, and every 3 years, work together with all sorts of government bureaus to work together. Striving to provide equal opportunity to adolescents, toddlers, grown-ups to get the help they need."

CONCLUSION

In this research literature brief, we reviewed the complicated and sometimes contradictory research on Internet addiction and problematic media use. We set out to understand what is known about whether the surge of new devices and increased media use are harming children's development. The issue is far from black and white. It seems clear that, for some adolescents and adults, it is possible to engage with technologies in obsessive or compulsive ways that have severe negative life outcomes, such as poor schoolwork or social withdrawal. Yet, it is not clear whether underlying factors such as depression or social anxiety may be driving unhealthy use of technology. Addiction is a complex and charged subject, and though it may be tempting to point to children's evolving technology- and media-related behaviors as evidence of new addictions, it is important to remember that true addictions reflect severe problems with very specific medical criteria. We should not be so quick to point at children's use of technology as an addiction. Still, even if children are not addicted, we should be cautious of the ways that problematic media use could affect their ability to stay focused or negatively impact their social and emotional well-being. Perhaps, as noted scholar Sherry Turkle (2015) suggests, it is more useful to consider the ways in which technology can make us vulnerable to undesirable behaviors such as multitasking or hurting our conversations with others. However the research community eventually comes to a consensus on whether and how to diagnose Internet addiction, it is clear that there has been a massive change in how we access and engage with technology, and parents, educators, researchers, and other stakeholders in children's lives should be alert to both problems and opportunities for children's development.

A note about the limitations of this literature review: There is a growing body of research on problematic media use, but much of it draws samples from college students and adults. In our literature review, we were surprised by how few experimental or quasi-experimental studies or large, national surveys have been done with adolescents around these issues. The research base on preteens ("tweens") and young children is even smaller. Much of the research that has been done is cross-sectional, which is helpful in giving a snapshot on young people's lives in the digital age but does not allow researchers to draw conclusions about cause. Children's brains are still growing and maturing through

adolescence and beyond, so research on how excessive or problematic use affects brain development is critical if we are to understand the impact of device and media use on children. Additionally, longitudinal and experimental research that can show changes over time, and that can support causal rather than correlational relationships, will help stakeholders better understand problematic media use. Research is needed to better understand how and why people engage with media in problematic ways and whether particular children (i.e., children who are already depressed, socially isolated, etc.) are especially vulnerable.

Even as we wait for additional research to fill in the major knowledge gaps, we should not feel paralyzed. Media multitasking is distracting and fatiguing, so how can we instill good habits in children from an early age, so that they can grow up using technology and media in intentional and not reflexive ways? How can we help parents gain control over their own device usage and mentor their children about integrating technology into their lives in thoughtful and productive ways? What do media producers need to know to design products and media that are ethical and that don't unfairly take advantage of children's developing cognitive and self-regulation abilities? As Gardner and Davis (2014) argue, we should look for ways to use technology to promote creativity, collaboration, and identity in ways that support well-being.

In the last decade we have seen wide and sweeping adoption of devices and technology as well as pervasive media use. As a society we should aim to better understand how these changes will impact our children and future generations. Understanding the cautions and concerns presented in this review is a necessary step toward creating opportunities for people in all areas of children's lives to help children thrive in the digital age.

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