EFFECTS OF SMARTPHONES ON OUR CHILDREN

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ABSTRACT

Younger generations are more likely to use their smartphones to communicate and keep up with the latest trends than any other method today. Our youth are growing up with technology evolving at a fast pace. The increase in numbers of smart phone users in children and adolescents raises concerns for many regarding the possible adverse health effects of this use. Smartphones have become an essential way for the children and adolescents to communicate, go online and access and share information. According to Ericsson Mobility Report (2018), there are 5.5 billion mobile broadband subscriptions globally. There is growing concern that increased phone use may be becoming an addictive-like behavior and have a negative impact on our future generation. This paper discusses the associated risks of cancer, increased motor vehicle accidents, smartphone addiction, mental health, sleep disorders and cyber bullying. Some countries around the world have already begun legislation that bans the use of smartphones in schools, prohibit sales and advertisements that target young age groups and expanding warnings on phones/packages. Educational campaigns are also being adopted to further protect this population. This paper will review the studies completed on smart phone use and some of the negative effects on our youth.

Keywords: *Smartphones, Mobile phone, Children, Adolescents, Risk, Cancer, Addiction, Cyber bullying, Social engagement*

Smartphones are a part of our everyday culture and are being used not only for communication but have become a status symbol for some children and adolescents. Children and adolescents now use their smartphones work, play, share, learn, communicate, and stave off boredom. This increase has resulted in a reliance on technology. The increased use of smartphones has caused concerns that our future generation is becoming addicted to them and is having negative effects on their physical and mental health, neurological development and personal relationships, not to mention safety on our roads and sidewalks.

Scientists have reported adverse health effects of using mobile phones including changes in brain activity, reaction times and sleep patterns (Naeem, 2014). With the recent popularity of smart phone use among younger people and having a potentially longer lifetime of exposure to the negative effects; continued research needs to be done regarding this.

International Agency for Research on Cancer (IARC) classified mobile phone radiation possibly carcinogenic (Naeem, 2014). In a research study completed by the IARC, in late 1900's, showed some evidence of an elevated risk of glioma tumors in the temporal lobe for subjects who reported having used their mobile phone mainly on the same side as that on which the tumor occurred, however, biases and errors limited the strength of the conclusions (International Journal of Epidemiology, 2012).

In a more recent research study completed by Johansen, McLaughlin, and Olsen (2001), no evidence was associated between an increased tumor risk and cellular (smart phone) telephone use in either short-term or long-term phone users. Even though there is no established link of increased risk of brain tumors from the use of mobile phones; this may be related to a lack of data for smart phone use for longer than 15 years.

No consistent associations have been observed for childhood CNS tumors. One recent study found an increased risk of childhood leukemia with high maternal occupational exposure during pregnancy (Kheifets, Repacholi, Saunders, Van Deventer, 2005). There is not a lot of research, to date, related to any increased cancer risks with carrying and storing a smart phone in a pocket or a bra; both being common sites for adolescents. The possible effects of long-term heavy use of smartphones require further research studies.

Research has shown an increased risk of traffic accidents, about a three-to-four times greater chance of an accident, when mobile phones are used while driving due to distraction. According to the Centers for Disease Control and Prevention's 2011 National Youth Risk Behavior Survey, motor vehicle crashes are the leading cause of death among adolescents sixteen and nineteen years of age. Adolescents from sixteen to nineteen years of age are three times as likely to be involved in a fatal crash as drivers aged twenty years or older. Texting while driving plays a significant role in motor vehicle accidents and fatalities. Distracted driving because of texting while driving has emerged as an important teenage driver safety issue.

A national survey conducted by the Center of Disease Control has been implemented every two years to monitor priority health risk behaviors among youth. The Youth Risk Behavior Survey (YRBS) interviews adolescent drivers on their driving behaviors and, in part, texting while driving (TWD). The study found nearly half of high school students 16 years and older engage in TWD and established a connection between TWD and other risky MV behaviors (O'Malley Olsen, Shults, Eaton, 2013). According to Hosking, Young, and Regan, 2009), the amount of time that drivers spent not looking at the road when text messaging was up to 400 percent greater than that recorded in baseline (no-text-messaging) conditions.

Various approaches are being used to reduce the amount of TWD. Some that are being suggested including universal texting bans, provisions to delay full licensure of drivers with intermediate licenses or learner's permits for texting violations, applications (apps) to be added to smartphones to disable the ability to text while car is in motion. These all may be an effective deterrent of this behavior but laws limiting drivers' cell phone use will have little to no impact without

regulation and enforcement. Behavior change programs may improve vehicle safety, and public awareness campaigns are continually being developed as potential preventive efforts to reduce accidents caused by distracted drivers. This is an ongoing problem that affects all.

A recent poll reported by Common Sense Media on mobile device usage found that 50 percent of teens said they "feel addicted" to their mobile devices. At 59 percent, even more parents thought their teens were addicted. This information was obtained a study by Lake Research Partners. They designed and administered a nationwide telephone survey to determine mobile device usage and conflicts that occur in the family related to it. The study ran from February 16, 2016 to March 14, 2016, conducted 1,240 interviews of parents (n=620) and their children (n=620) (between the ages of 12 and 18), both of whom used a mobile device. The results showed reported evidence of 70% of parents and teenagers argued about device usage, and 77% of parents said their teenagers were sometimes distracted by their phones or tablets during time spent together with family (Dealing with devices, 2018).

The American Academy of Pediatrics (2001) recommended that parents limit their children's and adolescents' exposure to screens to less than two hours per day. There is, however, a clear evidence that young people exceed the two-hour recommendations though.

The more the children become addicted to smartphones, the less they participate in social engagement. Due to the recent trends of increased popularity, reduced price, and advertising to children this has led to increased smart phone use among children. Phone addiction has the potential to generate psychological problems such as feeling worthless when not online or feeling lonely and depressed. It also leads to ignoring responsibilities, managing time inefficiently, and low productivity (Ihm, 2018).

A kind of behavioral addiction, Internet Gaming Disorder (IGD), is causing concerns due to an increase of loss of control, and persistent and recurrent use of internet games which leads to significant impairment in psychosocial functioning. This has just been added to the Diagnostic and Statistical Manual of Mental Disorders-Fifth Edition (DSM-5) as one of the conditions for further study due to increased social interest worldwide. Ha et al. suggested that participants who reported depression tended to seek cyberspace to avoid negative emotions and difficulties in daily life, and they had a high likelihood of being addicted to internet games because of the emotional support they found in cyberspace (2016). The risk factors for smartphone addiction are being female, internet use, alcohol use, and anxiety (Choi et al., 2015).

The neural mechanisms underlying Internet Gaming Disorder resemble those of drug addiction. Functional Magnetic Resonance Imaging (fMRI) reported by Weinstein, Livny, Weizman (2017), showed changes in brain regions responsible for control of attention, impulse control, motor, sensory-motor coordination, and emotional regulation. The authors reported lower white matter density in brain regions involved in decision-making, behavioral inhibition and emotional regulation, and dopamine release similar in magnitude to those of drugs of abuse.

More research is needed answer the concerns of researchers regarding the DSM for Internet Gaming disorder (IGD) the lack of agreement on symptomatology and assessment of problematic gaming and the social and political effects of declaring a social behavior as a disease. According to Weinstein, Livny, Weizman (2017), IGD adolescents have a decreased reward sensitivity irrespective of the type of reward and feedback. They may only be sensitive to error monitoring regardless of satisfaction or achievement obtained from the internet gaming. A rushed diagnosis may construct an addiction with potentially harmful effects on formerly healthy populations, particularly adolescents. "Further studies are required to investigate decision making adolescents and concomitant brain regions" (Weinstein, Livny, Weizman, 2017, p. 12).

Concerns over the mental effects of electronic devices have been largely driven by fears that the prevalence of conditions such as attention-deficit/ hyperactivity disorder (ADHD). Previous studies related to television use and young children identified possible effects on their development. It was found that the more television children watched at age three, the more likely they were to have attention problems. This led to a need for more information on whether such a link extends to portable devices; such as cell phones and tablets.

A 2015 study by pediatrician Dr. Hilda Kabali, and colleagues at the Einstein Medical Center, in Philadelphia found that these devices command attention much better than other things and make it more difficult for parents to interact with their children. Dr. Dimitri Christakis, director of the Center for Child Health, Behavior, and Development at Seattle Children's Hospital reported concerns about the addictiveness of applications on tablets and smartphones, and the potential for them to eat too far into the child's daytime activities. Dr. Christaki's concerns are related to how these games are designed to be addictive and taking the device away causes upset and tension.

A limitation of these devices that they are of a two-dimensional nature (Edwards, 2017). Research by developmental psychologist Rachel Barr and colleagues at Georgetown University revealed infants find it more difficult than older children and adults to translate learning from the 2D space to three dimensions. What the infant or toddler is faced with on the screen is different to what they are faced with in the real world. "Children can seem to be digital natives when they use these devices so easily, but it's actually more cognitively demanding to learn from them." (Barr, 2013). Online technology can be a social experience, but it needs to be not used as an isolated type of interaction. It is important to sit down with our children and learn with technology and use it to enhance that social interaction (Edwards, 2017).

The effects on adolescent sleep related to the use of electronic media use, including the use of mobile phones or smartphones has been reported worldwide in several research papers. Sleep deprivation influences an adolescents' physical and mental health. Sleep deprivation can result in persistent fatigue, daytime sleepiness, poor appetite, memory deficits and decreased levels of attention and alertness. Fatigue is a frequent complaint of adolescents. It is often related to recreational activities like sports or school work activities, but also to the overuse of electronic devices such as computers, tablets and smartphones. Late bedtimes

result in poor sleep, poor school performance, poor motivation with an increased risk for depression and health hazards such as type 2 diabetes, unhealthy diets and smoking.

Smartphones, or any other type of tablet, emit blue-enriched light which blocks the secretion of melatonin and delays the circadian clock rhythm. The future should involve manufacturers finding ways to control the level of emission of harmful blue light to prevent disruption of this internal clock. Until then blue-blocker glasses may be useful in adolescents in reducing the blue light effects and melatonin suppression.

Due to the harm that devices like smartphones have on sleep, and circadian rhythm in adolescents, light before bedtime, both in the living areas and in the adolescents' and children's bedrooms, should be reduced and controlled. This would be the easiest way to minimize the effects of exposure and reduce circadian clock misalignment (Weaver, Gradisar, Dohnt, Lovato & Douglas, 2010).

A new type of bullying is resulting with the increased use of smartphones and related electronic devices. Bullying has always been a problem, but it didn't used to extend into children and adolescents' bedrooms, living rooms, and beyond. Cyber bulling is a form of aggression that occurs through personal electronic devices. Children are being cyberbullied on their phones, computers, and other devices by receiving harassing chats, texts, messages, comments, forum posts, and pictures that cause emotional harm.

Several downloadable applications (apps) for smartphones, were originally designed for a positive and constructive purpose are being used by cyberbullies to harass victims online; photo-sharing, video sharing and social networking services enable its users to take pictures and videos, apply digital filters to them, and share them on a variety of social networking services, such as Facebook, Twitter, Tumblr and Flickr. Snapchat is another smartphone app that deletes a photo after a recipient has had a few seconds to look at it. With the increase of smartphone use it is becoming more apparent just how damaging cyberbullying can be; but preventing it is a major challenge. Cyberbullies infiltrate their victims' lives as often as they want to, sometimes even around the clock. There is no way to escape or hide from their attacker. The information and harassment are recorded permanently online and has the potential to affect the victim's reputation for years to come.

Findings have shown that approximately one in five students will be cyberbullied and about the same ratio of students will cyberbully others (Wright, Burnham, Inman & Ogorchock, 2009). According to Wang, Iannotti, and Nansel, (2009), being bullied interferes with scholastic achievement, development of social skills, and general feelings of wellbeing. Recent cross-sectional studies have shown an association between cyber bullying victimization and mental health problems, and even between cyber bullying victimization and suicide. Many children and adolescents never report their experience of cyberbullying and cope with the negative feelings and experiences on their own.

In the past decade, cyberbullying has had an impact on a much broader age demographic than conventional/traditional bullying. A two-year longitudinal study was conducted among first-year secondary school students to examine whether

traditional and cyber bullying victimization were associated with adolescent's mental health problems and suicidal ideation. Results showed a significant interaction between gender and cyber bullying victimization on mental health problems. Among boys, cyber bullying victimization was not related to mental health problems. Among girls, cyber bullying victimization were associated with mental health problems. No significant interaction between cyber bullying victimization on suicidal ideation was found. These findings stress the importance of programs aimed at reducing bullying behavior, especially because early-onset mental health problems may pose a risk for the development of psychiatric disorders in adulthood (Bannink, Broeren, van de Looij, de Waart, & Raat, 2014). 47 states now prohibit electronic harassment and 18 states have provisions that specifically address cyber bullying.

Additional training needs to be continued and increased within our schools and medical professions to better enable them to recognize the signs of cyber bullying that contributes to psychological distress, interpersonal difficulties and interfere with the normal developmental tasks of childhood and adolescence.

CONCLUSION

Children and adolescents who spend too much time on smartphones and other tablets have associated risks including becoming addicted to them, having negative effects on their physical and mental health, neurological development and their personal relationships. According to research, children and teens use four to five times the recommended amount of time online with electronic devices. This leads to some serious and often life-threatening consequences. Smart phones and tablets allow children to get whatever they want at the click of a button. It does not teach them moderation, impulse-control, or how to challenge themselves, which are traits of an addictive personality. The light that emits from these screens suppresses the sleep hormone melatonin and shifts the body's natural sleep-wake cycle causing sleep disorders. According to research, smartphones or tablets have been a factor in rising rates of child depression, anxiety, attachment disorder, attention deficit disorder, psychosis, and problematic child behavior and testing while driving is a significant factor in morbidity and mortality with teen drivers. While the research on smartphones and their impacts on the future generation, current research is finding clear connections between the negative trends, in health and wellbeing of our children correlated with the rising smartphone use.

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