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The Neurological Underpinnings of Social Media and Addiction

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Abstract

Social media addiction and drug addiction may have similarities as both addictions target the brain's reward circuitry. The long-term effects of drug usage have been known to damage organs and change the effectiveness of the human brain, however, with social media addiction, there is currently not enough research to predict the long term effect of it on the brain. Digital imaging of the brain has recorded changes in the prefrontal cortex and cortical areas of the brain from internet addiction, but how this will impact the overall population is yet to be determined. The purpose of this study is to explore the neurological underpinnings of social media and addiction as the brain's reward circuitry which consists of the nucleus accumbens aids in the addiction process. The definition of addiction may differ amongst the medical community and behavioral science field, but both agree that it targets the brain. According to Leshner (1997), "Addiction is a brain disease" that targets the mesolimbic reward system (p.46). Additionally, the nucleus accumbens is part of the limbic system that releases a neurotransmitter, dopamine, which plays a big part in the reward or gratification process. The activation of the reward system is accountable for social media repeated use. Thus, users become excited from visiting social media websites and interacting with other users. Society encourages social media to connect with others, but the overuse of media sites can lead to an addiction.

Keywords: Social media, addiction, drugs, gratification, and research

1.0. Introduction

The normalization of social media has everlasting effects on the human brain. More and more time is being devoted to social media websites (PewResearch, 2018); which has a profound effect on the human brain and its coordinating organs (Garret & Hough, 2018). Studies suggest that social media addiction and drug addiction may have similarities as both addictions target the brain's reward circuitry (LaRose, 2003; Young, 2017). The long-term effects of drug usage have been known to damage organs and change the effectiveness of the human brain, however, with social media addiction, there is currently not enough research to predict the long term effect of it on the brain. Digital imaging of the brain has recorded changes in the prefrontal cortex and cortical areas of the brain from internet addiction (Young, 2017), but how this will impact the overall population is yet to be determined (Chang, 2003; Garret & Hough, 2018).

Social media is a relatively new creation that has only been around a few decades. During this short time frame, social media has grown and expanded globally (Asur,2010). With this popularity, there is evidence that suggests that the internet and social media addictions are also rising (Young, 2017). Currently, social media is an acceptable form of communication, but problems occur when one overuse social media. The major social media websites report that people spend many hours a day exchanging information (Facebook, 2018; Instagram, 2018). With so much time spent online sharing information, it is causing individuals to pay less attention to societal roles and obligations. When one becomes preoccupied with social media and neglect obligations this can indicate that an addiction may be forming. This paper aims to explore the neurological underpinnings of social media and the addictive behaviors of users.

2.0. Literature Review

The relevant literature indicates that the nucleus accumbens located in the brain is responsible for addiction (Quintero, 2018, p. 1500). The nucleus accumbens is housed in the basal forebrain, which is a part of the limbic system (Quintero, 2018, p. 1500). During the addiction process, the nucleus accumbens release dopamine which aid in the reward or gratification process (Garret, 2018; Quintero, 2018). Dopamine is a neurotransmitter that can cause pleasurable effects. It is also responsible for the euphoric feelings that occur during sex and eating (Garret, 2018). The activation of the reward system leads to the repeated use of social media (LaRose, 2003). Users are exposed to a stimulus, which is usually a message, comment, like, or some form of interaction on the social media site. This acts as a stimulus that excites the mesolimbic area within the brain. The "reward" or effects of the stimuli from social media cause users to return and repeat the process (Phan, 2010). According to Garret (2018), "reward is accompanied by a tendency to repeat the behavior that brought about the reward and, typically by feelings of pleasure" (p. 130).

The repeated process of seeking rewards is what generates habits that are present during an addiction. Some scholars refer to this process as "gratification". LaRose (2003) categorizes internet and media addictions as "a type of behavioral addiction" that provides gratification. Gratification describes the positive effect that the stimulus has on the social media user. Each user may experience a different pleasure from social media, but the excitatory pathway is the same and involves the nucleus accumbens. LaRose (2003) suggests that the symptomology of media addiction resembles persons suffering from substance addiction (p. 228). Addiction can be defined as "a preoccupation with obtaining a drug, compulsive use of the drug in spite of adverse consequences" (Garret, 2018, p. 481). Some of the symptoms that may be present during an addiction are: "preoccupation, tolerance, relapse, withdrawal, loss of control, life consequences and concealment" (LaRose, 2003, p. 228).

According to the Diagnostic and Statistical Manual or "DSM 5" (2013), internet addictions are not listed as an addictive behavior as there is not sufficient literature surrounding the issue (p. 481). Although there is not a label or diagnostic code provided by the American Psychiatric Association to categorize social media addictions, there is literature that suggests social media can become addicting and pose changes in the human brain (Young, 2017). Ivan Goldberg was the first person to conceptualize the addictive nature of the internet (Young, 2017). This is not a new concept, but many medical professions are skeptics and oppose that the internet can be addicting (Young., 2017, p.7). According to Young (2017), there is an opposition between medical professions and researchers because the two groups have varying definitions of what is categorized as an addiction (p.7). In the medical field, addiction should produce physiological changes, and if this does not occur the addiction is not accepted (Young, 2017). The definition of addiction may differ amongst the medical community and behavioral science field, but both agree that it targets the brain. According to Leshner (1997) "Addiction is a brain disease" that targets the mesolimbic reward system (p.46). Leshner (1997) indicates that all forms of addiction target this area of the brain (p.46). Garretts (2018) defines the mesolimbic pathway as "a system that projects from dopamine neurons in the ventral tegmental area to the nucleus accumbens (p. 486).

Social media users may experience these symptoms as they develop an addiction. The symptom preoccupation is represented by the abundance of time spent on social media websites. According to Shaw and Black (2008), "internet addiction is characterized by excessive or poorly controlled preoccupations, urges or behaviors regarding computer use and internet access that lead to impairment or distress" (p. 353). Tolerance is another sign that one has an addiction and is noted when a person does not respond to the usual amount of a drug (Garret, 2018, p.118). When a social media user requires additional time on Facebook or Instagram, it may suggest that they have built a tolerance.

Frequent users of social media often repeatedly use the internet until the behavior is habitual. Song et. al (2004) suggest that addictions are habits and that may form with process gratifications (p. 387). Relapse occurs in addictions after there is a moment of sobriety. Addicted social media users may delete accounts, then reactivate the account shortly after. Life consequences are represented when users are aware of the negative effects of frequently using social media but continue to do so. Concealment arises when the social media user tries to conceal problematic behavior. The process of addiction may develop over time, but literature reveals that these symptoms manifest in those who are addicted to media (LaRose et. al., 2003).

3.0. An Overview of Social Media

Social media provides a quick pathway to exchange information and communicate with people in different locations across the globe (Chang, 2003). Social media does not consist of one single platform, but many different social networking avenues that allow users to exchange information. The creation of the World Wide Web in 1989 by Tim Berners-Lee made it possible for the information to be shared using the internet (Chang, 2003, p. 13). According to Asur (2010), "social media has exploded as a category of online discourse where people create content, share it, bookmark it and network at a prodigious rate" (page 1). Social media creates a virtual environment, often referred to as a "community", that allows users to engage socially with others.

3.1. Facebook

Facebook officially launched on February 4, 2004 and has catalyzed the growth of social media and the demand for social networking sites (Wilson, Gosling, & Graham, 2012, p.206). Facebook is the biggest social exchanging website globally (as cited in Kim, 2016, page 1). Data suggest that in 2014 nearly "72%" of American adults who frequent the internet were users of Facebook and "71%" were individuals under the age of 18 years old (as cited in Kim, 2016, p. 1). According to Facebook's company website (2018), it is estimated to have "1.4 billion daily active users" and "2.13 billion monthly active users" concluding the year in 2017. In the beginning, it was a hub created by Mark Zuckerberg to keep college students interconnected (Wilson et. al, 2012, p.206). Initially, Facebook catered to college students, then it changed to allow all individuals 13 years of age and older to sign up (Wilson et. al, 2012, p.206). It is suggested that Facebook is one of the most searched sites on the internet (Wilson et. al, 2012, p.203).

3.2. Instagram

Instagram is another highly liked social networking website. Instagram is not as popular with social media users as Facebook, but it has an impressive number of users within the social exchange community. The social media website launched to the world and became active six years following Facebook (Kim, 2010, p. 4). Kevin Systrom along with Mike Krieger founded Instagram "in October 2010" and later sold it to "Facebook in April 2012" (Instagram, 2018; Salomon, 2013). According to Salomon (2013), Instagram is used a great deal amongst students enrolled in college. It allows them to connect with friends and family to share pictures that highlight their college years (Salomon, 2013). Currently, Instagram (2018) reports having nearly 800 million users. Pew Research (2018), indicates that "71%" young American adults between the age of 18-24 log onto the website several times in a day". This number is astonishing as it represents a large segment of the American population.

3.3. *Snapchat*

Snapchat like many other social media platforms is a way for individuals to communicate and express themselves (Hirst, 2019; Verstraete, 2016, Hartman, 2020). Since the inception of Snapchat, there have been many debates whether this application is considered social media as it differs greatly from other interactive social sites and includes videos that only last a short time (Andreassen, Petersen, Harrison & Raun, 2018; Hirst, 2019). Snapchat is a software application that was developed by creators Evan Spiegel, Reggie Brown, and Bobby Murphy in 2011(Hartman, 2020). The founders of Snapchat designed the application to appeal to young adults and teenagers by allowing users to share ephemeral images and videos (Verstraete, 2016; Larsen & Kofoed, 2016). Verstraete (2016) points out that one of the features that attract users is the length of time videos or "snaps" are viewable. Users record videos in 10-second increments and upload them to their stories (Elder, 2019). After a 24-hour timespan, the videos are automatically deleted from one's story (Elder, 2019). Those who elect to save stories can do so by enabling the feature on the app (Elder, 2019). Utz, Muscanell, & Khalid, (2015) reports that in 2013, Snapchat was the third most used social media platform lagging Facebook and Instagram. According to Clement (2020), Snapchat is reported to be the most used social media application amongst individuals between the ages of 18 to 25 years old (Clement, 2020).

3.4. TikTok

TikTok is a recently developed social media app that shares similarities to Snapchat. Tiktok works similarly to Snapchat as individuals can record short videos and allow others to view them (Anderson, 20). Hayes et. al. (2020) indicates that those who utilize the app are referred to as "creators" as they can alter the videos by using different features that are available through the platform. It is a downloadable app where individuals can share and edit short videos of themselves singing. According to Hayes et. al. (2020), TikTok combined with Musical,ly in 2018, and rose to fame from young adults' usage. Musical.ly was an application that allowed individuals to dance and lip-synch to artists of their choice (Anderson, 2020). Anderson (2020) reveals that Musical.ly's parent company sold the rights to ByteDance in 2017 and blended it with TikTok a year later. Hayes et.al. (2020) reports that in a year, over "1.5 billion" individuals downloaded the application (page B). Reports indicate that in 2019, it was the top social media app that was installed on mobile devices (Hayes et. al., 2020). Researchers allude that TikTok is successful because individuals are lured into watching the short videos. Yang (2020) suggests that individuals access the app daily for about "46 minutes" a day (page 5).

4.0. Risks for Addiction to Social Media Websites

As social media expands globally, this creates a greater probability for one to develop an addiction to social media. There is currently not enough research to outline the specific risk factors for social media addiction (Young, 2017), but available studies indicate that social media addiction has the same characteristics as other addictions (LaRose, 2003). Young (2017) suggests the following to be risk factors for smartphone addiction: "personality factors, prolonged use, social factors, and digital factors" (p. 40). Personality factors include one's emotional state and how they perceive themselves (Kimberly, et. al, 2017, p. 40). An example of a social factor would be the family support or lack thereof (Kimberly, et. al, 2017, p. 40). Digital factors simply refer to "social networking" (Kimberly, et. al, 2017, p. 40).

All age groups are at risk for developing an addiction to social media. However, the literature reveals that youth may have a higher chance of developing an addiction due to their immature brain development (Kimberly, et. al, 2017, p.4). According to Young (2017) "children and adolescents are especially at risk for problematic uses of interactive media, both because they are early and enthusiastic adopters of technology with which they are more facile than supervising adults, and because they have yet to develop executive brain functions such as impulse control, self-regulation, and future thinking" (p. 4).

4.1. Time Spent on Social Media

On average, youth between the ages of "8 years old to 18" spend roughly "6.5 hours" a day on social media sites (as cited in Pempek et. al, 2009, p. 228). The long hours spent online is alarming for young minds as it only leaves 17.5 hours in the day for other activities. Pompek et. al (2009) suggest that as youth age and transition to young adulthood, time online may increase. According to a survey conducted by PewResearch (2010), "93%" of teens and young adults utilize the internet (Lenhart et. al, 2010, p. 5). Nearly "88% of 18-29-year olds indicate that they use any form of social media" and "78% among those ages 30 to 49" (Smith & Anderson, 2018).

More adults and older adults are signing up for social media accounts or actively using accounts. Madden (2010) points out that older adult's activity online has also increased. According to Smith et. al. (2018), "64%" of those who are 50 years old – 64 years old use social media, and for those over 64 years old the number reduces to "37%" (Smith & Anderson, 2018). Although older adults do not use social media as frequently as younger adults, the overall usage trends for social media is steadily increasing (Smith & Anderson, 2018). Some cohort groups may be using social media more frequently than others, but all age groups are spending more time logged online and using social media.

4.2. Problematic Behaviors of Social Media

One begins to display problematic behavior when social media is overused. Adults that spend a significant amount of time logged onto social media, often neglect to complete daily duties and task. They may opt to visit Facebook and/or Instagram and give little time to obligations. One may neglect loved ones and isolate themselves or display compulsive behavior. An example of this compulsive behavior is displayed when one may check social media accounts while operating a motor vehicle. This behavior has become problematic and warranted many policymakers to implement laws to discourage this kind of dangerous activity. When users drive and check their social media accounts, it can be fatal (Caird, 2014).

Caird (2014) reveals that "In 2011, distraction was a contributing factor in about 10% of all driver fatalities and 17% of injuries in the U.S." (as cited in Caird et. al., 2014, p. 314).

Due to the negligence of users, employers and schools have also taken initiative to prevent negative behavior (Young, 2017, p. 31). In some workplaces, the website addresses for social media sites are blocked because it distracts individuals and keeps them from completing assignments and tasks. Public school systems have implemented cell phone policies to redirect student's attention to learning during school hours as many have smartphones that are used to check social media accounts (Young, 2017, p. 30). The affordability of smart and handheld mobile devices allows one to connect to the world wide web instantaneously while moving about freely. According to Lenhart (2010), "75% of teens and 93% ages 18-29 now have a cell phone" (p. 4). It is estimated that "74% of them [teenagers] use mobile phones" (Kimberly, et. al, 2017, p. 30).

Another big concern for individuals with social media addictions is the reduction in hours of sleep to gain additional social media time. With youth being on social media for hours throughout the day, they do not get the recommended hours of sleep. The National Sleep Foundation indicates that youth should sleep "between 9 and 11 hours" daily (Hirshkowitz et. al, 2015). If these individuals neglect sleep for social media, it can lead to complications and compromise their overall health state (Hirshkowitz et. al, 2015). Literature reveals that being sleep deprived can also affect one's ability to concentrate.

4.3. How Social Media Can Become Addictive

The epigenetic theory alludes that individuals who form addictive behavior have genes that predispose them to addiction (Berger, 2009) The environment can trigger the genes to turn on and make a person susceptible to addiction. According to Berger (2009), "Thus, a crucial aspect of the epigenetic theory is that genes never function alone; their potential is not actualized unless certain *epi*- factors occur" (Berger, 2009, p.55). Other theorists as Newlin and Strubler (2007) suggest that human beings are habitual by nature and when negative behavior develops, that it can be natural. The negative habits are developed in the same was as eating and reproduction (Newlin & Strubler, 2007). However, before "bad habits" or the addiction is formed, a series of events transpire in the brain that leads to addictive behavior.

Although there is insufficient literature on social media addiction, it is believed that social media users can develop addictions in the same fashion as drug users (LaRose, 2003). Many users of social media often share the same addictive characteristics. After receiving a comment, they feel obligated to immediately respond. After a response is provided, the website is then refreshed to see the latest post or available information. The cycle becomes continuous, and users repeat the behavior throughout the day. Wilson (2012), reported that in the year of 2012, users had logged onto the website for over "9.7 billion minutes per day" (Wilson et. al, 2012, p. 203).

People around the globe frequent social media websites multiple times throughout the day. The frequent visits to social media websites can form negative habits, and one may not be aware that this increases their chances of forming a negative habit. Social media websites allow individuals to communicate in real-time, which provides instant gratification. The instant gratification reflects the neurological reward system. Individuals are gratified because of the social interaction that occurs on social media. Theories suggest that when individuals receive positive feedback from other users, it can excite the brain's reward system (Phan et. al., 2010). Phan et. al. (2010) indicate that social interaction is responsible for the activation of the nucleus accumbens which cause the pleasurable effects. The positive feedback may also boost one's self-esteem (Hawi, 2016). Hawi (2016) points out that individuals who have low self-esteem may use social media websites to help boost their confidence.

Websites as Facebook and Instagram create platforms for ordinary people to magnify their voices and receive positive feedback. Social media also provides an environment where people can reinvent their image or the way they would like to present themselves to the world (Hawi, 2016). According to Hawi (2016) "people with low self-esteem, low life satisfaction, and who have few offline contacts compensate by using Facebook to gain more friends and more popularity" (p. 578). Users of Facebook and Instagram can become popular or a trending topic by sharing a single post and having others like and share it with others. The popularity that one gets from social media often creates the addictive behavior of users. It drives one to share thoughts and personal images with a community of strangers. According to Young, (2017), young adults' behavior of sharing images of themselves is becoming problematic.

Social media users utilize the virtual community to get their voices heard and reach a large audience. This becomes problematic when users knowingly share things, they are not supposed to on social media to capture a bigger audience. The behavior begins to become addictive as they are aware of the consequences. Several lawsuits exist because individuals chose to share private information without approval (Hearing & Ussery, 2012). There are many documented court cases of highly educated individuals sharing information on social media and being terminated from their jobs (Hearing & Ussery, 2012). The action that is exhibited suggests that the individual may suffer from addictive social media behaviors. Individuals are aware that posting private information violates policies but continues to share information impulsively. After sharing the information with the virtual community, users frequently monitor the status of the post. Media users constantly check alerts to see how popular their ideas are within the social community. It is common for users to check social media account while focusing on other tasks. Drivers often divert their attention from driving to check social media accounts. There have been several reports of drivers being distracted while driving, which has prompted many states to ban operating mobile phones while driving (McCartt et. al, 2006). According to the Traffic Injury Prevention (2006), there is a correlation between cell phone usage and automobile crashes.

5.0. The Implications for Practice

There is not a lot of research on social media addiction, but it is projected that many social media users will become addicted or develop addictive behaviors. This will be a great concern for clinical social workers as more and more people present symptomatic behavior that is not supported in the current literature. Social workers can help by seeking knowledge of the signs, symptoms, and the overall pathway of addiction to gain a clear understanding of the addiction process. Social workers can then better inform the public of the addictive behaviors of social media. Clinical social workers can help by providing therapy to those who suffer from addiction. Helping individuals, families, and groups develop interventions that will be effective in a technological environment. Social workers play an important role in combating addictions and can help treat the problem of social media addiction in many ways.

As children grow up in a digital world, more media addictions will be seen in this population. There will be an increase in young children who are impacted by social media addiction due to spending a great deal of time logged onto social media accounts. An effective treatment plan should be available to help families and teachers cope with the problematic behavior. Social workers and researchers will need to develop instruments to measure the severity of the addiction, without being able to remove the stimuli. This paper discussed two forms of social media, but there are many more popular websites. It will be difficult to eradicate social media, so interventions that help children cope in the problematic environment will need to be proposed as children cannot adequately problem solve and identify the issue. It will be difficult to diagnose children with addictions; thus, social workers will have to work closely with the family to identify the problem. Once the risk factors are determined, the public will need to be educated about the addiction.

6.0. Conclusion

Society is becoming more technologically advanced each year. The invention of the internet catalyzed many social exchanging websites that allows one to share information instantaneously. With the creation of social media websites as Facebook and Instagram, social media use is skyrocketing. This is possible because most of the American population has access to computers or mobile devices that permits one to connect to the internet with ease. The average time that an individual spends online increases as they get older, but all age groups spend a significant amount of time online. Since a great deal of time is spent on the internet, the likelihood of developing an addiction to various social exchanging websites is also increasing.

Currently, there is not a diagnostic label for social media addiction as there is insufficient research. There is literature that discusses social media addictions, but it does not hold validity in the medical field. Although the medical field does not accept social media as a valid addiction, there is scientific evidence that suggests it affects the brain like other noted addictions. The brain's reward circuitry which consists of the nucleus accumbens aids in the addiction process. The nucleus accumbens is part of the limbic system that releases a neurotransmitter, dopamine. Dopamine plays a big part in the reward or gratification process. Dopamine can also cause euphoria. The activation of the reward system is accountable for social media repeated use. Users become excited from visiting social media websites and interacting with other users. Society encourages social media to connect with others, but the overuse of media sites can lead to an addiction.

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