Scrolling vs. Smoking: Exploring the Complexities of Social Media and Nicotine Addictions

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Abstract

At this time in development, almost everyone around the world has a phone. On that phone, almost everyone has at least one social media platform downloaded. But what if that app was just as harmful as a smoking habit? In this project, the biochemical aspects of social media addiction will be explored and compared directly to the highly known nicotine addiction. Studies have proven that these addictions are on par with each other and that social media addiction is a more serious concern than would have been predicted. The biochemical pathways of the brain are similarly altered by chronic phone usage as they are by chronic nicotine consumption, and recent efforts to reduce this have been repeatedly failing. This project will provide an array of information about this topic that emphasizes its severity and potential actions that can be taken against it to protect society from this growing issue.

1. Introduction

As society has entered the digital age, a powerful new invention has arisen: social media. Only becoming more popular by the year, social media platforms have become subjects of widespread debate around the world. The controversy over social media was recently heightened by United States Surgeon General Doctor Vivek Hallegere Murthy's proposal to limit negative outcomes of social media. His recommendation is to put out a warning on social media platforms regarding the potential mental health side effects of utilizing the platform [1]. This would mimic a tobacco-style health warning, used for severe health crises. His proposed approach to this topic has become a highlight of the news, and has led to questions about the need for it. This review will delve into the comparison of the biological and mental aspects of nicotine addiction to those of social media addiction in order to better understand the Surgeon General's approach.

2. Background

Tobacco usage has long been an aspect of humankind, but research has

been more recent. Although cultivated thousands of years ago, negative effects of tobacco were consistently overlooked. It was not until the 1920s and 1930s, when a trend of rising lung cancer was realized, that scientists took action [2]. The first significant evidence came in the 1950s, when an array of scientists published studies on the smoking habits of lung cancer patients. The United States Public Health Service then eventually took its first course of action in 1957 and has since greatly increased their efforts to curb nicotine addiction in America.

Much later than tobacco, social media came to fruition in 1997, when the first social media platform Six Degree was created [3]. This led to a trend that resulted in a vast variety of social media platforms forming in the coming years. 56.8 percent of the world is active on social media, and about 210 million of those people have social media addictions [4]. This largely affects young people of ages 18-20, with 40 percent of American users in this age range reporting they suffer from an addiction. While nicotine addictions come with largely physical negative effects, social media addictions come with more mental issues. In surveying teenage users, "70% felt left out or excluded when using social media, 43% have deleted social media posts due to receiving too few likes, 43% felt bad about themselves if no one liked or commented on their posts, [and] 35% reported experiencing cyberbullying" [4]. Although more prominently used by adolescents, middle-aged and older adults are also afflicted with this issue. 72 percent of American adults currently use social media and experience the fear of missing out (FOMO) that drives a significant amount of social media use. 26% of 38 to 54 year olds consider themselves social media addicted, along with 21% of 55 to 64 year olds [5]. Additionally, there has been a positive relationship found between social media addiction and depression in adults [6]. Further studies have additionally shown social media use has a negative effect on academic performance, harms work-life balance, and negatively impacts productivity. It especially can harm those with an external locus of control, causing it to become a prominent issue in society.

Although tobacco and social media differ, a common theme in both areas is the significant impact industry has had on promoting addiction, especially in targeting youth and women. Big Tobacco has only emphasized their focus on marketing towards youth in recent years, particularly with the development of electronic cigarettes. From marketing candy- and fruit-flavored products to focusing on product placement in television and movies, the tobacco industry has fixated on increasing their youth sales, which has evidently been effective [7]. Comparably, social media companies utilize addictive feeds and formulas to draw youth into their platforms and prevent them from logging off [8]. In a similar vein, these industries also focus on growing their female consumer base. Tobacco and social media companies alike have marketed towards women for decades by evoking negative body

images and themes of fashion and glamour [9]. These similarities reveal the strategic parallels between the tobacco and social media industries in promoting addiction to their products, highlighting the ethics of their marketing techniques.

3. Methods

To identify relevant literature and studies, I searched databases most likely to contain research about nicotine and social media addictions. This included Library and Information Science Source, Web of Science, Google Scholar, and the National Institute on Drug Abuse. The literature found contained a variety of evidence and hypotheses surrounding this topic, providing a strong foundation for this paper that involves an array of verified information.

4. Results

4.1 Biochemical Explanation

In regards to why humans become addicted to nicotine, there is a largely biological explanation. Once nicotine enters the bloodstream - whether it is through the lungs, mouth, or skin - it reaches the brain within seconds [10]. It then crosses the blood-brain barrier, resulting in blood pressure elevating as the adrenal glands are stimulated and releasing epinephrine, which causes many of the common results of a stimulant. Nicotine also binds to nigrostriatal and mesolimbic dopaminergic receptors, stimulating them and resulting in the release of a variety of neurotransmitters and hormones, including dopamine. This thereby stimulates the midbrain dopamine reward pathway. Nicotine's activation of the mesolimbic dopamine system causes the biological mediation of the reinforcing actions of drug use since whenever the reward circuit is activated, a burst of dopamine is released that signals that what is occurring needs to be remembered [11]. The release of dopamine leads to changes in neural connectivity that make it easier for the activity to be repeated without thinking about it, leading to habits and addiction. As the National Institute on Drug Abuse puts it, "Just as drugs produce intense euphoria, they also produce much larger surges of dopamine, powerfully reinforcing the connection between consumption of the drug, the resulting pleasure, and all the external cues linked to the experience" [11].

In addition to the biological aspect of nicotine addiction, there are some mental facets to it as well. On the psychological side of this, nicotine can cause people to develop conditioned signals to use tobacco [12]. This can include scenarios such as developing a routine to smoke after a meal or being unknowingly conditioned to smoke when stressed. The concept of learning in behavioral psychology is also a substantial part of nicotine addiction as conditioned signals can cause an emotional attachment to nicotine use.

In contrast, as a rather new thing of popularity, less studies have

been conducted on social media so the biological aspect of addiction has not yet been confirmed. Nevertheless, there have been several significant studies that reveal important information on this topic. There appears to be a popular biopsychosocial approach to the predisposition of social media. It has been proposed the biological aspect of age; the social aspects of gender, intensity of use, the extent it meets needs, and social comparisons made while using social media; and psychological aspects of stress, empathic concern, conscientiousness, and depression impact likeliness for social media addiction [13]. While these may impact the way social media use can affect oneself, it is important to understand how precisely social media addictions work.

The most popular current theory is that social media addictions function very similar to the nicotine addiction pathway explained previously. According to the Journal of Mehmet Akif Ersoy University Economics and Administrative Sciences Faculty, "The results of neurological and psychiatric tests on social media users show that similar biological and psychological symptoms of alcohol, cigarette and drug addicts are seen in active social media users" [14]. Based on the hypothesis of incompletion, it is hypothesized that individuals who do not receive enough satisfaction from natural rewards, such as food, are directed towards other items and behaviors that stimulate that reward mechanism, which dopamine is a top driver of. Similar to Sapolsky's idea of the magical maybe, the unknowing of whether one will find a notification on their phone when they look at it drives them to keep checking it. When there is a notification, studies show there is a significant increase in dopamine levels, but it then quickly decreases [14]. The brain then restarts the search for dopamine, which causes people to unconsciously succumb to an oncoming loop of urges to look at their phone in hopes of a notification. This has been supported by a recent study where a functional magnetic resonance imaging was performed on people with an online game use disorder while showing them pictures of online games. The study revealed that there was brain activation in many reward areas of the brain. Another study proved a similar result, where a single photon emission computed tomography showed reduced dopamine carrier levels in internet addicted individuals' striatum region of the brain. This is further reinforced by a Harvard University study that proved self-disclosure on social media platforms activates the same areas of the brain that addictive substances activate [15]. The study explained how its results point to the explanation that social media addiction is fueled by a dopamine reward pathway that positively reinforces the brain into rewiring itself to become dependent on social media.

Another aspect of social media addiction appears to be the amount of self-promotion that takes place on social networking sites. During self-promotion, the brain's reward regions fire at full capacity, and

people talk about themselves 80% of the time on social media in comparison to 30-40% offline [15].

An additional proposal for the biological explanation for social media addiction involves the neurotransmitter gamma-aminobutyric acid (GABA). Studies have shown prolonged phone use can chemically alter the brain's reward circuitry, and GABA is impacted by this [15]. GABA production can either be increased or reduced by chronic phone use, and as a controller of relaxation and exhilaration, this can have a significant impact on anxiety and other emotions. According to research published in the Radiological Society of North America, "Heavy phone use was associated with an unsettling ratio of GABA to other neurotransmitters…The teen test subjects' brain chemistry returned to a ratio unaffected by addiction after receiving cognitive behavioral therapy (CBT) for the problem." While this differs from the dopamine reward pathway proposal, it is similar in the sense of phone use impacting the biochemistry of the brain.

4.2 Past Actions

As nicotine addiction has been a global problem for decades, many actions have been taken to reduce the use of it. The United States has been especially committed, with a variety of efforts ranging from increased taxes, more policies, media campaigns, and health warnings on cigarettes [16]. America has been largely successful in these efforts, especially due to their grading system of the country's and states' efforts each year [17]. The grading system forces reflection nationally and regionally and allows for resources to be redirected as needed. However, even as cigarette smoking has decreased in America, nicotine addiction remains persistent, especially with the introduction of e-cigarettes and other nicotine products. As of 2024, 5.9% of middle and high school students currently used electronic cigarettes and 1.8% currently used nicotine pouches [18]. Additionally, as of 2021, 4.5% of adults were current electronic cigarette users [19]. Even with strong American efforts to limit nicotine usage, the recent creation of various nicotine products presents issues for tobacco control.

Since social media addiction is a relatively newly recognized issue, fewer efforts have been made to reduce it. This is also due to the popular American debate over privacy versus security and the reluctance of social media companies to release their data. One of the most significant actions taken was the introduction of the Social Media Addiction Reduction Technology Act, which would ban addictive features such as infinite scrolling, provide users with more power to monitor their use of social media, require more detailed consent forms, and give the FTC and HHS the authority to ban similar practices [20]. While proposed, this act has been mainly unsupported due to concerns over enforcement and hindering the usability of these platforms. Another major action taken is a proposed California bill that would

hold social media companies legally responsible for causing addiction to their platforms by preventing formulas that show bad content [21]. However, many lobbyists and digital rights advocates have claimed this would be unconstitutional and a violation of federal law.

5. Discussion

Although social media addiction is often seen as solely a mental one, these studies reveal it shares many biochemical similarities with a nicotine addiction. The proposed involvement of the dopamine reward pathway in social media addiction proves an extreme similarity to substance addiction. They appear to share many neuro-biological mechanisms, proving there is a serious biological aspect to social media addiction. In addition to this, social media has added complexities of mental components, such as a need for attention and feelings of self-worth. This makes social media an extremely severe issue that requires action, especially as it is commonly underestimated in the digital age. The array of similarities between the biochemical aspects of nicotine and social media addiction supports preventative nicotine addiction like actions taken for social media. Most current social media actions have failed or are struggling to pass, with the exception of minor restrictions such as school guidelines. While these actions are important, large-scale actions seem necessary to prevent this growing issue, especially as technological developments only continue.

However, more research still needs to be done on this topic to learn more about the biochemical effects of social media addiction and how to best reduce it. Currently, the majority of the data about this topic has been self-reported data about social media usage. This could be fixed by scientists including more digital traces and information shared by individuals on their social media in their studies [22]. More neuroimaging would also reveal more of the biochemical aspects of this and provide more hard evidence. In addition to this, a push for social media companies to release their data would greatly inform research on this topic as formulas and social media statistics could be analyzed. Lastly, there is an increasing call for evidence concerning the prevention of online harms caused by adolescents interacting with the digital environment.

6. Conclusion

The numerous studies and explanations done on both nicotine and social media addiction demonstrate how alike they are, and specifically how a similar level of action taken against the former needs to be done for the latter. As adolescents commonly use social media in schools, schools can implement digital education policies and evidence-based education methods that aid with effective communication and positive coping [23]. Another prominent solution is cognitive behavioral

therapy (CBT), which studies have shown causes significant reduction in internet addiction [24], along with significantly increasing mental health and quality of life. Making CBT therapy more accessible for adolescents and adults alike could cause a significant reduction in social media addiction. In addition to this, actions similar to the ones against nicotine addiction can be taken. Adding prices to utilize social media platforms could potentially reduce usage, especially if they are recurring costs. Moreover, there are a variety of policies federal and state governments could enact to restrict use. From enforcing time limits on social media usage, similar to China's gaming policies, to limiting the frequency of notifications, the enactment of legislation to address this issue could be extremely significant in curbing social media addiction. Overall, social media addiction is a serious issue comparable to substance addictions and should be handled accordingly.

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