

Neurobiological and behavioral correlates of excessive social media use in adolescents

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Ethics Committee Approval

Since this study is based solely on a literature review, ethics committee approval and informed consent were not required. However, all reviewed studies were sourced from reputable academic journals, institutions, and official reports, ensuring adherence to ethical research standards. Whenever applicable, the original studies included in this review obtained ethical approval from relevant institutional boards and secured informed consent from participants.

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Conflict of Interest

No conflict of interest was declared by the authors.

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Abstract

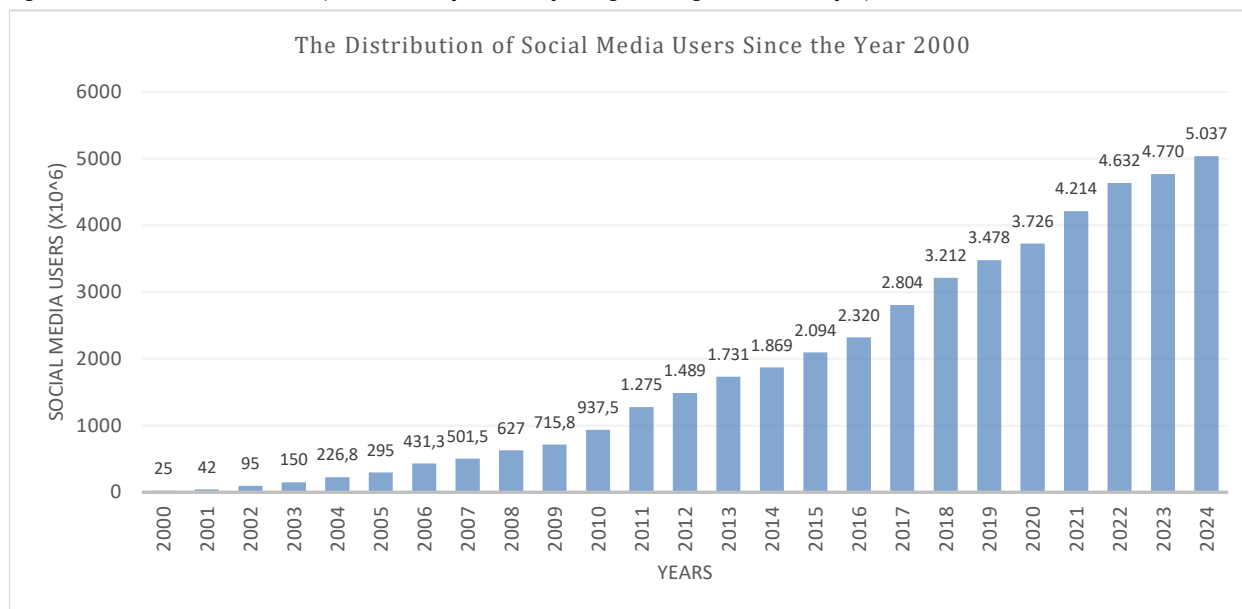
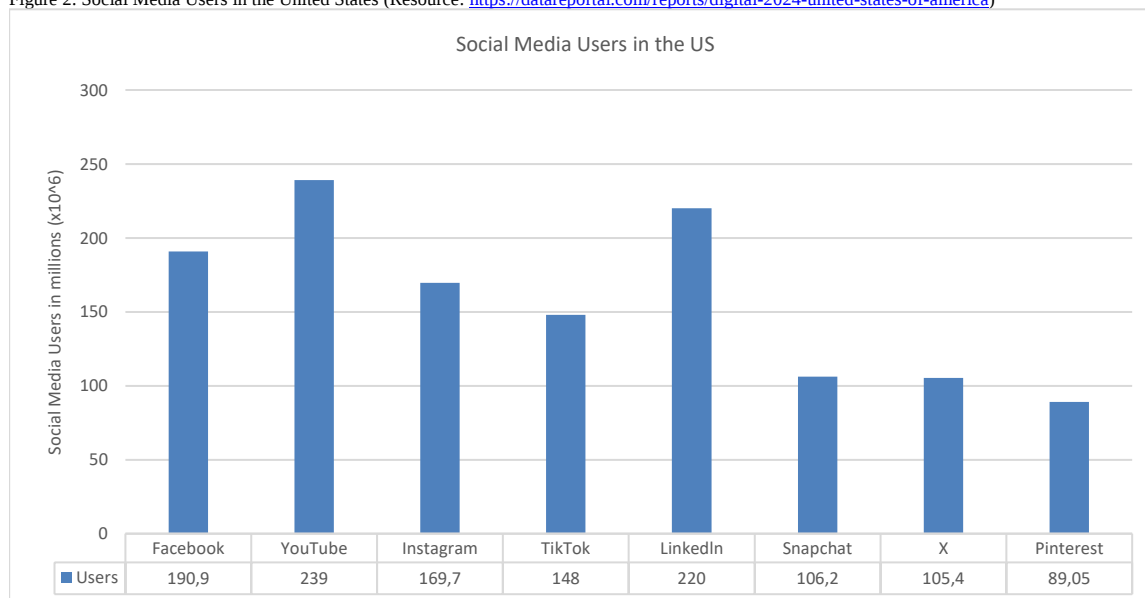
Background/Aim: Millions of teenagers around the world spend more time engaged with their social media accounts than ever before. This situation raises questions about the impact of social media on mental health. This systematic literature review explores the relationships among extreme social media use and addiction, depression, and sleep deprivation.

Methods: A thematic analysis of 38 peer-reviewed studies, all published between 2010 and 2024, was conducted. The selection of studies was based on their significance and relevance to teenage mental health, namely, neurobiological, psychological, and behavioral perspectives. The study categorized findings into three primary themes: compulsive digital behaviors (addiction), emotional distress (depression), and disrupted circadian rhythms (sleep deprivation).

Results: Extended social media exposure alters dopamine regulation, reinforcing addictive tendencies similar to substance dependence. Excessive usage correlates with heightened depressive symptoms, exacerbated by social validation pressures and algorithm-driven content cycles. Furthermore, late-night digital engagement contributes to melatonin suppression and chronic sleep debt, impairing cognitive function and emotional stability.

Conclusion: As serious mental health issues stemming from excessive social media content haunt society, it is essential to initiate effective coping strategies. Given the insights from the present study, the need for an awareness campaign, structured daily usage, and more neuroscientific studies to reduce the long-term impact of social media on adolescent well-being is acute.

Keywords: social media, addiction, depression, sleep deprivation, mental health, teenagers

Figure 1: Social Media Users Since 2000 (Resource: datareportal.com/reports/digital-2024-global-overview-report)Figure 2: Social Media Users in the United States (Resource: <https://datareportal.com/reports/digital-2024-united-states-of-america>)

Introduction

As of January 2023, the Global Overview Report [1] noted that the Earth's population is 8.01 billion people, with 57% of people residing in urban areas. The number of internet users globally is 5.16 billion, while active social media users totaling 4.76 billion people. Furthermore, the United Nations World Population Prospects [2] reports that by January 2024, the global population had increased to 8.08 billion people. That is, over one year, the global population increased by 74 million people, reflecting an annual growth rate of 0.9 percent. As of January 2024, there are 5.35 billion internet users and 5.04 billion active users on social media platforms. For a detailed view of the growth in active social media users over the last 24 years, please refer to the figure 1 provided by [3].

As of January 2024, data [3] indicate that the population of the United States is 340.9 million people. Among this population, there are 331.1 million individuals who use the internet; of those, 239 million people are active users of social media. The accompanying figure 2 illustrates the number of social media users in the United States [3].

Social media is a crucial part of the lives of almost everyone, especially teenagers. Nowadays, teenagers can access social media platforms and technology at the tip of their fingertips. In a survey conducted by the Pew Research Center in 2022, 95% of teenagers had access to a smartphone compared with 73% of teenagers in 2014-2015 [4]. Extrapolating these statistics to the population of teenagers in the United States (42 million according to the US Department of Human Services) means that approximately 39.9 million teenagers have access to a cell phone [5]. This number represents a 22% increase over the past 7 years.

Teenagers use social media for a many of reasons, including communication, leisure, and identity. Identity in particular plays an important role in the lives of adolescents, as it defines their sense of self, their values, and their aspirations for the future. The process of establishing one's identity on social media can be likened to selecting one's finest attire for an outing; this goal is to leave a lasting impression [6].

Social media serves as an accessible platform for individuals across the globe. It enables the instantaneous sharing of diverse content, including images, videos, and direct messages, with just a simple click. Given the widespread use of social media

among adolescents, social media platforms have the potential to contribute to various mental health challenges, such as addiction, hormonal imbalances resulting from sleep deprivation, as well as heightened feelings of anxiety, depression, and suicidal ideation [7,34]. Social media and cell phone usage among teenagers has increased in the past couple of years; this usage can result in a wide variety of mental health issues as teenagers grow up to become adults [4]. The purpose of this article is to explore how excessive use of social media on a daily basis affects the mental health of teens (aged 12-20 years old) in North America.

Materials and methods

Study design

We adopted a literature review, which encompasses choosing from a variety of methods and processes for locating, recording, comprehending, meaning-making, and distributing material relevant to a topic of interest [8]. A literature review serves as the foundation for developing a new conceptual model or theory, and it can be useful when attempting to chart the evolution of a certain research topic across time. Due to the fact that literature review combines the conclusions and points of view from multiple empirical studies, such an investigation can often address research subjects better than can a single study [9]. For the purpose of this investigation, ‘excessive social media use’ is defined as engagement exceeding three hours per day, based on criteria used by Fiellin et al. [14] and Alavi et al. [32]. Other reviewed studies use varying thresholds, including compulsive behaviors or self-reported digital dependence, highlighting the absence of a universally accepted definition.

Data collection

A thorough review was conducted using credible sources such as government reports and institutional studies in addition to peer-reviewed academic sources like PubMed, PsycINFO, Scopus, and Google Scholar. The search terms used were “social media addiction,” “teen mental health,” “digital dependency,” “social media and sleep deprivation,” and “social media and depression.” To ensure relevance and credibility, studies were chosen based on these criteria:

- Empirical studies published between 2010 and 2024.
- Studies focused on teenagers (ages 12-20 years) in North America.
- Research examining neuroscientific, psychological, or behavioral impacts of social media use.

The selected studies were systematically reviewed using a thematic analysis approach, and the findings were categorized into three primary themes:

- Social Media Addiction & Cognitive Impact: Analyzing alterations in dopamine regulation and brain activity.
- Depression & Anxiety Linked to Social Media: Evaluating the emotional and behavioral effects.
- Sleep Deprivation & Circadian Disruption: Examining the consequences of digital overstimulation and screen time at night.

The study highlights research trends, gaps, and commonalities by synthesizing findings from 38 studies. To guarantee impartiality and balanced representation, a critical evaluation of study limitations, sample sizes, and methodology was carried out.

Analysis

The results of the studies were examined to determine recurring themes and answers to the following research questions:

- Does excessive use of social media result in addiction?
- Does excessive use of social media cause depression?
- Can excessive social media usage lead to sleep deprivation?

Results

Addiction

Excessive use of social media by teenagers is directly linked to behavioral addiction symptoms, according to several studies. Fiellin et al. [14] found that teenagers using social media for more than three hours per day exhibited compulsive usage behaviors similar to those of substance dependence. Specifically, adolescents experienced difficulty controlling their time online, withdrawal-like symptoms when disconnected, and an increased tolerance, requiring more engagement for the same satisfaction.

Alavi et al. [32] further established parallels between adolescent social media addiction and substance addiction, highlighting neurobiological mechanisms such as impaired impulse control. Adolescents addicted to social media exhibited heightened activity in reward-processing brain regions, mirroring patterns observed in cases of drug dependence.

Kuss and Griffiths [11] emphasized the role of reinforcement mechanisms embedded within social media platforms, including instant feedback through likes, comments, and notifications, that contribute to compulsive engagement. These reward structures stimulate dopamine release, reinforcing repetitive behaviors and making disengagement more difficult. Notably, studies examining adolescent brain responses to excessive social media use have detected alterations in dopaminergic pathways similar to those observed in cases of behavioral and substance addictions [11].

Depression

The psychological toll of excessive social media use on adolescents has been well-documented, with growing evidence linking prolonged engagement to increased symptoms of depression. Abi-Jaoude et al. [37] reported that teenagers with high levels of screen time noted lower self-esteem and higher rates of depressive symptoms, especially when social media engagement involved passive scrolling or social comparisons.

Patterns of digital interaction appear to influence emotional well-being, particularly in cases of cyberbullying and fear of missing out (FOMO). Keles et al. [19] conducted a meta-analysis and found consistent evidence of increased depression risk in adolescents spending extended hours on social platforms, particularly when exposure involved stress-inducing factors.

Additionally, the nature of engagement—that is, passive or active—plays a critical role in mental health outcomes. Huang [22] demonstrated that passive social media use, where individuals consume content without active interaction, was more strongly correlated with depressive symptoms compared with direct engagement. This finding underscores the psychological toll of comparison-based behaviors, in which adolescents internalize unrealistic portrayals of happiness and success displayed by their peers online.

Sleep Deprivation

The effect of nighttime social media use on teenagers' sleep patterns is well-documented, with research showing significant disruptions to sleep hygiene and overall rest quality. Venton et al. [27] observed that adolescents engaging with screens late at night experienced delays in sleep onset, reduced sleep duration, and lower sleep efficiency. These effects were particularly pronounced in individuals who reported compulsive social media use, indicating a behavioral pattern that exacerbates sleep deprivation.

Exposure to blue light from screens plays a critical role in sleep disturbances; blue light interferes with melatonin production and the body's natural sleep-wake cycle [18]. LeWine [30] found that nighttime social media engagement was strongly correlated with increased fatigue and mood instability the following day, largely due to prolonged cognitive stimulation and artificial light exposure disrupting circadian rhythms.

A broader review by Harvard Medical School (2018) reinforced these findings, emphasizing that excessive social media use before bed increases brain activity, delaying melatonin secretion and reducing sleep readiness [6]. This body of research underscores the negative consequences of nighttime digital engagement, suggesting that adolescents with habitual late-night social media usage may be at greater risk for chronic sleep deprivation.

Discussion

The reviewed studies collectively indicate a strong link between excessive social media usage and teenage mental health, particularly in terms of addiction, depression, and sleep deprivation. However, the methodological approaches across these studies vary significantly, which could possibly impact the reliability and applicability of their findings.

Social Media and Addiction

The earliest human records provide evidence of an inclination towards addictive psychoactive drugs. Throughout history, psychoactive substances have been utilized by religious leaders during sacred rituals, medical practitioners for therapeutic reasons, and the general population; such substances include alcohol, nicotine, and caffeine [15]. However, addiction and excessive use of drugs has also been incorporated into the practice of medicine. Levinstein [16,17] conducted one of the first thorough studies of morphine addiction in 1875. He highlighted two critical aspects of opiate addiction that would go on to intrigue researchers: the peculiar nature of withdrawal, which could be rapidly alleviated by administering more of the drug, and the obsessive dependence on the substance, which took precedence over all else, even as the individual's circumstances worsened [17].

Current neuroscientific breakthroughs support the notion that addiction is a brain disorder [18]. However, some experts disagree, stating that addictive behavior is a choice [10]. However, from a neuroscience point of view, addiction can be classified as a physiological disease. The extended amygdala, basal ganglia, and the prefrontal cortex are affected by addiction mainly through certain receptors and neurotransmitters. The prefrontal cortex has both dopamine D1 and D2 receptors. D2 receptors activate at lower dopamine concentrations due to their higher sensitivity to

dopamine. Under normal conditions, the prefrontal cortex receives a low-level, consistent supply of dopamine due to the slow, rhythmic activation of dopamine neurons in the ventral tegmental area (VTA), which connects to the cortex. However, dopamine neurons activate more quickly in response to an unexpected occurrence, such as a fun reward or a highly unpleasant event. This rhythmic firing causes a sudden, although brief, rise in dopamine. The large amounts of dopamine obtained during phasic firing can activate D1 receptors, which are believed to be essential for dopamine's rewarding effect [18]. Addiction is a very serious mental disease that affects a person's "brain circuits" and their ability to control themselves when it comes to certain stimuli. (For example, sex, drugs (opioids and cocaine), pornography, gambling, food, and social media [11].) Addiction is a disease that can both cause pleasure and lessen unpleasant or bad effects. Its primary characteristics include an inability to control behavior and the persistence of that activity in the face of adverse consequences [12,20].

Each of the stimuli noted above controls different parts of the brain and is associated with the secretion of different hormones (i.e., neurotransmitters). Several philosophers and psychologists have criticized the neurobiological diagnosis of addiction, as typified by obsessive and recurring drug use [19]. Their critique is based on both empirical evidence and conceptual analysis. Empirical criticism suggests that the disease view lacks support from the empirical evidence cited by its proponents. This critique consists of both observational proof of addicts' recurrent self-destructive conduct and molecular evidence of modifications to the brain's normal functioning brought on by frequent drug use [19]. Abuse-related drugs have a wide range of effects on brain circuitry, including perception, emotion, decision-making, and cognitive function. These effects contribute to the instinctive and compulsive character of drug use [20]. Changes in synaptic connections caused by the drug's activity in these networks may persist long after the drug has cleared a person's system [12,20].

Addiction can have a profound effect on people's well-being, interpersonal connections, and general standard of living. Some of the signs of addiction include [21]:

- Incapability to stop: Individuals may persist with their substance use or participate in detrimental addictive behavior despite their desire to stop.
- Failure to control oneself: Individuals may experience a sense of complete relinquishment of control over their substance use or activities, leading to feelings of helplessness.
- Health concerns and personal difficulties: Addiction affects a person's physical and emotional well-being as well as their relationships, career, and personal relationships.
- Decrease in vitality and motivation: People suffering from addiction may experience a lack of energy or motivation to the things they would normally value [22].

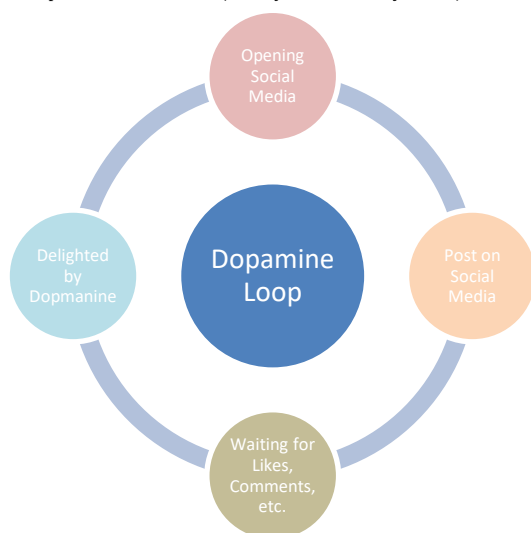
The primary neurotransmitters that influence a person's mental health include dopamine, serotonin, oxytocin, and endorphins [13]. Addiction is also a physiological disease that involves changing the structure of the brain. Anatomical changes in the brain classify addiction as both a physiological and psychological disease [14]. According to Bechara [23], addiction

results from an imbalance between two distinct but interconnected neural systems that regulate decision-making: the prefrontal cortex system, which is reflective and signals pleasure or pain associated with future prospects, and the impulsive amygdala system, which signals immediate prospects' pain [24]. Goodman [25] defined addiction as a state in which a problematic activity is typified by two things: (a) persistent inability to regulate the conduct and (b) persistence in the behavior despite serious negative effects [26].

Dopamine is an important element in people's brains that regulates daily behavior; it may be involved in addiction. Dopamine is intended to send feelings of pleasure, comfort, and happiness to dopamine receptors whenever an action that is pleasurable is thought of and completed. The dopamine system is a "primitive" system that confers a sense to pleasure to repeating a task such as eating food. Indulging in an activity that secretes massive or continuous amounts of dopamine, such as scrolling on social media, causes dopamine receptors to get overwhelmed and adapt to the large amounts of dopamine received over time. To obtain the same feeling of dopamine going forward, a person must use social media for a longer period of time. As time goes on, the receptors get even more adapted to the large amounts of dopamine, resulting in addiction [14]. This situation is often referred to as the dopamine loop [28]. Drugs such as cocaine can block the dopamine transporters in the pre-synaptic nerve, causing a buildup of dopamine in the synaptic cleft between the pre-synaptic nerve and the post-synaptic nerve [18]. This buildup causes a pool of dopamine to accumulate in the synaptic cleft, which in turn travels into the transmitters to provide the dopamine signal [27].

The following figure shows the dopamine loop of social media use [28]:

Figure 3: Loop of Social Media Use (Akshay, Sudha, and Ajit, 2019)



Serotonin is the mood-booster hormone. It changes a person's mood in a positive way and influences behaviors and functions such as memory, fear, stress, digestion, addiction, sexuality, sleep, and homeostasis [29]. (Homeostasis is the state at which the human body remains at equilibrium.) Lower levels of serotonin are correlated with depression in people [29].

Oxytocin is produced in the hypothalamus and secreted from the pituitary gland of the brain. It is often referred to as the "love hormone" and/or the "connection hormone." Oxytocin is like serotonin in terms of mood boosting. It is promoted by

increasing the connection between two people. For example, oxytocin is important for pregnant women and mothers to accelerate the process of giving birth and helping to transport milk from nipple ducts [39]. Oxytocin furthermore increases the feelings of relaxation and trust while improving people's mental health [30].

Endorphins are referred to as the "pain tolerance and sex hormone" as they are most prevalent in those situations. These neurotransmitters are produced in the pituitary glands and are then released into the nervous system. Endorphins are secreted into the circulatory system when a person is engaged in physical activity [31].

The majority of teenagers are addicted to social media without being conscious of it. In a survey conducted by the Pew Research Center, many teenagers report difficulty in reducing social media use [4].

Behavioral addiction, like internet addiction, parallels drug addiction; however, instead of dependence on a substance, the individual becomes addicted to the behavior itself or the emotional response it generates [32]. The extreme nature of internet use shares significant parallels with substance addiction. Neuroimaging studies suggest that the underlying causes of this behavior align with those of other addictive disorders. Structural changes in the brain may disrupt executive functions related to planning and reasoning, heightening impulsivity and increasing susceptibility to addiction [33].

It is straightforward for teenagers to become addicted to social media given its usage of colors, notifications, and other habit-forming characteristics. Excessive daily use of social media can contribute to physiological changes in the brain associated with addiction and attention issues [7]. In an article released by Stanford University, 24% of teens reported being online "constantly" [10]. The concept of scrolling on social media platforms such as TikTok, Instagram, or YouTube enables the viewer, in this case a teenager, to spend focus on short videos (i.e., those with a maximum length of one minute). That constant scrolling results in a shortened attention span due to the dopamine physically changing the anatomy of the brain. Dr. Julie Albright, a sociologist, states that the state of scrolling is "almost hypnotic" and a "pleasurable dopamine state" [40]. A study revealed that 50% of TikTok videos are longer than one minute, which may increase cognitive load. Certain social media platforms exploit this fact by providing short videos to scroll through. As a result, this situation can contribute to shortened attention spans and can contribute to other factors such as sleep deprivation [7].

While several studies [14,32] have established behavioral addiction parallels between social media and substance abuse, many have relied on self-reported data. That situation may have introduced bias. Moreover, the lack of longitudinal studies makes it difficult to assess long-term neurological consequences of excessive social media use. The absence of standardized diagnostic criteria for social media addiction further complicates comparisons across studies, making it challenging to distinguish compulsive digital engagement from true clinical addiction.

Sleep Deprivation and Social Media

Social media-induced sleep deprivation can have many effects on teenagers' mental and physical health. Teenagers in this day and age have access to technology and social media that can

affect their sleep schedule. For example, in a survey conducted by the Pew Research Center, 95% of teenagers noted having access to a smartphone compared with just 73% of teenagers in 2014-2015 [4]. We note, however, that sleep deprivation in teenagers can also be due to other issues. For example, the social expectation of succeeding and being admitted to a competitive university drives many teenagers to take challenging Advanced Placement classes. One teenager, Walworth, reports after spending around 4-5 hours on her homework she prefers to go online and chat with her friends and “surf the web.” That situation causes her to go to bed later. Constant exposure to illuminated screens at night can throw the body's circadian rhythm out of whack [30]. The term “circadian rhythm” refers to a biological clock in the body that decides what time someone should go to sleep [34]. The mental effects of sleep deprivation include an inability to focus, concentrate, and remember [29]. Sacrificing sleep to study for an exam is not recommended—the capacity to which a student can remember decreases drastically when he or she is sleep deprived [34]. The effects of sleep deprivation also include an increase in body fat due to hormone imbalances and a weakened immunity to fight bacteria and viruses. When the body is in a rested state, it automatically fights, defends, and destroys “foreign invaders” that could be a cause of disease and or long-term health conditions [35]. The combination of social media and homework can trigger an imbalanced sleep schedule in teenagers, which causes them to be sleep deprived and susceptible to physical and mental conditions that can affect their current and long-term well-being.

Studies have consistently highlighted the negative impact of nighttime screen exposure on melatonin regulation and circadian rhythms [34]. However, sample sizes vary, and few studies have incorporated physiological sleep tracking. That situation limits their ability to quantify the direct neurological effects of sleep deprivation caused by excessive social media use.

Depression and Social Media

With the advent of scrolling, “a few minutes” can easily turn into more than 30 minutes. Impulsivity is strongly associated with addiction, and there are multiple mechanisms through which individuals with impulsive tendencies may be at greater risk of developing addictive behaviors or experiencing addiction with increased severity and duration. One such mechanism involves difficulties assessing or managing both positive and negative emotions, which can result in reduced control over risky actions and poor decision-making [36].

Along with sleep deprivation, social media usage can open the door to anxiety, depression, and suicide in teenagers. Among teenagers, girls are known to exhibit more significant signs of anxiety, depression, and suicide, and girls also tend to spend more time online [37]. The second cause of death among teenagers in Canada is suicide; there was a 110% increase in the number of hospital admissions of intentional self-harm among teenage girls between 2007 and 2014 (Canadian Institute for Health Information, 2018) [41]. An article by the Canadian Medical Association Journal (CMAJ) reported that spending more than 2 hours per day on social media and networking sites was associated with feelings of suicide and depression among teenage girls [38]. Specific subconscious triggers can increase feelings of depression, suicide, and anxiety in teenagers; those triggers include FOMO, which is defined as “a persistent concern that

others may be enjoying valuable experiences while one is missing out.” Other triggers include feeling like it’s necessary to post pictures of yourself to get likes and comments, the feeling of being “replaceable,” and physical yet unconscious addictions such as looking at your phone whenever you are bored [38].

The availability of social media opens the door to content that can expose teenagers to sensitive information. For example, viewing distressing images and videos unintentionally related to suicide can promote feelings of anxiety and depression in teenagers who are particularly sensitive. Limiting one’s social media apps and using content blockers can allow teenagers to prevent having feelings of depression, anxiety, and suicide [38].

Furthermore, cyberbullying can also promote feelings of suicide in teenagers [38]. Humans are social creatures, and teenagers’ feelings of negativity in the form of anxiety and depression can be rooted in the lack of real-life social interactions [7]. Consequently, using social media excessively can leave teenagers with feelings of anxiety, depression, and suicide that came up due to conscious and subconscious triggers and cyberbullying.

Similarly, research linking social media use to depression [37,38] often lacks control for confounding variables, such as family dynamics, socio-economic status, and pre-existing mental health conditions. While correlations are evident, establishing causation remains problematic, requiring more robust experimental designs.

Limitations

While this study provides valuable insights into the impact of excessive social media usage on teenagers' mental health, several limitations must be acknowledged. Firstly, the review relies on a limited number of studies (38), which may not fully capture the breadth of the existing research on this topic. A larger dataset would confer a broader understanding of the impact of social media across different demographics. Secondly, the research primarily focuses on data from North America, particularly the United States. This geographical limitation may not reflect the experiences of teenagers in other cultural contexts, where social, economic, and educational factors may influence social media usage differently.

Additionally, the heterogeneity of the reviewed studies poses another challenge. The included research varies in methodologies, sample sizes, and measurement techniques, making it difficult to draw direct comparisons or establish universal conclusions. Some studies rely on self-reported data, which are subject to participant bias and may inflate or distort findings on social media-related addiction, depression, and sleep deprivation.

Furthermore, his review is largely descriptive; it summarizes existing findings rather than conducting statistical analysis or meta-synthesis. This approach, while valuable for identifying trends, does not establish causality, meaning that the link between social media usage and mental health outcomes remains correlational rather than definitive.

Future research should prioritize longitudinal studies, cross-cultural analyses, and experimental designs to better understand causal mechanisms and potential interventions.

Conclusion

This literature review examined 38 studies to investigate the relationship between excessive social media use and its effects on teenagers' mental health. The findings support a strong correlation between social media addiction, depressive symptoms, and sleep disturbances.

Social Media Addiction

Several studies identified excessive social media usage as a behavioral addiction, with mechanisms similar to substance dependence. Neuroscientific research highlights that prolonged engagement leads to dopamine dysregulation, fostering compulsive behaviors. A study by Fiellin et al. [14] found that teenagers who spend more than three hours per day on social media exhibit impaired impulse control, mirroring traits observed in substance-related addictions. Additionally, Alavi et al. [32] emphasized that behavioral addiction follows patterns similar to drug dependency (that is, affecting prefrontal cortex activity and cognitive decision-making).

Depression & Anxiety

Our review furthermore indicated a strong association between excessive social media use and depressive symptoms. A longitudinal study by Abi-Jaoude et al. [37] revealed that teenagers engaging in high-frequency social media interactions noted higher levels of self-comparison, anxiety, and depressive moods. Additionally, cyberbullying and social validation pressures contribute to elevated emotional distress [38]. These findings are consistent with prior research emphasizing that social comparison theory plays a key role in mediating depressive tendencies among adolescents [4].

Sleep Deprivation & Cognitive Impact

Evidence suggests that nighttime social media usage contributes significantly to sleep disturbances, disrupting circadian rhythms. A Pew Research Center survey (2022) found that 58% of teenagers struggle to limit their social media usage before bedtime, leading to delayed sleep onset and reduced sleep quality. Stanford Medicine [34] reports that blue-light exposure from screens inhibits melatonin production, causing chronic sleep debt among adolescents. Furthermore, disrupted sleep cycles correlate with impaired memory retention, decreased academic performance, and heightened stress responses.

The reviewed literature underscores that excessive social media usage manifests as an addictive behavior, exacerbates mental health challenges such as depression and anxiety, and significantly disrupts sleep cycles, leading to long-term cognitive and emotional consequences.

Although social media is currently a major part of teenagers' digital and real lives in means of identity, community, leisure, and communication, excessive usage can lead to many mental and physical health issues. Teenagers should limit the amount of time they spend on social media each day. Some tips for doing so include:

- Consciously recognizing when you have the urge to go on social media.
- Setting reminders to take a break from social media every 5-10 minutes.
- Regularly arranging cell phone breaks.
- Limiting the content you can see on social media.

- Switching to a "dumb phone", like a Nokia, Gabb phone, and/or a flip phone, that only has the ability to text message and call.
- Going on a digital detox at least once per week.
- Getting support from external resources such as a trusted friend, therapist, or support group.

Despite methodological limitations, the cumulative evidence supports a clear trend: teenagers engaging in high-frequency social media use exhibit patterns consistent with addiction, including dopamine dysregulation and compulsive engagement behaviors. Furthermore, social validation mechanisms on platforms like Instagram, TikTok, and Snapchat exacerbate self-esteem concerns, reinforcing negative feedback loops that contribute to depressive symptoms. Sleep deprivation acts as a compounding factor, worsening cognitive function, emotional regulation, and academic performance. To advance research in this domain, future studies should prioritize:

- Longitudinal analyses to assess the long-term neurocognitive consequences of excessive social media use.
- Standardized diagnostic criteria for social media addiction.
- Objective physiological measures (e.g., EEG sleep studies, fMRI dopamine activity).
- Controlled experiments that account for external variables influencing mental health outcomes.

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