# Adolescents' Internet Addiction: Influence Factors, Risks and Neuroscience Connectivity

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**Abstract.** This review explains and demonstrates certain factors and the formation of internet addiction in adolescents. The aim of this review was to find the Internet addiction concept, the mental status of the problematic use of the internet, the psycho-pathological mechanism in internet addiction, and neuroimaging studies on internet-addiction-related changes in brain activities. The methods in this article used the database Google Scholar to indicate the relationships between risk personality and internet addiction, supported by the adolescents' samples from the recent research. At the end of this review, we conclude that poor Internet use is linked to various negative psychological effects on teens. Understanding the variables that may lead to Internet misuse might help lessen its detrimental impacts.

**Keywords:** Adolescents, neuroscience connectivity, internet addiction, mental health.

## 1. Introduction

Internet addiction in adolescents is a core problem of the mental development of teenagers and the psychopathology that has been studied, mainly in parallel, through the lenses of education, personality psychology, and neurosurgery. This article would argue for mechanisms of adolescent internet abuse. This article will outline how the fundamental psychological aspects (ego-resilience, emotional intelligence, self-injury, depressive symptoms) may subserve the addictive behavior. We also argue that the damage to the psychosocial well-being underlies many risks (social anxiety, social phobia, social hostility, parenting crisis, and substance overdose) identified in the psychological research on compulsive Internet using and reviewing the latest sources that the neuroscience holds potential for the discovering decreased functional connectivity in adolescents with internet addiction. Some exceptional cases by the reviews are the evidence that illustrates that attention-deficit-hyperactivity-disorder (ADHD) patients have similar psychiatric conditions as internet addiction [1]. Also, conduct disorder increases the risk of internet addiction in adolescents with ADHD [2]. This review explains and demonstrates the factors that may cause adolescents' internet addictions. Much literature on the essential ideas discusses what makes teenagers addicted to the Internet [3, 4]. However, in general, the research underlying the assessments is still argued. While the fast growth of the Internet and internet production, including online video games, social media, and other cyber entertainments, several studies indicate that families, schools, and unexpected harmful incidents may also play an essential and complicated role in the reason adolescents are addicted to the Internet. Thus, in some of the early classic research on internet addiction in adolescents, Parker and Simmerfeldt discussed the relationships between emotional intelligence in clinical and special needs samples [5]. Trumello et al. devoted a page to the relationships with parents and emotion regulation in adolescents' internet addictions [6].

However, all the treatments for discussing the affections of the mental disorder are relatively brief. Additionally, few sources exist that comprehensively articulate the connection between psychopathology, mental development, and adolescent internet addiction. Therefore this article intends to accomplish this. In the first section, the introduction, internet addiction, mental development, and mental diseases are precisely defined. In the second part, the research method and the analytic research used to investigate the internet addiction in adolescents, psychopathology, and social relationships are indicated. As we show there, all these processes rely on the same underlying data sources. In section three, there will be a literature review, including the original discussion of

internet addiction, neuroscience, the mechanism of psychology, and the variables that may affect the addiction. In the last section, the hypothetical data from the examples developed in sections one and two will be used to illustrate both processes. This review could summarize the outcomes by investigating how these relate to adolescent internet abuse and considering various methods, treatments, and research directions. Therefore, this review evaluates, from a psychological standpoint (development psychology and clinical psychology) and the impact of the introduction on scientific research, to observe indirectly how this controversial field of research is progressing.

## 2. Methodology

There are further readings conducted using the academic database Google Scholar. The resources underlie the individual factors and the addiction to the Internet. The following studies' key points, and their derivatives were introduced: personality factors, mental health, social media, negative consequences of abuse, ADHD, depression, adolescents, and neurological aspects. Studies were required to (i) contain wide range of data (including the results that could be collected from studies to surveys with thousands of participants), (ii) the studies finished after 2010 (studies will be much more objective and supported by abundant data and experiments), and (iii) include an analysis of Internet SNS addiction.

## 3. Literature Review

### 3.1 Definition of Internet Addiction

Addiction to the Internet is often understood to be a compulsive disease characterized by a lack of inhibitions when using the Internet in the absence of drug abuse [7]. As a result of excessive Internet use, social and cognitive functioning are dramatically impaired. This issue is also referred to as problematic internet usage, unhealthy internet use, compulsive internet use, online dependency, and excessive internet use. Commonly, addiction to the internet is characterized as a condition in which a person has lost control of the amount of time spent on the internet and continues to use it in an excessive manner to the point that it has a detrimental influence on the individual's life [8]. Internet addiction is a challenging issue conceptually, clinically, and statistically. The characteristics of Internet addiction (IA) include persistence over time, tolerance, and impulsivity, as well as the prominence of the activity (a preoccupation with online activities) (seeking increasing time to achieve satisfaction). Young hypothesizes that internet usage tends to reduce dysphoric feelings and might thus be used to deal with or compensate for actual problems. In an early research, Yen et al. [9] argued that individuals are more likely to engage in periods of intensive TV watching when they are in dysphoric states; this finding is consistent with the idea that media usage has the ability to act as a kind of compensation for negative emotions. This is a kind of self-medication.

Researchers investigating the link between dysthymia, poor mood, and the growth of online misuse have used the term internet addiction most often since the year 2000. It is often characterized as the inability to limit Internet usage, which may lead to the development (and maintenance) of addictive symptoms, functional impairment, and co-occurring disorders in certain users. It is thought that the term was developed in the mid-1990s, and numerous academics argued for the presence of television and video games in 1995 [10]. Science's understanding of the issue has come a long way since then. The most study was conducted on internet addiction, followed by online entertainment, including online video games and social media addiction. However, its expansion has been the subject of academic, scientific, and clinical debate.

### 3.2 Adolescent's Personality Factors Influencing the Internet Addiction

Gray's [11] neuropsychological theory is a useful framework for comprehending and explaining fundamental human behaviors, including addiction. People have a self-efficacy system, a self-consistency system, a behavior activation system (BAS), a behavior inhibition system (BIS), and a

self-resilience system. Self-resilience refers to "the human attributes that enable one to flourish in the face of adversity" [12], and is often understood to be the ready availability of effective solutions to challenges. So, a person who is strong can deal well with stress and lessen its negative effects, such as anxiety and depression. Being weak can also have less of an effect on people who are resilient. Researchers have found that resilience protects the same way against Internet addiction. The bad effects that Internet addiction can have on your mind were lessened by your ability to bounce back. Also, teens who spent a lot of time on the Internet didn't do anything bad because they were strong.

Based on his reviews, Chun [13] concludes that proximal determinants are more generalizable than particular to any one addictive behavior. These proximal factors include attitudes, inadequate coping abilities, and exposure to peers who participate in addictive behaviors. Reduce refusal effectiveness. In addictive behaviors, distal determinants are also known as intermediate variables. Adolescents' perspectives on drug use are shaped by three factors: their own values, the values of their role models (such as parents), and their own affective states (such as poor self-resilience and emotional motivations for wanting to use substances). In addition, impulsivity, anxiety, and depression moderated the apparent relationship between poor self-efficacy and Internet addiction in a recent research conducted with high school students in Asia. As a result, the hypothesis that personality plays a role in one of the vulnerabilities that might lead to internet addiction is consistent with the available evidence.Several studies looked at the link between low self-esteem and using the Internet too much. According to the findings of these investigations, there is a negative association between these two factors [14]. In the research, however, there is no agreement on whether poor self-esteem is the source or the outcome of Internet addiction [15, 16]. Grifths's [17] early study gives vital insight into the link between self-esteem and Internet addiction. She showed that people may try to solve their troubles by using virtual reality, which allows them to establish alternative "personalities" and social identities. These persons, who perceive themselves badly, may increase their Internet use by becoming dependent on it. Teenagers are thought to be the most prone to Internet "addiction" in this instance. Frequently, bad Internet use is associated with a variety of negative psychological effects. According to our study, when adolescents demonstrate problematic drug use, it may be required to intervene by enhancing their self-esteem.

According to the Association of Indonesian Internet Service Providers the country’s internet users reached 132,7 million (51.7%) in 2014. Compared to college-going teenagers, high school students showed weak self-control, poor self-regulation, and low cognitive ability [18]. This assertion is corroborated by Kuss et al., who discovered that high school students crave adult-like freedom. According to a comprehensive literature review, internal and external factors influence teenage internet addiction. Internal variables include isolation, low self-esteem, and neuroticism in the personality.

### 3.3 Internet Addiction Risk of Teenagers with Poor Mental Health

Longitudinal associations between anxiety and teenage Internet addiction have been explored by several academics, and the mental health deficiency has been the subject of much investigation. Numerous factors influence the links between internet addiction and mental disorders. Between the ages of 25 and 29 and 35 and 39, there were 24 million internet users; between the ages of 15 and 19, there were 12.5 million; and between the ages of 10 and 15, there were 768 thousand [19]. The number of Internet users increases annually. Several studies have shown that internet addiction may result in psychopathology. According to a research done in Iran, internet-addicted populations tend to exhibit indications of psychiatric problems such as sadness, interpersonal sensitivity, anxiety, refractory depressive disorder, and bipolar disorder [20]. These phenomena were associated with greater hazards in the Internet-addicted group compared to the non-addicted group.

Recent research has connected Internet addiction to multiple mental illnesses, including depression and suicide ideation [21]. Anxiety [22], social phobia [23], obsessive-compulsive symptoms, hostility, aggressiveness, problematic alcohol use, drug abuse [24], self-injurious conduct [25], and in particular attention-deficit hyperactivity disorder [26] may be the cause of internet addiction. [22],

[23], [24], [25] Self-injurious behavior may be the result of [26] Internet addiction. ADHD is the most frequent axis-1 illness among adolescents referred for IA, according to Bozkurt et al. In addition, in a two-year longitudinal study of Taiwanese teenagers, ADHD was shown to be the most important predictor of internet addiction [23], along with anger.

54%–84% of children and adolescents with ADHD also have the oppositional defiant disorder (ODD), and a substantial number of these patients were anticipated to acquire ODD [28]. Consistent with the available data, 65.5% of our sample had co-occurring ODD/CD and ADHD. As with substance-use disorders, Lee et al. [29] suggested that ODD raises the likelihood of IA in adolescents with ADHD. It is believed that dysfunctions of the prefrontal brain play a significant role in the pathophysiology of ODD/CD [30]. Children and adolescents with conduct disorder display a propensity for risky and irresponsible behavior, indicating decision-making and impulsivity issues.

Despite contradictory research, a number of experts have recently expressed concern that internet usage in general, social networking, or at least some online activities undertaken on social media may be linked to mental problems. Pantic et al. investigated teenage depression and social networking in 2012. They discovered that the amount of time spent on Facebook and other social network platforms associated favorably with depressive symptoms as evaluated by the Beck Depression Inventory [31]. The following conclusion was drawn from a study: Time spent on Facebook and other SNS platforms is positively connected with depressive symptoms as evaluated by the Beck Depression Inventory [30], according to research by Pantic et al. In comparison to "face-to-face" interactions, it was projected that interpersonal ties formed on online social platforms may lack the necessary quality.

Also, researchers noticed one common syndrome that happens to kids with the risk of internet addiction. Multiple studies have revealed the negative consequences of internet addiction on teenagers, including irregular food habits, physical inactivity, inadequate sleep, increased sadness, loneliness, and social anxiety. In the psychological, psychiatric, and medical communities [30], these negative social and health implications are currently being contested. Communities. Additionally, internet-dependent students are more likely to have difficulty sleeping [32]. Depression symptoms are much more prevalent among students with sleep problems. Among the investigated children, internet addiction and its impact on sleeping habits and quality of life were prevalent [33]. Raising parental knowledge of problematic Internet usage and its risks will improve sleep habits and quality of life.

Despite extensive internet and social networking addiction, these diseases are not recognized as mental disorders by other classification and diagnostic instruments studies. Nonetheless, most authors concur that internet addiction is a severe public health issue that can negatively impact psychological health.

### 3.4 Neuroscience contributes to the adolescents in internet addiction

Internet addiction is linked to a broad and considerable reduction in cortico-striatal functional connection [34]. The network-based statistic (NBS) was used to identify regional brain networks with a statistically significant difference in interregional functional connectivity across groups. There was evidence of reduced functional connectivity in the brains of internet-dependent teenagers. Consistent with contemporary theories emphasizing the role of cortico-subcortical dysfunction in addiction [34]. Twenty-four percent of the disturbed network connections separating addicted patients from healthy controls included linkages between frontal and subcortical regions [35]. In keeping with earlier research connecting these areas in addiction, an additional 27% of studies connected subcortical and parietal regions, with minimal evidence for the insula's involvement. In this research, the NBS was used to determine the size of a network based on its size or the total number of connections [34]. This size measure cannot identify focused effects involving single, isolated links that do not constitute a network. To test for these sorts of focused variations across groups, the NBS analysis was repeated to investigate differences in component mass as opposed to size. Testing for component size changes is less vulnerable to focused, strong impacts than mass statistics. Both the FDR and the mass statistics

failed to detect any significant between-group variations, indicating that the diffuse network of cortical and subcortical areas involved in internet addiction's aberrant connection.

Addiction to the internet in adolescents has been studied for over six years, and many studies have been published describing the frontoparietal and salience networks in these young people. According to Yau Y H., while problematic Internet use is regarded as a "behavioral addiction" related to substance-use disorders, its brain bases are understudied [36]. Researchers have gained a better understanding of the neurobiology of online addiction as a result of many neuroimaging studies that investigated the structural and functional brain changes connected with this non-substance-related behavioral addiction [37]. These studies looked at the structural and functional brain changes linked with internet addiction. rs-fMRI is an efficient method for mapping the function and dysfunction of large-scale brain networks. This technique is based on the observation that functionally linked but geographically separate brain areas exhibit strongly correlated low-frequency (0.1 Hz) blood oxygen level-dependent oscillations. Using group independent component analysis [37], the resting-state fMRI data of 26 teenagers with internet addiction and 43 controls were analyzed, and five intrinsic connection networks (ICNs) were identified from the data. These ICNs include the anterior and posterior default mode network (DMN), left and right frontoparietal network (FPN), and salience network. The salience network was shown to be the most important (SN). This investigation demonstrated that Internet-dependent people had aberrant fractional anisotropy of the white matter [38] and reduced brain activity during the execution of certain activities [39]. An uncontrolled use of the internet may be supported by unbalanced connections within and between important brain networks [37]. The findings suggest that internet addiction and other addictive illnesses may have comparable neural abnormalities.

## 4. Implications and Limitations

Following the findings of these researches regarding cognitions derived from a social environment with excessive pressure on school performance, our findings indicate the need to consider other cognitions related to the social context that may impede the development of life projects. To avoid this issue, it is vital to instill confidence in adolescents' ability to construct the future from the present via interactions with instructors that support this confidence and boost enthusiasm for school within the peer culture of digital natives. Providing teenagers with chances to regulate their lives offline within the school framework will lessen their urge to hunt for these opportunities online and reduce their risk of internet addiction. Prior research has shown that the co-occurrence of internet addiction and anxiety symptoms is widespread. Nursing students who use the Internet excessively may be more neurotic, less extroverted, socially apprehensive [40], and lonely than their counterparts who do not exhibit these excesses and get more support from online social networks. Moreover, nursing students who experience greater fear may spend more time online to avoid real-world obligations, consistent with findings showing that socially anxious persons often prefer online communication to face-to-face interaction.

In addition, previous researchers demonstrated the consequence of internet addiction, including a wide range of comorbid factors and poor lifestyle habits. They also indicated that computer screen lighting might negatively influence circadian rhythm and contribute to sleep phase delay. Similarly, IA significantly impacts daytime drowsiness, sleeping problems, and tiredness [Ferreira et al., 2017]. Another research also found that internet addiction had detrimental effects on sleep, such as sleep deprivation and exhaustion [40].

From a neuroscientific perspective, a number of fundamental features explain the function of the internet in addiction. Multiple neurotransmitters, including dopamine, are known to be influenced by the area of the brain, and reduced striatal dopaminergic activity has been proposed as one of the basic biochemical reasons of addiction disorders. The present study includes a number of limitations. In the first place, established diagnostic criteria for internet addiction differ across studies, and the present study used maybe the most out-of-date but widely utilized measure. Due to the self-reported

nature of the scale, students may have reporting biases, such as concealing internet use time. In this research, family traits related with internet addiction were not studied as potential variables. Second, the limited sample size hindered our ability to discover significant associations between functional connectivity and YIAS scores [30]. Due to the school's and the student's friendship and family dynamics, academic pressure may be a crucial influence. Therefore, the current finding needs be replicated in a larger sample of internet-dependent patients and controls.

## 5. Conclusion

This review provides the data for understanding the relationship between internet addiction in adolescents, covering the personality factors, the mental health condition, psychological theories, and brain function underlying risk-taking. Teenagers are the most susceptible to Internet "addiction." Poor Internet usage is often associated with an array of unfavorable psychological outcomes for adolescents and adults. Determining ways to mitigate the negative effects of problematic Internet usage requires understanding the factors that might be predisposed to Internet misuse. In some cases, children with mental issues may be much easier to addict to the Internet. Following previous research, the current results highlight the importance of early diagnosis and management of internet addiction in adolescents with various mental challenges and personality disorders. For instance, these results also imply that adolescents with ADHD may be more susceptible to internet addiction than those with ADHD alone and that they may need to be evaluated with more care. Further future research is required to completely comprehend the relationships between IA and ADHD.

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