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Review article

The Impact of COVID-19 on Internet Addiction and Mental Health: A Brief Overview

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SUMMARY

Introduction. Beginning as a wave of unexplained pneumonia cases in Wuhan in December 2019, the novel coronavirus SARS-Cov-2 illness (COVID-19) spread throughout the world and posed a major threat to public health. People's lives were changing quickly, and COVID-19 instances were spreading quickly over the world, making people frightful. One of the ways in which the COVID-19 epidemic impacted people's lives was through the increased use of the Internet, particularly social media platforms. Research from the past undoubtedly connected the pandemic to symptoms of stress, sadness, worry, and suicide thoughts, in addition to increased Internet use. Research undertaken globally showed that an individual's propensity to develop an Internet addiction was positively correlated with the level of stress they experienced related to the COVID-19 epidemic.
Methods. We reviewed the scientific literature on Internet addiction, mental health, and COVID-19.
Conclusion. We came to the conclusion that more time was spent online during the COVID-19 pandemic. Furthermore, the aforementioned facts led to a decrease in social activities, which in turn caused Internet addiction. This resulted in psychological distress, increasing the feelings of loneliness and depression.

Keywords: **COVID-19, anxiety, Internet dependence, depression**

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INTRODUCTION

Beginning in Wuhan in December 2019 as a cluster of unexplained pneumonia cases, the novel coronavirus illness 2019 (COVID-19) quickly spread throughout the world and posed a major threat to public health. Limits on the movement of people and full or partial lockdowns were enacted in many countries to stop the disease's spread and keep health systems from being overburdened (1, 2).

Nine days after the first official case of COVID-19 was discovered, on March 15, 2020, the Serbian government declared a state of emergency. As a result, one of the Europe's strictest pandemic response measures, including a 12-hour curfew and weekend enforcement by the police, strict movement restrictions (especially for those over 65) and border closures, were put into force. All kindergartens, schools, colleges, and cultural institutions were closed and children were forced to spend days, weeks, or even months indoors learning via TV platforms and Internet. Sports and training were also put on hold. When people began spending time using computers and tablets and watching TV at home, social media greatly contributed to the dissemination of news and the bringing of people together (2).

The COVID-19 epidemic left the entire world in shock and agony, with 200 developed and developing countries reporting confirmed cases. People were terrified because COVID-19 cases were spreading quickly around the world and because lifestyles were changing quickly. Research from the past has undoubtedly linked the pandemic to symptoms of stress, despair, anxiety, and suicide thoughts, in addition to increased Internet use (3). Internet access was the sole way to communicate with others during the lockdown. Many studies conducted during the quarantine suggested that mental health problems have increased since the start of this global epidemic (3).

In regards to the COVID-19 pandemic's effects on mental health and Internet addiction, this paper offers a concise summary of the existing scientific research.

METHODS

This is a narrative review. Using the Medline database and the PubMed interface, a search of the available literature for English-language articles was conducted. Using the Boolean operators "AND" or "OR," the keywords and MeSH terms "Internet addiction," "mental health," and "COVID-19" made it easier to identify the research and reports needed to look into the relationship between Internet addiction and COVID-19. Only the three keywords were used in the main literature search. Furthermore, utilizing the same electronic database and more particular search queries, a second, more thorough literature search was carried out to confirm the review's thoroughness. The following terms, as well as their combinations, were frequently used for this purpose: “depression,” “distress”, “loneliness”, “coronavirus disease 2019” AND “Internet addiction” OR “mental health” OR “psychological distress” AND “Internet addiction”. We included observational studies, cross-sectional studies, meta-analyses, and systematic reviews published between 2020 and 2022. We examined the data that is currently available about the COVID-19 pandemic's impact on conditions like depression, anxiety, Internet abuse, distress, social isolation, and loneliness that can be connected to Internet addiction.

RESULTS

Table 1 summarizes the characteristics of the most important studies included in this rapid review that examined Internet addiction and mental health during the COVID-19 pandemic.

Table 1. *Some of the most important research conducted during the COVID-19 pandemic on Internet addiction and mental health*

Authors	Year	Country	Aim of the study	Study design	Population (sample size)	Relevant measures of mental health	Relevant measures of Internet addiction	The most significant results
Kumar et al.	2022	India	To determine how Internet addiction affects anxiety and sleep quality in Bhubaneswar college students during COVID-19	Web-based cross-sectional, questionnaire study	Students (n = 475)	Generalised anxiety disorder score; The Pittsburgh Sleep Quality Index	Patterns of Internet use; Youngs Internet Addiction Test	- Students' excessive Internet use leads to anxiety and affects mental health; - Females were more addicted than males.
Gao et al.	2020	China	To determine how common mental health issues are and investigate whether social media use is associated with mental health issues	Cross-sectional study	Citizens aged ≥ 18 years old (n = 4872)	WHO-Five Well-Being Index (WHO-5); Generalized anxiety disorder scale (GAD-7)	Demographics and social media exposure (SME)	- More than 80% of participants reported frequent exposure to social media; - There was a high prevalence of mental health problems (depression, anxiety and combination of depression and anxiety), which were positively associated with frequent social media exposure during the COVID-19 outbreak.
Lebni et al.	2020	Iran	To examine Internet addiction and its impact on college students' mental health	Descriptive -analytical study	Students (n = 447)	Goldberg General Health Questionnaire 28	Young's Internet Addiction Test	- Excessive use of the Internet by students leads to anxiety, depression and negative mental health, which affects their academic performance; - Significant predictors of students' vulnerability to Internet addiction were depression, and somatic symptoms.
Onukwuli et al.	2022	Nigeria	To identify the incidence of Internet addiction and its contributing factors among teenagers during the epidemic	Cross sectional study	Adolescents (n = 851)	Structured self – administered questionnaire	Young's Internet Addiction Test (IAT)	- The prevalence of Internet addiction was 88.1% (24.9% had mild, 59.6% had moderate, while 3.6% had severe addiction) and a good proportion of the respondents (81.1%) perceived addiction as bad; - The predictors of addiction were the male gender, early adolescent age, and duration of Internet use.
Lin	2020	Taiwan	To assess Internet addiction prevalence and determine psychosocial risk factors during the COVID-19 pandemic	Cross-sectional study	High school students (n = 1060)	Depression Anxiety Stress Scale (DASS)	The Chen Internet Addiction Scale (CIAS)	- The prevalence of Internet addiction was found to be 24.4%; - High impulsivity, high virtual social support, older in age, low subjective well-being,

								family disfunctionality, and alexithymia were independent predictors of Internet addiction.
Siste et al.	2020	Indonesia	To evaluate the influence of COVID-19 on the prevalence of Internet addiction (IA) and examine the associated variables during the pandemic and quarantine pandemic	Online survey	Adults (n = 4734)	Symptoms Checklist-90; Pittsburgh Sleep Quality Index	Internet Addiction Diagnostic Questionnaire (KDAI)	- The prevalence of Internet addiction during the COVID-19 pandemic was 14.4%. - Online duration increased by 52% compared to the period before the pandemic. - Increased time of daily Internet use, specific motivation, types of application, and having confirmed/suspected COVID-19 cases within the household were predictive of Internet addiction.
Sarıalioğlu et al.	2021	Turkey	To ascertain the correlation between the degrees of Internet addiction that teenagers have and the loneliness that they perceive during the epidemic	Descriptive-correlational study	Adolescents (n = 482)	UCLA loneliness scale-short form (ULS-SF)	Internet addiction scale for adolescents (IASA)	- It was found that family income, mothers' education status, fathers' education status, duration of Internet use before and during the pandemic, and the total score of loneliness had statistically significant effects on the total score of Internet addiction. - For adolescents as the level of loneliness increases the level of Internet addiction increases as well.
Hamami et al.	2021	Indonesia	To determine whether stress and Internet addiction are related in college students	Survey-based correlational quantitative study	College students (n = 81)	Perceived Stress Scale-10 modified for COVID-19	Internet Addiction Test	- There was a significant positive relationship between stress due to the COVID-19 pandemic and Internet addiction among students. - The higher the level of stress related to the COVID-19 pandemic in an individual, the higher the tendency for Internet addiction.
Dong et al.	2020	China	To scientifically evaluate the potential psychological variables linked to Internet addiction (IA) and evaluate the characteristics of Internet use during the COVID-19 pandemic	Cross-sectional, anonymized, self-reported survey	Children and adolescents (n = 2050)	Young's Internet Addiction Test (IAT); Questions regarding demographic information and Internet use characteristics	Depression, Anxiety, and Stress Scale (DASS-21)	- Internet usage grew during the COVID-19 epidemic, including the frequency and duration of recreational Internet use, and the frequency of stay-up Internet use. - Female gender, age, depression, and stress were significantly correlated with excessive Internet use.

Jain et al.	2020	India	To investigate the relationship between Internet addiction, insomnia, and depression	Cross-sectional study	Subjects who have been using Internet for the past six months (n = 954)	PHQ-9; Insomnia Severity Index (ISI)	Internet addiction Test (IAT)	- Internet addiction was predominantly associated with depression and insomnia; - Several parameters including graduation level, time spent per day online; the place of Internet use, cigarette and alcohol consumption had significant association with Internet addiction.

DISCUSSION

Mental health and COVID-19

The COVID-19 pandemic's severity presents new concerns for mental health. The World Health Organization states that mental health is a state of well-being that allows an individual to reach their full potential, manage everyday stress, work efficiently, and contribute to the community. A mentally healthy individual exhibits positive interactions with others, successful functioning within their own family, and the ability to express satisfaction in life. Thus, mental health encompasses more than just the absence of mental disorders. A complete life for an individual includes being sad, ill, furious, or unhappy; those with good mental health experience these emotions frequently. Yet, mental health is frequently seen as having only positive effects, characterized by a sense of control over surroundings and contentment (4).

Mental health is a concept that describes how we think, feel, and act when confronted with various situations in life (5). There has been an increase in interest in researching the causes, symptoms, and treatments of depression, anxiety, and stress since these conditions are seen to be fundamentally negative indicators of mental health and some of the major health issues. Dysphoria, pessimism, a sense of self- and life-devaluation, social weariness, and anhedonia are all the signs of depression in a person. Anxiety is characterized by elevated levels of physiological arousal, self-perceived anxiety, and a sense of helplessness. When one or more risky occurrences take place, the organism enters a state of negative stress, which is characterized by increased levels of arousal and strongly negative mental thoughts. Typically, those who are predisposed to anxiety also frequently exhibit depressive symptoms, and vice versa. Depression and anxiety are also correlated with stress (6).

The COVID-19 pandemic brought people into many situations that changed not only their own lives but also of those they cared about. Until then, people had not been accustomed to situations like closing their homes, excluding themselves from social interactions, losing close friends, and general to uncertainty. Their mental health probably suffered significantly because of the ongoing pandemic stress. Stress encompasses physiological and psychological responses to environmental stressors, and people frequently have no control over these stress-inducing factors (4).

A worldwide quarantine response to the COVID-19 pandemic occurred, and it was associated with feelings of social distancing, anxiety, and loneliness. Panic and fear of the disease, in conjunction with lockdown and physical isolation, especially in vulnerable individuals, can lead to a number of negative outcomes, including social isolation, reduced family and social support, job loss, loneliness, inactivity, restricted access to basic services, and increased exposure to food, alcohol, drugs, and online gambling (7). A Chinese study found that the COVID-19 pandemic was associated with a notable prevalence of mental health problems, which were closely linked to frequent usage of social media (8).

Studies evaluating stress, anxiety, and depression during quarantine brought on by the spread of SARS-CoV-2 showed that the COVID-19 pandemic is linked to extremely high levels of stress, which in many cases may cross the threshold of clinical significance. Significant psychological distress

and psychopathological variables were found in these studies (9).

Internet addiction and COVID-19

The term "Internet addiction" (IA) refers to a compulsive behavior linked to any online activity that interferes with daily living and stresses out social interactions. In addition to offering seven diagnostic criteria (at least three criteria over two months), the American Psychiatric Association defines IA as a disorder linked to mood disturbances over a two-month period. These criteria include tolerance, mobility symptoms, spending more time than expected online, a persistent tendency to impulse control behavior, spending time on online-related activities, a decrease in social activity and employment, enjoyment of the effects of Internet use, and continued use (10).

The outcome of excessive Internet use is Internet addiction. "Problematic Internet use" is another word for Internet addiction, which is the inability of an individual to control their use of the Internet, according to Shek et al. (11). Over the world, it has emerged as a grave health issue. According to research, one in eight Americans experience problematic Internet use (12). Two point four percent of Chinese people (13), 10.4% of Taiwanese people (14), 1.5% and 8.2% of Americans and Europeans (15), respectively, and 3.2% of UK people reported having an Internet addiction (16).

In the occurrence of the pandemic, the rates in Taiwan (17), Nigeria (18) and Indonesia (19) were 24.4%, 88.1%, and 14.4%, respectively. Another study that used six Asian nations found that the Philippines had the highest rate of Internet addiction (20). During the pandemic, a number of risk factors are linked to Internet addiction, including loneliness and fear of missing out, boredom, COVID-19 dread, melancholy, anxiety, and hyperactivity (21). Moreover, it is the cause of insomnia and poor sleep quality (22). Various research indicate that Internet addiction reduces self-confidence, social self-efficacy, and self-esteem (23). As a result of the Internet addiction, people often neglect their families, which can lead to various social and psychological difficulties and endanger the emotional, psychological, and mental well-being of each family member (24). Internet addiction among unemployed persons suggests that they are less interested in skill development (25). Academic achievement is also hampered by problematic Internet use (26). The percentage of unemployed people may rise because of this.

It has already been noted that excessive and inappropriate Internet use is associated with IA. Teenagers and young adults who use the Internet excessively are the most prevalent and susceptible Internet users (27). Although results are frequently inconsistent, IA is a serious public health concern, particularly in adolescents. Many studies have found a connection between IA and conditions like depression, anxiety, and stress (28). Moreover, the prevalence rate of problematic Internet use ranges from 14% to 55% in nine European nations (29). Yet, during the COVID-19 pandemic, Internet addiction became more common.

Relationship between mental health and Internet addiction in the context of the COVID-19 pandemic

Many people develop mental health issues throughout the course of their lives, which has an impact on how we decide to manage stress, interact with others, and make decisions. People's psychological and social outcomes are ascribed, in part, to the persisting COVID-19 infection and the associated house confinement, lockdown, and social isolation. Not only did this affected people's mental health, but it also disrupted their sleep patterns and produced negative feelings in society (30). The use of the Internet has also grown exponentially over the years, and since everyone was compelled to stay indoors during the pandemic, it was the only way for people to access entertainment, take online courses, and stay in touch with loved ones who were in distant areas of the country (30). A meta-analytic review conducted by Tokunaga in 2017 determined the average correlation of Internet habits with loneliness and depression in the existing research and explored particular order in which these effects may differ. Cumulative correlations presented loneliness and depression as independent variables related to Internet habits in all studies (31).

One of the numerous facets of life that have been impacted by the COVID-19 epidemic is the rise in Internet use, particularly on social media sites. Frequent Internet users run the risk of becoming addicted to the Internet. Global research results show that an individual's propensity to become addicted to the Internet increases with the amount of

stress they experience related to the COVID-19 epidemic (32).

Research by Jain et al. (33) and Bhandari et al. (34) revealed a significant positive correlation between Internet addiction and anxiety. Lebni et al. (35) established the link between Internet addiction and depression, as well as the fact that excessive Internet use might worsen depression and social isolation by reducing ties to friends, family, and the local community. Thus, an Internet addiction can result in depression (35). Several studies have demonstrated that people may experience anxiety symptoms as a result of their dread of COVID-19 and prolonged quarantine. Online gaming, online shopping, online television shows, and online chatting are examples of amateur Internet hobbies that are frequently used as coping mechanisms for anxiety and depression. However, excessive use can exacerbate anxiety and reinforce Internet addiction by developing dysfunctional coping mechanisms (35).

Studies have revealed that there is a strong connection between Internet addiction and mental health problems, including depression, anxiety, and stress. Internet addiction was more likely to occur in people who were depressed (36). This is feasible given the chaotic nature of life during the COVID-19 pandemic. The participants were more depressed as word spread about the countless deaths brought on by COVID-19. Anxiety is a significant mental health issue. There is a clear link between anxiety and internet addiction, according to studies. News about COVID-19 and its indestructible status may raise the likelihood of anxiety among participants because Internet addiction results in more time spent online (37). Stress, another condition affecting mental health, has been linked to Internet addiction because of going through a stressful lockdown due to the COVID-19 outbreak (32).

Human behavior has been profoundly impacted by the Internet, which has both beneficial and negative impacts. However, excessive usage of the Internet can lead to Internet addiction. Research has demonstrated that prolonged usage of the Internet causes anxiety, depression, and mental health problems.

CONCLUSION

Our analysis of the scientific literature on COVID-19, mental health, and Internet addiction has led us to the conclusion that, as a result of fewer social activities during the pandemic, people spent more time online, which exacerbated psychological distress and increased feelings of loneliness and depression.

An important problem that negatively impacts mental health is Internet addiction. Because of this, early intervention is essential, especially in conditions of increased social stress, as the COVID-19 pandemic was.

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Uticaj COVID-19 na zavisnost od interneta i mentalno zdravlje: kratak pregled

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SAŽETAK

Uvod. Počev od talasa neobjašnjivih slučajeva upale pluća u Vuhanu u decembru 2019. godine, nova bolest iz grupe koronavirusa, nazvana SARS-Cov-2 (COVID-19), širila se globalno, predstavljajući ozbiljnu pretnju po javno zdravlje. Životi ljudi brzo su se menjali, a slučajevi infekcije COVID-19 ubrzano širili svetom, izazivajući strah. Uticaj epidemije COVID-19 na život ogledao se, između ostalog, u tome što se internet (posebno platforme društvenih medija) koristio u većoj meri. Prethodna istraživanja nesumnjivo su povezala pandemiju sa simptomima stresa, tuge, brige i mislima o samoubistvu, kao i sa povećanom upotrebom interneta. Istraživanja sprovedena u svetu pokazala su da je sklonost pojedinca da razvije zavisnost od interneta u pozitivnoj korelaciji sa nivoom stresa koji doživljava u vezi sa epidemijom COVID-19.

Metode. Pregledali smo naučnu literaturu o zavisnosti od interneta, mentalnom zdravlju i infekciji COVID-19.

Zaključak. Zaključili smo da je u toku pandemije COVID-19 došlo do povećanja vremena provedenog na internetu. Zbog navedenih činjenica, došlo je do smanjenja društvenih aktivnosti, koje je potom dovelo do razvijanja zavisnosti od interneta. To je rezultiralo psihičkim stresom, pojačanim osećajem usamljenosti i depresijom.

Ključne reči: **COVID-19, anksioznost, zavisnost od interneta, depresivnost**