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FROM SUBSTANCE USE TO ALGORITHMIC CONTROL: NEW PARADIGMS IN THE PSYCHOLOGY OF ADDICTION

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ABSTRACT

This article analyzes the stages in the development of the psychology of addiction and elucidates the intrinsic interconnections among chemical, behavioral, and digital–algorithmic forms of addiction. The study examines the neurobiological and biopsychosocial foundations of addiction, with particular attention to the dopaminergic reward system and the impact of contemporary digital technologies and artificial intelligence on human behavior. Addiction to artificial intelligence is interpreted as a new and complex phenomenon within modern psychology.

KEYWORDS

Addictive behavior; chemical addiction; behavioral addiction; digital addiction; addiction to artificial intelligence; dopaminergic reward system; biopsychosocial model; algorithmic control.

Introduction

The psychology of addiction is a fundamental scientific field that explains disturbances in human behavior, motivational systems, and conscious activity, and its formation and development are directly linked to the social, economic, and technological changes occurring within society. According to explanatory dictionaries of psychological concepts, addictive behavior (from the English addiction, meaning dependence or a harmful habit, and the Latin addictus, referring to being completely bound to something) is defined as a specific form of destructive behavior in which an individual seeks to escape from real life by deliberately altering their psychological state [1].

In psychology, the main types of addictive behavior are commonly classified as follows:

– the consumption of psychoactive substances that alter mental states, including alcohol, narcotic drugs, synthetic pharmaceuticals, and various toxic substances;
– pathological involvement in gambling activities, including computer and video games;
– addictive forms of sexual behavior;
– excessive eating or, conversely, pathologically restrictive eating;
– excessive involvement in work activities (“work addiction”);
– prolonged exposure to rhythm-based loud music or similar stimuli accompanied by a loss of self-control [2].

During the formation of addictive behavior, a noticeable narrowing of interpersonal emotional relationships and a decline in the quality of social interactions are observed. In a narrow sense, addictive behavior is limited exclusively to forms of dependence on psychoactive substances.

In the early stages, the concept of "addiction" was primarily interpreted as a state of physiological dependence resulting from the consumption of alcoholic beverages, narcotic substances, and other psychoactive agents. This interpretation dominated medical literature of the nineteenth and early twentieth centuries, where addiction was viewed exclusively as a somatic disorder [3].

However, from the second half of the twentieth century onward, research conducted in psychology, psychiatry, neurobiology, and sociology demonstrated that addiction is a far more complex phenomenon. Scholars established that addiction does not arise solely from the effects of a substance, but is also closely associated with individuals' internal psychological needs, capacities for emotional regulation, reward system responses, impulsivity, and stable patterns of personal behavior [4]. In other words, addiction represents a complex integration of physiological processes, cognitive mechanisms, emotional states, and behavioral patterns.

This scientific shift made it possible to conceptualize addiction not merely as a substance-related disorder, but as a complex phenomenon shaped by the interaction between an individual's internal psychological dynamics and external social influences. As a result, a new concept emerged in the psychology of addiction—behavioral addictions. According to this perspective, even in the absence of psychoactive substance use, certain behaviors—such as gambling, excessive engagement in games, overuse of the Internet, and persistent activity on social networking platforms—can stimulate the brain's dopaminergic system in a manner comparable to that of chemical substances.

At this stage, the psychological model of addiction was substantially refined. Addiction began to be explained in terms of:

– the central role of an individual's need for reward;
– the necessity of alleviating negative emotional states;
– deficits in impulse control;
– disturbances within the motivational system;
– and the influence of external stimuli that reinforce behavior [5].

Taken together, these factors function as an integrated system that accounts for the formation, development, and maintenance of addictive behavior.

Scientific studies conducted in the late twentieth and early twenty-first centuries, integrating neurobiological and psychological perspectives, provided a deeper understanding of the complex nature of addiction [6]. As a result, the psychology of addiction evolved beyond a purely clinical phenomenon and developed into an interdisciplinary field that examines the interactions between everyday human behavior, personality structure, social experience, and the technological environment.

In the late twentieth century, extensive research led by the prominent U.S. neurobiologist George F. Koob and Nora D. Volkow, Director of the National Institute on Drug Abuse (NIDA), fundamentally transformed prevailing views on the neurobiological foundations of addiction. Their work conceptualized addiction not as a simple behavioral disorder, but as a complex phenomenon associated with pathological changes in the brain's motivational and reward systems. According to their central conclusions, addiction is driven by dysregulation of the dopaminergic reward system, heightened sensitivity to reward-related cues, and a value system in which short-term gratification is prioritized [4]. These processes are observed in dopamine-related brain structures such as the ventral striatum and

the nucleus accumbens. Consequently, the individual's "wanting" response intensifies, while the "liking" response diminishes, leading to the development of the compulsive nature of addictive behavior.

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The "brain disease model of addiction" developed by George F. Koob and Nora D. Volkow conceptualized addiction not as a manifestation of ordinary weakness of will or moral failure, but as a neurofunctional disorder. According to this model, three major changes occur in the brain over the course of addiction:

1. reduced sensitivity of the reward system, whereby ordinary life experiences no longer produce pleasure;
2. hyperactivation of the stress system, leading to a rapid intensification of negative emotional states;
3. impairment of executive functions, resulting in diminished impulse control and weakened planning abilities [8].

Subsequent research further expanded this model by explaining addiction in conjunction with cognitive impairments (such as reduced critical thinking and difficulties in evaluating errors) and emotional imbalance (including heightened stress sensitivity, affective vulnerability, and impulsivity). In addition, social factors—such as social pressure, isolation, and a lack of supportive relationships—were identified as playing a significant role in addiction. Consequently, addiction was reinterpreted as a multifactorial phenomenon within a biopsychosocial model [6].

At the beginning of the twenty-first century, the rapid proliferation of digital technologies gave rise to a new evolutionary stage in the psychology of addiction. Addiction was no longer viewed as being limited to chemical substances; instead, it was demonstrated that dependence could also develop through digital stimuli and algorithmic control. Behaviors such as Internet addiction, computer gaming addiction, social media addiction, online gambling, and smartphone addiction began to be recognized by the scientific community as distinct forms of addiction [7].

The primary reason for the emergence of technology-related addictions lies in the capacity of digital technologies to artificially and intensely stimulate the dopaminergic reward system [7, 9, 11]. For example:

– endless content streams continuously activate reward anticipation mechanisms;
– "like," "share," and notification systems exploit the human need for social validation;
– reward structures in games intensify dopaminergic cycles of "winning";
– personalized algorithms deliberately reinforce user engagement by targeting individual preferences.

As a result, dependence on digital technologies increases sensitivity to reward in the brain in a manner similar to psychoactive substances, while simultaneously weakening regulatory and control systems [9]. In such processes, two fundamental mechanisms of addiction become active:
– positive reinforcement, referring to the desire to repeatedly experience pleasurable stimulation;
– negative reinforcement, referring to the use of digital technologies to reduce stress, boredom, or emotional discomfort.

Together, these mechanisms contribute to the formation of digital technology addiction. Thus, the psychology of addiction has shifted from chemical substances to behavioral processes and subsequently to digital and algorithmic stimuli, representing a profound evolutionary transformation in contemporary addiction theory.

In the development of digital addictions, a number of modern psychological mechanisms have been identified. These mechanisms emerge from the interaction between the evolutionary characteristics of the human mind and the technical capacities of digital technologies. The mechanism of immediate reward intensifies the individual's need to obtain gratification instantly. This tendency aligns with the nature of the brain's dopaminergic system: the faster and more unexpected the reward, the greater the release of dopamine. Digital platforms, particularly systems based on artificial intelligence, deliver responses within milliseconds. As a result, users become habituated to rapid rewards, while their interest in sustained, complex cognitive activity gradually declines.

The endless flow of content represents one of the most powerful mechanisms underlying digital addiction. The perceived inexhaustibility of information and the anticipation of constantly new stimuli continuously activate the brain's reward system and prevent disengagement from digital platforms [7]. This process generates a high-intensity dopaminergic cycle, fostering a behavioral pattern characterized by the urge to "check one more time."

Algorithmic control constitutes the regulatory mechanism of digital addiction. Platforms monitor user behavior and deliver content tailored to individual preferences. Although this process often operates imperceptibly, it shapes behavior at a subconscious level [10]. Without fully realizing that their actions are being algorithmically guided, individuals begin to spend increasing amounts of time on digital platforms.

Adaptive personalization further intensifies this process by treating each user as a distinct psychological profile and automatically generating content aligned with their needs, emotional states, and interests. This mechanism is particularly evident in artificial intelligence–based systems such as ChatGPT, Replika, and Gemini. As individuals receive increasingly personalized responses, feelings of psychological closeness and trust toward the system are strengthened.

The tendency to avoid cognitive effort is grounded in the principle of cognitive energy conservation. Rather than engaging in demanding cognitive processes, individuals tend to rely on artificial intelligence systems that provide ready-made solutions. This preference reduces independent thinking, amplifies intellectual passivity, and contributes to the formation of cognitive dependence on artificial intelligence [11].

The mechanism of emotional compensation represents another central component of digital addiction. Individuals attempt to alleviate negative emotional states—such as anxiety, loneliness, stress, and uncertainty—through interaction with artificial intelligence. Because AI-mediated communication is consistently polite, nonjudgmental, and supportive, emotional needs are increasingly satisfied through algorithmic interlocutors [12].

The need for social validation, an evolutionarily rooted human motive, is stimulated in digital environments through notifications, likes, feedback, and real-time responses. In interactions with artificial intelligence, users similarly experience emotional gratification resembling social reward when their opinions are acknowledged and positively received [13].

These mechanisms closely correspond to the operational principles of artificial intelligence platforms. As AI systems adapt more precisely to users' cognitive, emotional, and social needs, the formation of dependence on artificial intelligence—particularly among students—becomes increasingly likely. This process can be explained by the transformation of artificial intelligence from a mere educational tool into a psychological agent.

The subsequent stage of digital addiction—addiction to artificial intelligence (AI)—has been actively discussed in the scientific literature since the 2020s. The high level of interactivity, conversational capacity, user-adaptive semantic systems, and mechanisms for emotionally responsive feedback have transformed AI into a psychological tool that differs fundamentally from classical digital platforms. Consequently, researchers have begun to identify compulsive use, cognitive reliance, emotional attachment, and algorithmically guided behavior as novel forms of addiction specifically associated with AI systems.

Artificial intelligence is no longer perceived merely as a technological instrument; rather, it increasingly functions as a psychological agent, social interlocutor, cognitive assistant, and intellectual partner.

When summarizing the evolution of the psychology of addiction, three major stages can be identified:

1. The stage of chemical addictions, characterized by substance-induced disruption of the brain's dopaminergic system and the formation of physiological dependence;
2. The stage of behavioral addictions, in which dopaminergic reward processes are artificially intensified through behavior alone, without the use of substances;
3. The stage of digital and AI-related addictions, marked by algorithmic control, interactive AI-mediated communication, emotional compensation, cognitive offloading, personalization, and engagement with artificial conversational agents, resulting in complex forms of psychological dependence.

Addiction to artificial intelligence represents an integrated and convergent form of these three stages, wherein biological, cognitive, emotional, and algorithmic factors interact and mutually reinforce one another. For this reason, AI addiction is increasingly recognized as one of the most complex, multilayered, and pressing phenomena in contemporary psychology.

References

1. APA Dictionary of Psychology. — Washington, DC: American Psychological Association, 2007. — 1024 p.
2. Grant J. E., Potenza M. N., Weinstein A., Gorelick D. A. Introduction to behavioral addictions // The American Journal of Drug and Alcohol Abuse. — 2010. — Vol. 36, № 5. — P. 233–241.

3. Jellinek E. M. The disease concept of alcoholism. — New Haven (CT): Hillhouse Press, 1960. — 384 p.
4. Koob G. F., Volkow N. D. Neurobiology of addiction: A neurocircuitry analysis // The Lancet Psychiatry. — 2016. — Vol. 3, № 8. — P. 760–773. — DOI: 10.1016/S2215-0366(16)00104-8.
5. Griffiths M. D. A ‘components’ model of addiction within a biopsychosocial framework // Journal of Substance Use. — 2005. — Vol. 10, № 4. — P. 191–197. — DOI: 10.1080/14659890500114359.
6. Engel G. L. The need for a new medical model: A challenge for biomedicine // Science. — 1977. — Vol. 196, № 4286. — P. 129–136. — DOI: 10.1126/science.847460.
7. Kuss D. J., Griffiths M. D. Social networking sites and addiction: Ten lessons learned // International Journal of Environmental Research and Public Health. — 2017. — Vol. 14, № 3. — Article 311. — DOI: 10.3390/ijerph14030311.
8. Volkow N. D., Koob G. F., McLellan A. T. Neurobiologic advances from the brain disease model of addiction // New England Journal of Medicine. — 2016. — Vol. 374, № 4. — P. 363–371. — DOI: 10.1056/NEJMra1511480.
9. Alter A. Irresistible: The rise of addictive technology and the business of keeping us hooked. — New York: Penguin Press, 2017. — 368 p.
10. Eyal N. Hooked: How to build habit-forming products. — New York: Portfolio, 2014. — 256 p.
11. Risko E. F., Gilbert S. J. Cognitive offloading // Trends in Cognitive Sciences. — 2016. — Vol. 20, № 9. — P. 676–688. — DOI: 10.1016/j.tics.2016.07.002.
12. Turkle S. Alone together: Why we expect more from technology and less from each other. — New York: Basic Books, 2011. — 384 p.
13. Montag C., Lachmann B., Herrlich M., Zweig K. Addictive features of social media/messenger platforms and freemium games against the background of psychological and economic theories // International Journal of Environmental Research and Public Health. — 2019. — Vol. 16, № 14. — Article 2612. — DOI: 10.3390/ijerph16142612.