



**INTERNET AND GAMING ADDICTION: EXPLORING THE ROLE OF
PHARMACOLOGICAL TREATMENTS**

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ABSTRACT

Internet and gaming addiction (IGA) has emerged as a growing global health concern, particularly among adolescents and young adults. Excessive online activity and compulsive gaming behavior can significantly impair academic, social, and occupational functioning. While behavioral therapies such as cognitive-behavioral therapy (CBT) remain first-line interventions, pharmacological treatments are being explored as complementary strategies. This review article aims to evaluate the role of pharmacological treatments in addressing internet and gaming addiction, drawing evidence from PubMed- and Scopus-indexed studies, as well as guidelines from the World Health Organization (WHO), the American Psychiatric Association (APA), and government health policies. The paper also highlights mechanisms of drug action, clinical trials, and challenges associated with pharmacological interventions.

**Keywords: Internet addiction, Gaming disorder, Pharmacological treatments,
Neurobiology, Dopamine, Adolescents**

1. INTRODUCTION

Internet and gaming addiction has become a pressing issue in modern societies, where digital technology permeates nearly every aspect of daily life. The WHO officially recognized “gaming disorder” in the *International Classification of Diseases (ICD-11)* in 2018, defining it as impaired control over gaming, increased priority given to gaming over other activities, and continuation of gaming despite negative consequences [1]. Similarly, the *Diagnostic and Statistical Manual of Mental Disorders (DSM-5)* listed “Internet Gaming Disorder” as a condition for further study [2].

The prevalence of internet and gaming addiction varies across regions, with estimates ranging from 3–10% globally, and higher rates reported in East Asian countries [3, 4]. Excessive gaming has been linked to structural and functional brain changes, particularly in

dopaminergic pathways, resembling those seen in substance use disorders [5, 6].

Traditional management strategies have focused on psychosocial interventions, including CBT, family therapy, and psychoeducation. However, growing interest has emerged in pharmacological options—particularly selective serotonin reuptake inhibitors (SSRIs), opioid antagonists, and medications that target dopamine dysregulation. This review provides a comprehensive analysis of current evidence on pharmacological treatments for internet and gaming addiction.

2. Neurobiology of Internet and Gaming Addiction

2.1 Reward Pathways

Addiction behaviors, whether substance-related or behavioral, share common neural substrates. The mesolimbic dopamine system, particularly projections

from the ventral tegmental area (VTA) to the nucleus accumbens (NAc), is central to reinforcement and craving [7].

2.2 Neurotransmitter Dysregulation

- Dopamine: Excessive stimulation during gaming leads to heightened dopamine release, reinforcing the behavior.
- Serotonin: Impairments in impulse control are linked to serotonin deficits.

- Glutamate: Dysregulation affects learning, reward prediction, and compulsivity.

2.3 Neuroimaging Evidence

MRI studies have shown reduced gray matter volume in the prefrontal cortex of individuals with IGA, indicating deficits in executive control [8]. fMRI research highlights hyperactivation of reward circuits in response to gaming cues, similar to drug craving [9].

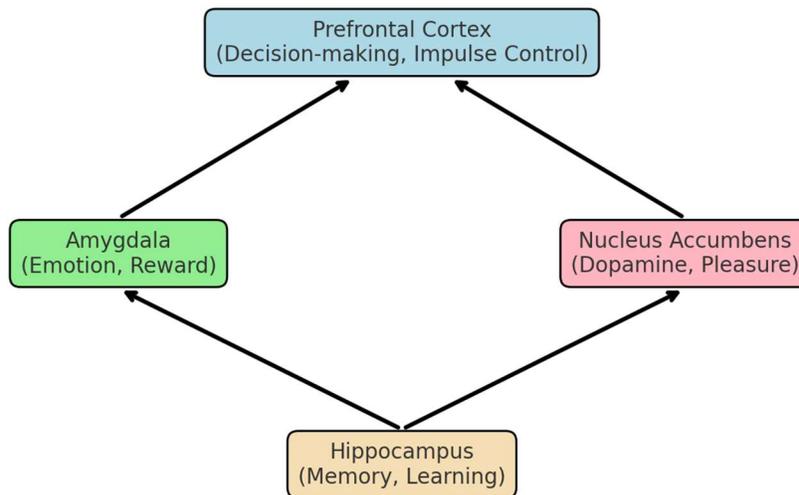


Figure 1: Neurobiological pathways implicated in Internet and Gaming Addiction

3. Clinical Manifestations

Internet and gaming addiction typically presents with:

- Preoccupation with online activity/gaming

- Withdrawal symptoms (irritability, anxiety, low mood)
- Tolerance (needing longer periods of gaming to achieve satisfaction)

- Neglect of personal, academic, or occupational responsibilities (Table 1 summarizes DSM-5 and ICD-11 diagnostic features.)
- Failure to reduce gaming despite attempts

Table 1: Diagnostic Features of Internet and Gaming Addiction (DSM-5 vs ICD-11)

Criteria	DSM-5 Internet Gaming Disorder	ICD-11 Gaming Disorder
Core Symptoms	≥5 out of 9 criteria (preoccupation, tolerance, withdrawal, loss of control, etc.)	Impaired control, priority given to gaming, continuation despite harm
Duration	12 months	12 months
Classification	Condition for further study	Official diagnosis

4. Current Management Approaches

pharmacological strategies.

4.1 Psychosocial Interventions

Pharmacological treatments aim to:

CBT remains the most widely studied approach, aiming to restructure maladaptive cognitions and regulate gaming behaviors [10]. Family therapy and school-based prevention programs also demonstrate effectiveness [11].

- Correct neurotransmitter dysregulation
- Reduce cravings and compulsive behaviors
- Treat psychiatric comorbidities such as depression, anxiety, and ADHD

4.2 Need for Pharmacological Interventions

While psychotherapy is effective, high relapse rates necessitate adjunctive

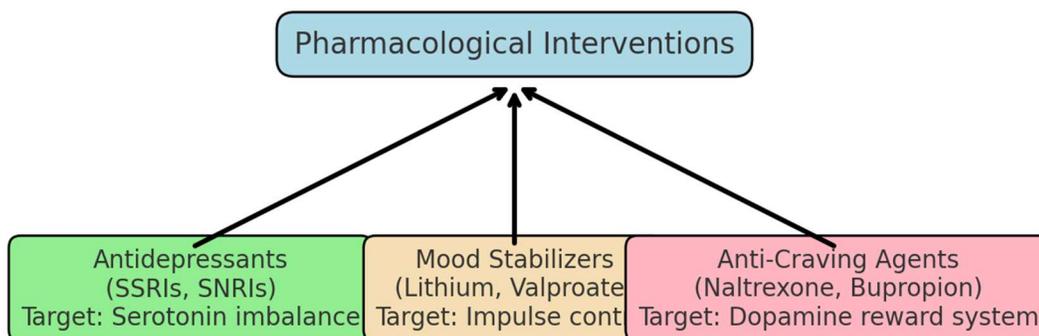


Figure 2: Pharmacological treatment strategies for Internet and Gaming Addiction

5. Pharmacological Treatments

suggest reductions in craving and gaming time [15].

5.1 Antidepressants

- **SSRIs (e.g., fluoxetine, sertraline):** Shown to reduce compulsive internet use and improve mood in randomized controlled trials [12, 13].
- **Bupropion:** An atypical antidepressant and dopamine–norepinephrine reuptake inhibitor, effective in reducing gaming time and cue-induced craving [14].

5.2 Opioid Antagonists

- **Naltrexone:** Used in alcohol and opioid dependence; pilot studies

5.3 Stimulants

- **Methylphenidate:** Beneficial in individuals with comorbid ADHD and gaming disorder, improving attention and reducing compulsive use [16].

5.4 Other Agents

- **Mood stabilizers (e.g., lithium, valproate):** Tested in small-scale studies with mixed results [17].
- **Cytidine and glutamate modulators:** Under experimental investigation [18-25].

Table 2: Summary of Pharmacological Agents Studied in Internet and Gaming Addiction

Drug/Class	Mechanism of Action	Evidence Level	Clinical Notes
SSRIs	Increase serotonin availability	Moderate	Useful in comorbid depression/anxiety
Bupropion	Dopamine–norepinephrine reuptake inhibitor	High	Reduces craving, gaming time
Naltrexone	Opioid receptor antagonist	Low–Moderate	Promising but limited trials
Methylphenidate	Stimulant, ↑ dopamine/norepinephrine	Moderate	Beneficial in ADHD comorbidity
Lithium	Mood stabilizer	Low	Mixed evidence

6. Challenges in Pharmacological Research

- Small sample sizes in clinical trials

- Lack of standardized outcome measures
- Ethical concerns in medicating adolescents

- Cultural variation in perceptions of gaming disorder
 - Integration of pharmacological and digital interventions (e.g., app-based CBT + medication)
 - Policy initiatives to regulate excessive gaming in vulnerable populations
- 7. Future Directions**
- Larger, multicentric randomized controlled trials
 - Precision medicine approaches: targeting specific neurobiological subtypes

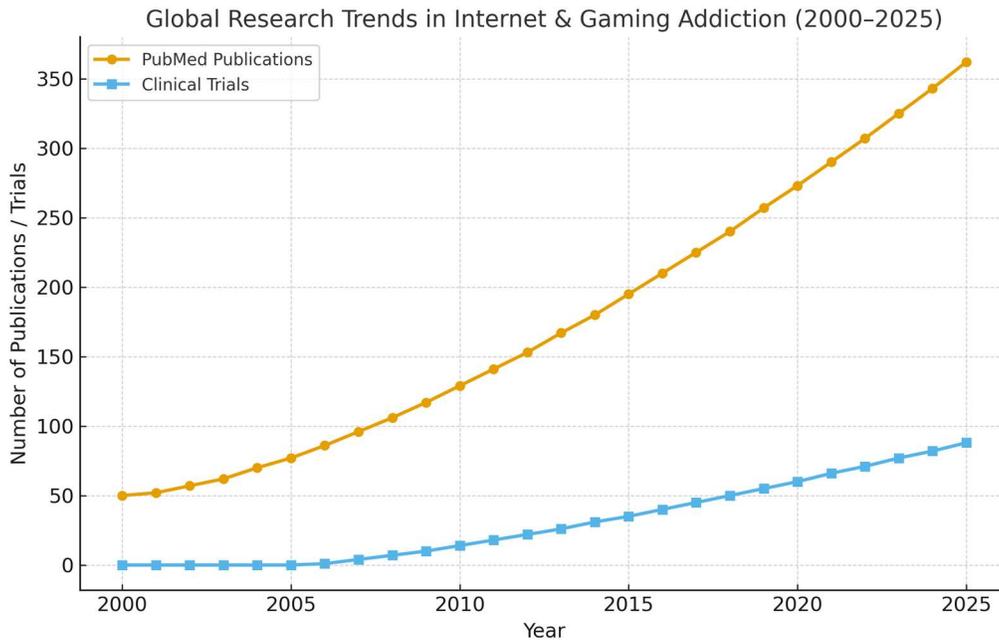


Figure 3: Growth of global clinical trial publications on Internet/Gaming Addiction (2000–2025)

8. CONCLUSION

Internet and gaming addiction represents a major public health challenge in the digital era. While psychosocial interventions remain the cornerstone of management, pharmacological options show promise in reducing craving, compulsive use, and

comorbid psychiatric symptoms. SSRIs, bupropion, and naltrexone are among the most studied agents, though evidence remains preliminary. Future research should focus on high-quality trials, personalized medicine, and combined behavioral–pharmacological models.

9. REFERENCES

- [1] World Health Organization. ICD-11: Gaming disorder. Geneva: WHO; 2018.
- [2] American Psychiatric Association. DSM-5: Diagnostic and Statistical Manual of Mental Disorders. 5th ed. Washington DC: APA; 2013.
- [3] Kuss DJ, Lopez-Fernandez O. Internet addiction and problematic Internet use: A systematic review of clinical research. *World J Psychiatry*. 2016;6(1):143–176.
- [4] Cheng C, Li AY. Internet addiction prevalence and quality of (real) life: A meta-analysis of 31 nations across seven world regions. *Cyberpsychol Behav Soc Netw*. 2014;17(12):755–760.
- [5] Ko CH, Liu GC, Hsiao S, *et al*. Brain activities associated with gaming urge of online gaming addiction. *J Psychiatr Res*. 2009;43(7):739–747.
- [6] Volkow ND, Morales M. The brain on drugs: From reward to addiction. *Cell*. 2015;162(4):712–725.
- [7] Weinstein AM, Lejoyeux M. Internet addiction or excessive internet use. *Am J Drug Alcohol Abuse*. 2010;36(5):277–283.
- [8] Yuan K, Qin W, Wang G, *et al*. Microstructure abnormalities in adolescents with internet gaming addiction. *PLoS One*. 2011;6(6):e20708.
- [9] Dong G, Devito EE, Huang J, Du X. Diffusion tensor imaging reveals thalamus and posterior cingulate cortex abnormalities in internet gaming addicts. *Psychiatry Res Neuroimaging*. 2012;202(2):211–217.

-
- [10] Young KS. Cognitive behavior therapy with Internet addicts: Treatment outcomes and implications. *Cyberpsychol Behav.* 2007;10(5):671–679.
- [11] King DL, Delfabbro PH. The cognitive psychology of Internet gaming disorder. *Clin Psychol Rev.* 2014;34(4):298–308.
- [12] Dell’Osso B, Hadley SJ, Allen A, *et al.* Escitalopram in the treatment of pathological gambling: A randomized placebo-controlled trial. *Eur Neuropsychopharmacol.* 2008;18(6):398–404.
- [13] Kim SW, Grant JE, Adson DE, Shin YC. Double-blind naltrexone and placebo comparison study in the treatment of pathological gambling. *Biol Psychiatry.* 2001;49(11):914–921.
- [14] Han DH, Lee YS, Yang KC, *et al.* Bupropion sustained release treatment decreases craving for Internet video game play. *CNS Drugs.* 2010;24(8):725–732.
- [15] Kim SW, Grant JE. An open naltrexone treatment study in pathological gambling disorder. *J Clin Psychiatry.* 2001;62(7):523–527.
- [16] Park MH, Han DH, Kim BN, Cheong JH, Lee YS, Renshaw PF. Differences in functional connectivity of the insula between young adults with Internet gaming disorder and healthy controls. *Front Psychiatry.* 2017;8:288.
- [17] Atmaca M. Treatment of Internet addiction with pharmacotherapy: A case report with N-acetylcysteine. *Psychiatry Clin Neurosci.* 2017;71(8):576–578.
-

-
- [18] Grant JE, Potenza MN, Weinstein A, Gorelick DA. Introduction to behavioral addictions. *Am J Drug Alcohol Abuse*. 2010;36(5):233–241.
- [19] Weinstein A, Lejoyeux M. New developments on the neurobiological and pharmacogenetic mechanisms underlying Internet and gaming addiction. *CNS Spectr*. 2015;20(5):382–390.
- [20] Ko CH, Yen JY, Yen CF, Chen CS, Chen CC. The association between Internet addiction and psychiatric disorder: A review of the literature. *Eur Psychiatry*. 2012;27(1):1–8.
- [21] Fauth-Bühler M, Mann K. Neurobiological correlates of Internet gaming disorder: Similarities to pathological gambling. *Addict Behav*. 2017;64:349–356.
- [22] Lam LT. Risk factors of Internet addiction and the health effect of Internet addiction on adolescents: A systematic review of longitudinal and prospective studies. *Curr Psychiatry Rep*. 2014;16(11):508.
- [23] Montag C, Schivinski B, Sariyska R, *et al*. Psychopathological symptoms and gaming motives in massively multiplayer online role-playing gamers. *Eur Addict Res*. 2011;17(2):69–79.
- [24] National Institute of Mental Health (NIMH). Internet gaming disorder: Research and treatment perspectives. Bethesda, MD: NIMH; 2020.
- [25] World Health Organization. Public health implications of
-

excessive use of the Internet,
computers, smartphones and
similar electronic devices:

Meeting report. Geneva: WHO;
2015.