Internet and Video Game Addictions

Diagnosis, Epidemiology, and Neurobiology

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KEYWORDS

• Internet gaming disorder • IGD • Video game • Internet • Addiction • Digital • Computer

KEY POINTS

- Proposed criteria for diagnosis of Internet gaming disorder and other digital technology addictions are analogous to those for substance use or gambling disorders.
- Diagnosis of Internet and video game addictions should include both screening tools and clinical interview for "red flags," such as academic decline, sleep disruption, and changes in real-life activities and relationships.
- Epidemiologic studies, limited by variation in diagnostic methods, yield prevalence estimates ranging from less than 1.0% to 26.8%.
- Internet and video game addictions are associated with psychological and social comorbidities, such as depression, attention-deficit/hyperactivity disorder, alcohol use, anxiety, and poor psychosocial support.
- Neurobiological evidence suggests a dual processing model of digital technology addictions characterized by an imbalance between the reactive reward system and the reflective reward system.

INTRODUCTION

With the increasing power and accessibility to digital technology and exploding range of online activities over the past 2 decades has come a great expansion of the amount of

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time youth regularly spend engaging with it. The 2015 Common Sense Media Use Census found that teens ages 13 to 18 spent a daily average of more than 6.5 hours on screen entertainment (including TV, smart phones, computers, video games, streaming videos, and so forth) and the daily average of tweens ages 8 to 12 was more than 4.5 hours.[1] This represents a significant increase in youth screen habits, with a substantial minority developing excessive, problematic habits that interfere with functioning in work, academics, relationships, and other domains. The concept that it is possible to develop a behavioral addiction to the Internet was first proposed in the 1990s,[2] and interest in this topic has grown along with the influence of the Internet in our lives.

Numerous researchers have investigated Internet and video game addictions ("IVGA" for the remainder of this article) in the past decade.[3–6] A wide variety of online activities are engaging enough to be potentially addictive, including video games, social media, smartphone use, texting, streaming videos, and online pornography. Notably, we omitted online gambling, as its related addiction is typically classified as a subtype of gambling disorder. The subtype of IVGA that research has validated most is video game addiction, particularly to games played online, such as massively multiplayer online games (MMORPGs). Increased acceptance of video game addiction led the 2013 inclusion of "Internet gaming disorder" (IGD) in the *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition* (DSM-V) as a "condition for further study."[7] A growing body of evidence indicates commonalities between IVGA, including IGD, and more well-established addictions, including substance use disorders and gambling disorder. This paper provides an updated review of IVGA, focusing on the significant body of research published in the 4 years since the proposal of IGD. We explore diagnosis, epidemiology, and neurobiology, much of which overlaps substantially with that of substance use disorders. This article will help clinicians improve their awareness, understanding, and ability to diagnose IVGA.

DIAGNOSIS OF INTERNET GAMING DISORDER AND OTHER TYPES OF INTERNET AND VIDEO GAME ADDICTIONS

Behavioral addictions may be conceptualized as an excessive, uncontrollable, "repeated behavior leading to significant harm or distress."[8] Young[2] initially conceptualized Internet addiction in 1996 using criteria adapted from those of pathologic gambling, the only behavioral addiction recognized in the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision*. Those meeting criteria had extreme online habits causing academic, occupational, relationship, and/or financial dysfunction.[2] Young's[2] original diagnostic questions served as a basis for many subsequent rating scales and proposed criteria for IVGA.

Most studies of IVGA use similar criteria, based on a conversion of DSM criteria or a well-validated scale for diagnosing substance use disorder or pathologic gambling. Resultant IVGA assessment scales and diagnostic criteria have been adapted for specific subtypes, including addiction to online gaming, the Internet in general, smartphones, online pornography, and others.[9–16] Griffiths'[17] similar conceptualization of addiction, based on the key components of salience, mood modification, tolerance, withdrawal, conflict, and relapse, forms the basis for a number of IVGA assessment scales as well.[18–22]

Romano and colleagues[23] demonstrated that Internet addicts are more likely than nonaddicts to experience withdrawal symptoms following a brief 15-minute Internet exposure. A pronounced decline in mood prompted addicts to rapidly reengage with the Internet. Addicts were also more likely to have depressive, impulsive, and autistic traits.

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