

# Treatment Considerations in Internet and Video Game Addiction: A Qualitative Discussion



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## KEYWORDS

- Social media • Smartphone addiction • Online gaming • Internet addiction treatment
- Internet addiction • Process addiction • Video game addiction
- Child and adolescent addiction medicine

## KEY POINTS

- This article reviews the etiologic and neurobiological antecedents to Internet and video game addiction.
- An understanding of patient readiness and motivational factors in Internet and video game addiction treatment is addressed.
- The unique aspects of Internet and video game use that contribute to its addictive nature are presented.
- Psychotherapeutic and pharmacologic treatment interventions are presented, along with a comprehensive treatment model.

## INTRODUCTION

To address the myriad of potential treatment issues and strategies applicable to Internet and video game addiction (IVGA) and related use disorders, a working definition of addiction is first presented. All addictions have similar behavioral and neurobiological etiology and symptomatology, although the severity varies widely.<sup>1</sup>

## ADDICTION MEDICINE DEFINED

Perhaps, the most comprehensive definition of addiction is one published by The American Society of Addiction Medicine,<sup>1</sup> which captures both the neurobiological and behavioral etiology of disruption in the mesolimbic reward circuitry of the brain and the impact of addictive behaviors:

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**Abbreviations**

ADHD	Attention deficit hyperactivity disorder
CBT	Cognitive-behavioral therapy
IVGA	Internet and video game addiction
OCD	Obsessive-compulsive disorder
SSRI	Selective serotonin reuptake inhibitor

*Addiction is a primary, chronic disease of brain reward, motivation, memory and related circuitry. Dysfunction in these circuits leads to characteristic biological, psychological, social and spiritual manifestations. This is reflected in an individual pathologically pursuing reward and/or relief by substance use and other behaviors.*

*Addiction is characterized by inability to consistently abstain, impairment in behavioral control, craving, diminished recognition of significant problems with one's behaviors and interpersonal relationships, and a dysfunctional emotional response. Like other chronic diseases, addiction often involves cycles of relapse and remission. Without treatment or engagement in recovery activities, addiction is progressive and can result in disability or premature death.<sup>1</sup>*

Although premature death is an infrequent consequence of IVGA, there are numerous psychological, behavioral, and physiologic consequences to protracted Internet and video game use.

Numerous anecdotal and clinical reports describe physiologic sequelae secondary to sedentary behavior, including elevated cortisol, hypertension, deep vein thrombosis, electrolyte imbalances leading to cardiac dysrhythmias, obesity, and metabolic disorders.<sup>2,3</sup> All addictions ultimately impact lifestyle, functioning, and behavior—and hence have similar functional deficits of variable severity.

Brain circuits implicated in the complex biobehavioral phenomenon of addiction include the ventral tegmental area/substantia nigra, amygdala, anterior cingulate, prefrontal cortex, and nucleus accumbens. These circuits are also implicated in IVGA.<sup>4,5</sup> There is some controversy in the addiction medicine as to the similarities and differences between substance-based and behavioral (or process) addictions.

The American Society of Addiction Medicine definition substantively captures the complex biopsychosocial interplay that defines addiction as a complex brain-behavior disorder. Research, clinical experience, and historical analysis of addiction by Harl<sup>6</sup> and Alexander<sup>7</sup> strongly suggest that social isolation is a strongly correlated factor for the development of an addictive pattern to a reinforcing behavior such as drug use or other behavioral addictions. We are hard-wired for social connection, and when deprived of it we are inclined to engage with a drug or behavior that medicates this need. The maxim that “the opposite of addiction is not abstinence but rather connection”<sup>6</sup> speaks volumes about the addictive nature of the Internet, video games and social media—all of which provide a pseudoconnection while often actually isolating the user socially.

## **A DIGITAL DRUG**

Some disagreement exists regarding the appropriate nosology for IVGA, but considerable clinical and research data document the use of, abuse of, and potential addiction to the Internet and Internet-mediated gaming.<sup>8–17</sup> Internet content and video games are typically accessed easily via portable handheld and console computers, as well as on smartphones, making ease of access a factor<sup>18</sup> in their addictive potential. Ease of access (or threshold reduction) has a significant impact of the addictiveness

of the Internet and video gaming, because shorter latency between substance ingestion or a mood-altering behavior and subsequent reinforcement, the more addictive that process is.<sup>18,19</sup> This is likely due to the operant and classically conditioned features of tolerance and extinction resistance characteristic of addictions, including Internet-related addictions.<sup>18</sup>

The marked phenomenological overlap between Internet addiction, substance addiction, and gambling suggests that a common neurobiological substrate involving an impairment of the “reward systems” underlies these disorders. The mesolimbic dopaminergic pathway represents the final common pathway for reinforcement and gratification induced by physiologic stimuli or psychotropic drugs. It follows that dopamine is considered to be the neurotransmitter mediating pleasure.<sup>20</sup>

Use of Internet entertainment, particularly via the smartphone, seems to hamper our ability to manage and balance time, energy, and attention, leading to lifestyle changes and behavioral deficits. IVGA impacts motivation, reward, memory, and various aspects of psychological functioning. There are numerous distinct psychological and cognitive processes that seem to contribute to the additive potential of the Internet. Numerous studies have found several key factors that are associated with the compulsive use of the Internet and video games, namely, disinhibition, ease of access, content stimulation, dissociation (time distortion), perceived anonymity, and the activation of neurobiological reward pathways.<sup>8,9,16,18</sup>

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### ***Disinhibition***

Disinhibition allows users to express and experience themselves in manner that is less impacted by ego constraints, and take on a persona or alter-ego state. This may, in part, be due to less access to executive functions in the orbitofrontal area of the brain within which inhibitory circuits are organized. It seems the brain can become high-jacked in its inhibitory capacity during online access.

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### ***Content Stimulation***

The Internet and its various portals are essentially delivery mechanisms for powerful and stimulating content. Video games, pornography, infotainment, social media, shopping, and gambling all have reinforcing properties unto themselves. The power of the Internet is in part due to its unique, interactive ability to rapidly deliver such content with greater ease of access, thereby creating a threshold reduction in experiencing said stimulating content.

The combination of stimulating content delivered with ever-decreasing latency produce synergistic amplification. Here, the whole is greater than the sum of its parts. The Internet experience can be thought of as a virtual hypodermic mechanism to deliver the digital-drug content in a highly efficacious manner.

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### ***Ease-of-Access***

Ease-of-access is a well known contributory factor in all addictions; the ability to readily access intoxicating substances or behaviors clearly increases the likelihood of compulsive or addictive use. Internet and video game availability acts as a neurobiological trigger, facilitating activation of the mesolimbic brain pathways in a manner similar to kindling a fire. Once ignited, the neuropathways and behavior patterns become sensitized and essentially are on automatic pilot.

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### ***Dissociation (Time Distortion)***

The experience of altered perception of time and space is a ubiquitous experience of the Internet medium.<sup>9,18</sup> The medium itself, along with the consumed content, alters

the perception of time, and is therefore psychoactive and thus, mood and consciousness altering.

### ***Perceived Anonymity***

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This curious phenomenon seems to be a significant marker for the Internet experience. As a communication and e-commerce modality: texting, instant messaging, chat, email, social media, shopping, stock trading, gambling, and pornography, and so on, are frequently experienced as anonymous or nearly anonymous, creating a unique commercial and communication interface. Users communicate and conduct business as if they are alone or as if they have a personal or private relationship with the person or business they are connecting to. Ironically, the Internet is perhaps the least anonymous of all communication mediums.

### ***Activation of Neurobiological Reward Pathways***

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The Internet seems to activate the same mesolimbic reward pathways that are activated by psychoactive substances and other addictive behaviors.<sup>21</sup>

## **A VIRTUAL SLOT MACHINE**

Use of the Internet functions as the “world’s largest slot machine”. The Internet operates on a variable ratio reinforcement schedule where there is unpredictability in what, when, and how desirable the content searched for, or received is. A slot machine operates similarly. Unpredictability keeps our brains tuned in and vigilant, and encountering pleasurable stimuli causes release of dopamine in the brain’s reward circuits. This reward is variable and unpredictable, causing the related behavior of checking online accounts or accessing smartphones to be highly habit forming and resistant to extinction. Checking phones can reach compulsive levels, whether accessing stocks, sports, social media, web searching, text, email, gaming, or pornography. Numerous studies<sup>5,22</sup> suggest that addictive Internet and video game use is associated with excessive dopamine release in the mesolimbic system, which leads to a desensitizing reduction in dopamine receptor expression, reward deficiency syndrome, and hypofrontality.<sup>18,22</sup>

The smartphone adds another dimension to our Internet experience with its frequent use of notifications. Users may be constantly alerted via beeps, buzzes, and blips that inform users that information is waiting to be accessed. This leads to the anticipation of possibly desirable content, providing a significant increase in dopamine, analogous to that which keeps one pushing the handle on a slot machine. Preliminary evidence suggests that smartphone notifications and ringing stimulate release of the stress hormone cortisol, in turn triggering a self-medicating response to engage with the device.<sup>2,3,23–25</sup>

When the information accessed is perceived as pleasurable, the user receives another reinforcing dopamine surge. The smartphone can also be called the world’s smallest slot machine fitting easily in one’s purse or pocket.

Considerable research suggests that the stronger levels of dopamine occur in conjunction with anticipation of reward than with reward itself. Anticipation may occur when one is “triggered” by the sight of a computer device or to a greater degree when alerted by a notification.

Smartphones can keep users on “automatic pilot,” responding to life on an automated, unconscious level, inhibiting one from making healthy choices. Users may socially isolate, become intolerant of boredom, and maintain constant distraction from their current situation. In short, users can become overstimulated and attention impaired.

The new digital culture places little value on real-time experiences that are not broadcast, as if our experiences do not actually occur unless witnessed and rated

by others. This phenomenon further contributes to the experience of fear of missing out (FOMO), the concern that one must update via social media while monitoring the updates of peers, or one will fail to be noticed or included. Ironically, what we seem to be missing is the present-centered experience of our own lives. Excessive Internet use may cause health problems, including increased sedentary behavior, limited attention capacity, and stress from constant vigilance.

Compulsive smartphone use leading to elevated distractibility can also become a health threat; recent data<sup>25,26</sup> clearly demonstrate that excessive use often continues while users are driving their cars. Those who compulsively use smartphones while driving cause an alarming number of accidents, injuries, and deaths. Recent findings indicate that texting is not the only way smartphones distracts drivers, because users engage with a variety of smartphone functions while driving.

## TREATMENT CONSIDERATIONS

The treatment of Internet addiction has not yet been standardized.<sup>27–30</sup> This factor is typical of addiction medicine, which is characterized by a lack of treatment standardization for most addictions.<sup>31</sup> A considerable lack of clarity remains regarding the exact definition of Internet addiction, what to label it, and whether to classify it via a unified diagnoses or distinct subdiagnoses.<sup>32</sup> Regardless, there is considerable public need for treatment services.<sup>29</sup>

A significant demand for treatment of Internet addiction exists in the United States; prevalence statistics suggest a range of 0.5% to 12%.<sup>29,30</sup> Even greater demand exists in China, Taiwan, and South Korea, where the estimated prevalence among adolescents ranges from 1.6%<sup>33</sup> to 11.3%.<sup>34</sup> Despite considerable overlap in current measures of diagnosis, a lack of agreed-upon criteria contributes to the difficulty in precisely determining prevalence. Treatment for addictions is often ultimately successful, which applies to both process and substance-based addictions.

## SPECIFIC TREATMENT INTERVENTIONS

The first goal is to determine level of motivation of patient. Who is the “customer” and who is invested in the treatment process? In many cases, the patient may be a child, adolescent, or young adult, and treatment must involve parents as well. Try to structure interventions based on the motivation and resources of the patient and family. It is important to understand the developmental and psychosocial context of symptoms. Why is the patient presenting for treatment now? What developmental processes are ongoing for the patient? What stresses currently exist in patient’s life? Are there social problems? Family re-education is critical, for re-empowering the parents to help set appropriate boundaries and expectations. Strategies include boundaries and limit setting, as well as management of family technology (parenting skills), modifying and controlling the use or abuse pattern, marital issues, medications, comorbidity, secondary gain, and incentive induction toward real-time living. Parental involvement in treatment is essential for successful outcome.

## IMPLICATIONS OF CURRENT CLINICAL AND NEUROBIOLOGICAL RESEARCH ON THE TREATMENT OF INTERNET AND VIDEO GAME ADDICTION AND RELATED INTERNET USE DISORDERS

IVGA is part of a “reward deficiency syndrome” caused by a negative downregulation of dopamine after excessive dopamine release secondary to abnormal neurotransmitter interactions in the mesolimbic system.<sup>35–38</sup> Considerations include natural

history, phenomenology, tolerance, withdrawal, comorbidity, attention deficit hyperactivity disorder (ADHD), overlapping genetic contribution, neurobiological mechanisms, and response to treatment strongly suggest that behavioral (process) addiction such as Internet addiction resemble substance addictions and that excessive Internet use is indeed an addiction. Winkler and colleagues<sup>37</sup> found that both pharmacologic and psychological treatments were effective in treating Internet addiction (time spent online, depression, and anxiety).

### COGNITIVE-BEHAVIORAL THERAPY

Numerous studies have suggested cognitive-behavioral therapy (CBT) is an effective treatment for Internet addictions.<sup>28,39-45</sup> Patients are trained to recognize triggers that encourage self-medication using the Internet and video games, and how to alter thoughts and behaviors to promote abstinence.

A meta-review of Chinese Internet addiction studies<sup>44</sup> supported the relative efficacy of CBT. Most contemporary addiction treatments have a strong CBT component. As Greenfield<sup>46</sup> notes, many if not most psychotherapeutic and behavioral interventions have cognitive-behavioral components, but addiction medicine heavily relies on psychoeducational strategies and identifying the cognitive, emotional, and behavioral triggers and relapse antecedents.

Metaanalyses by King and Delfabbro<sup>42</sup> and others<sup>43</sup> found that cognitive-behavioral strategies are efficacious in managing IVGA. Similar results have been found in the treatment of substance abuse, especially for adolescents and young adults, for whom cognitive and psychoeducational approaches may be particularly effective.<sup>47-49</sup>

### MOTIVATIONAL INTERVIEWING, MOTIVATIONAL ENHANCEMENT, AND HARM REDUCTION

Motivational interviewing and motivational enhancement are effective techniques to evaluate, establish, and increase motivation for abstinence as well as therapeutic alliance for treatment of addictions.<sup>50</sup> Patients seeking assistance for Internet-related disorders, like other addictions, have variable readiness for change,<sup>51</sup> and are frequently pressured into treatment by a family member. This factor is particularly relevant in treating Internet and gaming addictions, because these patients often lack an appreciation of the negative sequelae of their behavior. This barrier to successful treatment is exacerbated by a lack of clinicians experienced in treating IVGA and the variability of professional acceptance of the disorder as legitimate. These factors, along with the popular view of the Internet and video games as harmless entertainment, create roadblocks in the treatment process on many levels.

### MOTIVATIONAL INTERVIEWING AND MOTIVATIONAL ENHANCEMENT

*People are generally better persuaded by the reasons which they have themselves discovered than by those which have come in to the mind of others.*

—Blaise Pascal

It is critical in the treatment of any substance or behavioral/process addiction that adequate treatment motivation exist. Typically, however, many patients do not arrive for treatment at the highest level of motivation; therefore, attempts must be made to enhance treatment readiness and motivation, and potentially enhance them in the early course of evaluation or treatment.<sup>50</sup>

It is important for the clinician to be aware of personal judgments, feelings, fears, and frustrations toward the Internet or video game addict and be conscious of our natural tendency to judge our patient's actions or behaviors. Be conscious of ascribing negative prognosis in the face of a chronic, relapsing disorder:

- Become familiar with the neurobiology of addiction both as a clinician and to help educate the patient to understand the process of IVGA. Many suffering with this issue do not know about the neurologic factors associated with their illness.
- Learn to assess your patient's readiness to change, so you can apply appropriate motivational interviewing and motivational enhancement<sup>52</sup> interventions; it is important to remember that readiness to change and motivation are not necessarily linear, and may wax and wane throughout the evaluation, treatment, and subsequent recovery process.
- Beware of cognitive dissonance, where we presume patient motivation and prognosis based on addiction-based behaviors.
- IVGA treatment and management can be challenging, but so are many chronic medical illnesses!
- View addiction as any other chronic medical condition that may have exacerbations, remissions, and relapses—as well as recovery periods. Educate your patient about this recovery process.
- Only 50% of the epidemiology for addiction seems to be genetic; the rest seems to be environmental/behavioral, and epigenetic, which is a large part of where we as clinicians need to work.
- The longer the patient is abstinent, the more likely sustainable and moderated Internet and video game will last.

## READINESS FOR CHANGE AND TREATMENT

*How many mental health or addiction clinicians does it take to change a light bulb? One, but the light bulb has to want to change.*

The evaluation and management of patient motivation and readiness is as critical a feature of Internet addiction treatment as it is in other addictions. Patients' present at variable stages of readiness for change and recovery. The clinician must meet the patient with interventions appropriate to his or her particular level of motivation.<sup>51</sup> Stages of readiness for change are not linear; patients frequently move back and forth among varying stages, requiring clinicians to maintain a flexible treatment approach to remain effective. The stages of readiness and corresponding clinical goals are precontemplation, contemplation, preparation, action, maintenance, and relapse.

### ***Precontemplation***

In this stage, the patient is not currently considering change. The clinician should validate a lack of readiness. Clarify with the patient that the decision is theirs (although this is complicated when a parent is bringing a child or adolescent in for treatment). Encourage reevaluation of current behaviors and their consequences. Foster exploration for the patient, not actions. Explain and personalize the risks of excessive Internet use through psychoeducation, including the neurobiological underpinnings of addiction. Encourage questioning of whether the patient has a problem by highlighting that others (eg, parents, spouse, employer, friends) believe that they do.

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**Contemplation**

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In this stage, the patient is ambivalent about change, or “sitting on the fence.” This patient is probably not considering changing within the next month. The clinician’s goal is to validate their current lack of readiness and clarify that the decision regarding whether to change is theirs (as are the consequences). Encourage evaluation of the pros and cons of behavior change and help to identify and promote positive outcome expectations.

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**Preparation**

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Patients at this stage have some experience with change and are in the early stages of beginning to change addictive behavior: they are “testing the waters” and may planning to act within a month. Adolescents and young adults who are brought in for treatment by a family member are less likely to present at this stage. The clinician is to identify and assist in problem solving and helping them to remove obstacles to change. Help the patient to identify social supports for change. Encourage small, attainable initial steps in the recovery process. Affirm that patient has the ability to access or develop the necessary skills and behaviors to change their Internet and video game use patterns.

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**Action**

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Patients at this stage are practicing the new behavior. Clinicians should focus on restructuring cues and triggers, as well as strengthening social supports, including family relationships. Bolster self-efficacy for dealing with obstacles such as emotional challenges. Help to combat feelings of longing for the Internet and video gaming, and emphasize the long-term benefits of recovery and change. Highlight the positives of a balanced relationship with technology.

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**Maintenance**

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The patient has successfully changed behavior, and demonstrates a continued commitment to sustaining new behaviors. This outcome can occur at any point after treatment at 6 months to 5 years or more. Plan for supportive follow-up. Reinforce self-regulation including internal rewards for positive behavior. Discuss coping with potential relapse. It should be noted that all of these stages are not absolute or cumulative, and patients may move back and forth in their individual recovery readiness.

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**Relapse**

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This patient has resumed old addictive Internet and video game behaviors in a “fall from grace”: clinicians should evaluate the triggers causing relapse including urges, cravings, and cognitions around relapse. Develop or reaffirm a clear relapse prevention plan. Reassess motivation and possible barriers to mindful and moderated use. Help the patient plan stronger coping strategies. Addiction is a chronic, relapsing disorder that can be progressive in severity as well as cumulative in its recovery. Relapse is a normal part of the IVGA recovery process.

Our greatest gift in medicine is the installation of hope. Sometimes it is difficult for us to feel hopeful, or to adequately convey it to our patients, especially when we see our patients relapsing and experiencing negative sequelae. Medical compliance and treatment adherence is about 50%, yet in the treatment of addictions we somehow expect better or higher compliance, and when we do not see it, we might interpret this as a lack of motivation, which can interfere with effective treatment.



## ABSTINENCE VERSUS MODERATED OR MINDFUL TECHNOLOGY USE

It is indeed difficult to achieve abstinence with IVGA. Perhaps the best option is for moderated and mindful use and to remove the most problematic (triggering) content areas through external controls. Modified use via behavioral and neurobiological repatterning (identifying and changing the trigger or urge response pattern) can begin to repattern the neuropathways that have been established regarding the addictive pattern. The use of eye movement desensitization reprocessing has been helpful in reducing urges and triggers.<sup>31,53</sup> Treating concomitant social anxiety and social skills deficits (along with comorbid ADHD) may also be helpful.

Internet use disorder presents with a variety of unique characteristics in which addictive behaviors seem to be socially normative within the digital youth culture, further exacerbating denial.<sup>46</sup> Internet entertainment is an addictive behavior that seems to be acceptable within contemporary youth culture. As part of the youth digital culture, the smartphone has arguably become the dominant Internet access portal, and may be seen as a vital social and personal accessory, and may be personified as a digital member of the family.

## A PRACTICAL ADDICTION MEDICINE TREATMENT OUTLINE FOR INTERNET AND VIDEO GAME ADDICTION AND RELATED USE DISORDERS

Greenfield<sup>46</sup> developed a 7-step treatment process for IVGA. The model was developed over a 20-year period of providing outpatient and intensive outpatient treatment for IVGAs. This model views the treatment in a manner analogous to standard treatment protocols for other addictions, with some unique variations. This outline is not a fixed treatment protocol as in most addictions. IVGA treatment must be modified with moderated and mindful use. Exacerbations, relapses, and treatment adjustments must be made throughout the process, and no 2 patients are alike. These are guidelines to help inform the clinician on how to begin to manage and treatment IVGA.

The Center for Internet and Technology Addiction<sup>33</sup> uses a combination of psychoeducation and neurobiological education, motivational interviewing and motivational enhancement, psychotherapy, pharmacotherapy, management of comorbid or concurrent psychiatric issues, eye movement desensitization reprocessing<sup>53</sup> using a modified addiction management protocol, and varied readiness for change<sup>51</sup> and harm reduction strategies as described herein.<sup>52</sup>

### ***Patient Engagement***

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In this critical stage, a collaborative treatment relationship is developed for the management and treatment of IVGA. This first stage is the most critical component of successful treatment, because without a collaborative relationship, treatment motivation, adherence, and compliance will be greatly reduced. It is critical here to build the treatment relationship and, in accessing readiness for change, establishing motivational enhancement and patient support throughout the initial as well as subsequent phases of treatment.

### ***Pattern Disruption***

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This phase is intended disrupt the behavioral aspects of the addiction and compulsive use patterns. The goal is to interrupt problematic coping, self-medication, and trigger-response loops and begin to allow new, more adaptive, healthier Internet and video game use to emerge. Sometimes it is necessary to prescribe a period of relative abstinence, with a particular focus on the problematic content, for example, video gaming,

pornography, social media, or shopping; very problematic content may need to be blocked and/or monitors at this stage, in addition to other measures that can be taken. The patient begins to develop a more mindful use of the Internet, and in so doing, begins the process of breaking neural pathways associated with their maladaptive use pattern. Because all addictions involve both disruptions of the mesolimbic reward circuitry as well as antecedent and ritualistic behavioral patterns, we are attempting to access this brain circuitry through such pattern changes. We are counting on the neuroplastic and neurotrophic aspects of the brain–behavior relationship help to rewire the addiction behavior response pattern.

The goal is to begin to establish and strengthen new brain pathways, and to begin to decrease the pattern of dopamine post-synaptic receptor (downregulation) associated with addictive disorders. In doing so, we to begin to decrease the consequences of any reward deficiency syndrome by minimizing the excessive reward salience associated with addictive use, thus slowly encouraging other forms of rewarding behavior, possibly a novel experience after years of addiction. Hopefully, there will be more positive life consequences and rewards that are real time and naturalistic, as opposed to Internet or video game reward salience.

### ***Trigger Identification***

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All addictions involve behavioral triggers, which themselves have antecedents. It is critical to identify emotional and situational triggers that exacerbate the addictive cycle of behavior. Availability (ease of access), boredom, anxiety (particularly social anxiety), and academic/work avoidance are common triggers, but other triggers may be unique to the specific patient. The major treatment goal of this phase is to help the patient identify the triggers for their addictive use, and establish more mindful, moderate technology habits. Patients must increase self-awareness and then develop new trigger management skills in anticipation of posttreatment triggers.

### ***Management of Urges, Cravings, and Compulsions (Pharmacologic and Other Therapeutic Interventions)***

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In this stage, psychoeducational and cognitive–behavioral strategies are most useful. The management of cravings to engage in Internet use involves an increased awareness of one's inner mood state and external environmental triggers.

Internet addicts are typically hyperfocused on screen content and unaware of their internal process, and are, therefore, disconnected from themselves and others. This lack of mindfulness impairs social connection, which further exacerbates a desire to self-medicate. In-person social connection can be a partial antidote to IVGA. The absence of in-person contact contributes to social isolation, dissociation, and time distortion that coincides with Internet addiction. Addicts have little awareness of how much time they are spending online, and this further inhibiting self-reflection, examining contributing triggers, and the monitoring of physiologic symptoms and experiences.

## **PHARMACOTHERAPY AND MEDICALLY AUGMENTED THERAPIES**

A number of recent studies have addressed the use of pharmacotherapy in the treatment of IVGA.<sup>54–61</sup> Antidepressants<sup>54,56,58</sup> and antipsychotics<sup>54</sup> have both been used with varying degrees of success, along with other pharmacologic agents. Evidence-based addiction medicine has repeatedly demonstrated the need to use a combination of psychotherapeutic and psychoeducational approaches as the primary treatment of addiction, even when using medications adjunctively. Pharmacotherapies seem

to have promising usefulness as adjunctive treatment of IVGA, as well as for management of comorbid symptomatology.

Several psychopharmacologic agents may be useful in medically augmented treatment for Internet addiction and related disorders, although research evidence regarding medication strategies is limited in both depth and breadth. Efficacy has been demonstrated to some degree for various antidepressants, opioid receptor antagonists and partial agonists, mood stabilizers, antipsychotics, glutamatergic drugs, *N*-methyl-*D*-aspartate receptor antagonists, and psychostimulants.<sup>54–63</sup>

The medication that has been studied most extensively for the treatment of IVGA is bupropion. A 6-week open-label trial of bupropion sustained release in 11 patients with IVGA was related to decreased craving for video games and cue-induced brain activity, Internet addiction scores, and time spent online.<sup>60</sup> It seems that the drug was effective, but the study noted limitations by its small sample size. A randomized, double-blind trial compared bupropion plus psychoeducation with placebo plus psychoeducation in 50 participants with excessive online gaming and major depressive disorder.<sup>61</sup> During the 8-week trial, those treated with bupropion showed improvement in depression and video game addiction, and spent less time online than those treated with placebo. Bupropion seemed to be an effective adjunctive treatment for both depression and video game addiction in this study. A third open-label clinical trial of 65 adolescents with comorbid major depressive disorder and video game addiction compared bupropion with combined bupropion plus group CBT.<sup>41</sup> After 8 weeks, both groups showed improvement, but the combination group showed greater benefit for video game addiction severity and life satisfaction compared with the medication-only group. This finding suggests that bupropion treatment for depression and video game addiction may be most effective when combined with CBT.

One case report indicated that a patient with an Internet gaming addiction who was treated with escitalopram 30 mg for 3 months resulted in improved mood and a significant reduction in the drive to play online gaming, with a complete functional recovery.<sup>56</sup> An open-label trial of escitalopram (20 mg/d for 10 weeks) on 19 Internet addicts found significant decreases in weekly hours spent online and improvements in global functioning in 11 patients (64.7%).<sup>56</sup> At the end of the trial, subjects were blindly randomized either to continued escitalopram treatment or to placebo; both groups maintained gains made in the initial open-label treatment, but at the end of the double-blind phase there were no significant differences between the 2 groups. Larger controlled trials are clearly needed to investigate the efficacy of escitalopram and other selective serotonin reuptake inhibitors (SSRIs) for the treatment of IVGA.<sup>58</sup>

SSRIs may suppress inhibitory responses and the control of compulsive repetition, which likely explains their effectiveness in treating obsessive–compulsive disorders (OCDs). There also seem to be data indicating a high lifetime prevalence of major depression in Internet addicts. Clinical studies have also suggested a close relationship between dysregulation, impulsivity, and symptoms of the obsessive–compulsive spectrum, for which serotonergic drugs are known to be effective.<sup>59,64,65</sup> However, although definitely effective in treating OCD, SSRIs have shown mixed results in some impulse control disorders, namely, pathologic gambling, kleptomania, and compulsive shopping (as well as Internet addiction).<sup>57,62,63,65</sup>

The augmentation of SSRIs with atypical antipsychotics for the management of refractory OCD is gaining increasing acceptance. IVGA has some features in common with OCD, but appears to be a unique and distinct disorder. It has been hypothesized that quetiapine might be particularly useful for OCD,<sup>59</sup> and may also be a safe and effective augmenting medication in cases with problematic Internet use. Atypical antipsychotics have been successfully used to remediate address behavioral issues

associated with drug abuse, including impulsivity. In a review article Camardese and colleagues<sup>57</sup> proposed that SSRIs may potentially be efficacious in the treatment of IVGA and related disorders.<sup>57</sup>

The role of psychostimulants may be confounded by the frequently observed comorbidity of ADHD seen in IVGAs. Indeed, it is uncommon for a patient to present with Internet addiction without preexisting or concomitant ADHD symptomatology. Pharmacologic interventions are often used in addiction medicine as an adjunct for managing comorbid psychiatric symptoms, and less frequently than for the pharmacologic management of urges, cravings, and triggers, which also likely seems to be the case for psychostimulant management of IVGA.

In an 8-week trial of methylphenidate treatment for children with ADHD who played online video games, Internet addiction score and Internet use times were significantly decreased. The changes in Internet addiction scores between the baseline and 8-week assessments were correlated positively with the changes in inattention scores and performance on the Visual Continuous Performance Test. This finding suggests that Internet video game play is directly related to ADHD severity, and might be a means of self-medication for children with ADHD. This reflects the high rates of ADHD in patients with IVGA.<sup>18,65</sup>

Opioid receptor antagonists inhibit dopamine release in the nucleus accumbens and ventral pallidum, and other brain areas that mediate gratification, reinforcement, compulsion, and perseveration. Agents such as naltrexone have shown some clinical usefulness in the treatment of substance use disorders, gambling disorder, and kleptomania, and have also been considered for use in some behavioral addictions. However, research evidence regarding their effectiveness is currently limited to case reports.<sup>62</sup>

This case described a successful treatment of online pornography addiction with naltrexone.<sup>20,62</sup> By blocking the capacity of endogenous opioids to trigger dopamine release in response to reward, naltrexone may block the reinforcing nature of compulsive Internet and video game use.<sup>64</sup> Internet sexual activity and theoretically other IVGA behaviors. Future research is needed to better assess the effectiveness of these and other pharmacologic agents in treating IVGA. However, for the time being medication treatment remains adjunctive to more effective psychotherapeutic remedies, as described elsewhere in this article.

### ***Blocking, Monitoring, and Filtering***

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When dealing with substance-based addictions, addiction medicine typically espouses abstinence from all substances of abuse. This goal is appropriate for substance use disorders. However, in cases of IVGA it is generally unrealistic to avoid all Internet use. It seems that many aspects of everyday work and personal life are conducted online, and this perhaps is further complicated by modern society's dependence on smartphones. It is possible to achieve absence from specific problematic areas of Internet use (such as video games, pornography, social media) while continuing to use the Internet in more mindful and conscious ways.

An important goal for the treatment of Internet addiction should be to limit, monitor, and possibly block specific triggers, such as problematic content websites and Internet or video game content that serve as gateways to pathologic use. The initial goal is to detox from the most problematic sites and content, and then to relearn mindful technology use. It is sometimes possible to later reintroduce some of the problematic content in a limited way with less risk of relapse. However, in the case of an addiction to specific video games or pornography, it may be necessary to maintain ongoing abstinence. Many Internet and video game users have specific games, apps, or content that quickly lead to addictive use and may need to be avoided.

It should be noted that patients with an addictive video game habit often substitute gaming with watching videos of gaming on YouTube or other sites. This activity stimulates the addict's brain and may trigger a craving to play, creating opportunities for potential relapse. A qualified IT expert can block such triggering sites on the addict's computers, providing a buffer against triggering access to the most problematic sites and content, while allowing use of safer Internet content that may be useful for daily living. This measure creates a delay that allows for lithe inhibitive orbitofrontal circuits to be more easily accessed, preventing instant gratification via addictive content. We have seen how the addictive Internet content, once accessed, operates on a variable ratio reinforcement schedule, but such blocks can minimize potential relapse by creating disruptive extinction resistance.

An IT specialist can also set up monitoring software, providing the clinician with weekly reports detailing the patient's Internet use; in essence, this is an Internet abuse "toxicology screen," similar to a urine toxicology screen for substance-based addictions.

Care needs be taken not to assume that blocking, monitoring, or filtering a patient's online behavior will, on its own, be sufficient to treat Internet addiction. Often, a patient's family members attempt to manage their loved one's addiction via blocks and filters, but such IT strategies alone will likely fail unless part of a comprehensive treatment plan. The Internet addict is frequently more technologically sophisticated than their family, and may easily sabotage such efforts.

Many video game addicts, if blocked from playing their favorite games, switch to other media modalities (eg, YouTube) to watch others' gaming and experience game-play vicariously. Studies imply that video game addicts undergo a similar mesolimbic reward activation from simply observing other people's play as when playing the games themselves.<sup>20</sup>

### ***Real-Time Living Strategies***

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A hallmark of successful treatment of any addiction is the instillation or reinstallation of normalized life skills and behaviors. The Real-Time 100 involves a treatment strategy where the patient develops list of 100 real-time behaviors (non-screen-based) that are introduced and used when urges or cravings are noted; the idea is to slowly reintroduce "normal living" and reward saliency back into the patient's life. Addiction creates an imbalance in functional and developmental tasks where the addictive behavior becomes the primary source of dopaminergic stimulation in the nucleus accumbens and other reward brain structures. In the case of Internet and video game addicts, the inherit need for social competence, self-efficacy, accomplishment, and skills mastery becomes subsumed by Internet activities.

In such cases, we see desensitization (upregulation of postsynaptic dopamine receptors). This process results in the weakening of circuits related to naturalistic rewards (eg, food, sex, socializing, accomplishment in work or academics, etc). The Internet or video game addict has a diminished capacity to enjoy such everyday pleasures, and the redevelopment of naturalistic reward stimulation is essential in recovery. Nature abhors a vacuum, and as we decrease desensitized reward circuitry, it is necessary reestablish more naturalistic reward behaviors.

### **REWARD DEFICIENCY SYNDROME**

Addictions are, in part, maintained by a reward deficiency syndrome, in which normal life seems tedious compared with highly stimulatory addictive behaviors. This desensitization (dopamine receptor upregulation) involves a weakening of circuits related to

naturalistic rewards (eg, food, sex, social activities, work/academic reward, and delayed gratification for long-term goals). Once an addict enters this state, previously reinforcing behaviors decrease and excessive amounts of time become devoted to Internet use. Addictions are typically accompanied by a degree of developmental arrest with manifested impairment of typical social, occupational, and academic milestones. Patients typically need to resume healthy real-time living strategies to substitute dopaminergic reinforcement that addiction creates with the typical joys and satisfactions balanced living provides.

## **RELAPSE PREVENTION**

The goal of IVGA treatment is to maximize realistic sustainable recovery and maintain mindful moderation of technology use. For moderated use to continue even after treatment has completed, the clinician must help to inoculate the patient from relapse. The irony of relapse prevention is to acknowledge and assume potential relapse triggers and situations and to rehearse how these will be address not “if” they occur, but rather, “when” they will occur.

## **INTERNET AND VIDEO GAME ADDICTION: A NEW DRUG OF CHOICE**

Although a variety of therapeutic techniques have been presented for the treatment of IVGA, they are only at the beginning stage of validation and standardization. Although many of the general psychiatric and psychological treatments for Internet addiction are derived from an addiction medicine perspective, others are wholly novel. Internet addiction treatment should be seen as a distinct subspecialty of addiction medicine requiring specialized skills. Misdiagnosis is common, because many patients present for Internet addiction treatment only after numerous unsuccessful treatments failing to address the primary problem and instead focusing on general psychiatric symptomatology.

A common tenet in addiction medicine states that unless addictive behavior is addressed, treating comorbid psychiatric symptoms and disorders tends to be ineffective. Psychiatric conditions such as ADHD, depression, anxiety disorders, and autism spectrum disorder are typically premorbid and ensuing sequelae of the addiction, as with all addictions. The treatment of Internet addiction has not yet attained the benchmark of evidence-based criteria, but research evidence continues to mount, and better designed and implemented research is on the horizon.

An important perspective in treating Internet and video gaming addiction is that there is no need reinvent the wheel. Many well-established addiction treatment protocols and techniques have proven effective in correcting similar disruptions of the reward pathways of the brain, with or without psychiatric comorbidities. Internet use disorder may be new as a “drug of choice,” but numbing and self-medicating addictively are by no means new. We can draw from established substance use, alcohol use, and gambling disorder treatment protocols and therapies in helping our patients who suffer from an addiction to the Internet and video games; we know what can work in addiction medicine, and we know that addiction treatment is an ongoing recovery process. With adequate patient motivation and ongoing, targeted clinical care, healthier and sustainable technology use can be achieved and maintained over time.

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