

Clinical Considerations in Internet and Video Game Addiction Treatment



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KEYWORDS

- Social media • Smartphone addiction • Online pornography
- Internet addiction treatment • Internet addiction • Process addiction
- Behavioral addiction • Video game addiction

KEY POINTS

- This article reviews etiologic and neurobiological antecedents to Internet and video game addiction.
- Internet and video game addiction is defined from a behavioral/process addiction framework as defined by The American Society of Addiction Medicine.
- Patient readiness for change, motivation, and harm reduction factors in Internet and video game addiction treatment are addressed.
- Unique and dynamic aspects of Internet, video game, and screen use that relate to addictive behavior are presented.
- Psychotherapeutic, pharmacologic, and strategic treatments are presented, along with the Center for Internet and Technology Addiction treatment model.

INTRODUCTION

To address the clinical issues and treatment strategies applicable to Internet and video game addiction (IVGA), a working definition, along with the identification of the unique behavioral aspects of Internet and screen use disorders is required. Common addictive patterns found specifically with Internet screen use often present with similar symptomatology to other behavioral and substance-based addictions, although severity and impairment vary widely.¹ There are numerous specific characteristics which appear

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to uniquely contribute to the addictive properties of Internet behavior. This article examines the etiologic and neurobiological antecedents to Internet and video game addiction, reviews the treatment literature, and presents the CITA model of treatment.

ADDICTION AND PROCESS/BEHAVIORAL ADDICTION DEFINED

Perhaps, the most comprehensive and descriptive definition of addiction is the one published by The American Society of Addiction Medicine (ASAM),¹ which captures both the neurobiological and behavioral components of addiction and along with disruption in the mesolimbic reward circuitry of the brain, creates behavioral and negative functional impacts in daily living (see definition of addiction in italics).

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
CITA	Center for Internet and Technology Addiction

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. As 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.¹

Although premature death is a relatively infrequent consequence of IVGA, there are numerous psychological, behavioral, and physiologic sequelae to protracted Internet, video game, and screen use. In addition, excessive time spent online, regardless of Internet portal or content used, can create significant life impacts and imbalances.

Numerous anecdotal, clinical, and research studies describe various medical and physiologic sequelae, including elevated cortisol, hypertension, deep vein thrombosis, electrolyte imbalances leading to cardiac dysrhythmias, sleep disorders,² and obesity and related metabolic disorders.^{3,4} Many of these health-related problems may be the result of extended sedentary behavior and poor diet. Most addictions, and IVGA is no exception, ultimately affect psychological functioning and life balance, notably the major spheres of living, including occupation and academics, social and interpersonal behavior, health and self-care, and motivation. With IVGA there are often presentations of comorbid and co-occurring psychiatric issues such as depression, social and generalized anxiety, attention-deficit hyperactivity disorder (ADHD), and affective dysregulation.⁵

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 same circuits are also implicated in IVGA.^{6,7} There seems little doubt as to the neurobiological similarities between substance-based and behavioral (or process) addictions.⁶

The ASAM addiction definition substantively captures the complex biopsychosocial interplay that defines addiction as a complex brain-behavior disorder. Research and

historical analysis of addiction by Hari⁸ and Alexander⁹ strongly suggest social factors as a strong contributory factor for the development of an addiction to dopamine, innervating behaviors such as substance use and various behavioral addictions. We are hard-wired for social connection, and when access to such social connection is hampered by trauma, economic circumstances, and other psychological factors, engaging in intoxicating (dopamine innervating) substances or behaviors that modulates this need is enhanced. The maxim that social connection can serve to provide an antidote to addiction⁸ seems relevant when examining the addictive process of Internet, video game, and social media—all of which provide pseudoconnection, while often simultaneously socially isolating the user. The irony that the Internet was initially hailed as a neuroprotective behavior to mitigate social isolation has proved problematic, especially when examining some of the most addictive forms of online content, such as social media, pornography, and video gaming.

A DIGITAL DRUG ADMINISTERED BY VIRTUAL HYPODERMIC

Some disagreement exists regarding the appropriate nosology for IVGA; however, there is considerable clinical and research data documenting the use, abuse, and addiction to the Internet and video gaming.^{10–19} All forms of Internet content and video games are accessed easily via handheld devices, gaming consoles, and computers, as well as on smartphones and tablets, allowing significant ease of access,²⁰ thus increasing their addictive potential. Ease of access (or threshold reduction) is a significant variable relating to the addictive potential of a substance or a behavior, including Internet and video gaming, due to shorter latency between substance administration (or engaging in online behavior) and subsequent dopamine reinforcement—thus increasing addictive potential^{20,21}; this is likely due to associated operant and classically conditioned features of tolerance and extinction resistance characteristic of addictions, including Internet-mediated addictions.²⁰

The marked phenomenological overlap between Internet addiction, substance addiction, and pathologic gambling strongly suggests that a common neurobiological process involving affected reward circuits underlie these disorders and that the mesolimbic dopamine pathways likely represent a common pathway for neurobiological reinforcement and the biobehavioral addiction process from behavioral or pharmacologic stimuli. It seems that dopamine is the key neurotransmitter mediating pleasure, pain minimization, and reward deficiency in all additive processes.^{5,22}

The use and abuse of content on the Internet (which increasingly involves the use of the smartphone Internet access portal) seems to hamper the ability to effectively manage time and attention, thus leading to hampered life-balance and other behavioral impacts. IVGA seems to affect motivation, reward, compulsion, memory, and often presents with co-occurring conditions, such as depression, social and generalized anxiety, and ADHD.

There are numerous factors that seem to contribute to the additive potential of the Internet. Several studies have found key factors that are associated with the compulsive use of the Internet and video games, including disinhibition, ease of access, content stimulation, synergistic amplification, boredom intolerance, dissociation (time distortion), perceived anonymity, and the variable activation of neurobiological reward pathways.^{10,11,18,20,23}

Disinhibition

Disinhibition seems to allow users to express and experience themselves in a manner that is less affected by ego constraints, allowing them to take on alternate persona, roles, or behaviors. In our original research¹¹ we found that some of the variance

accounting for this phenomenon was due, in part, to *perceived anonymity*. When online, it seems that it is easier to experience aspects of one's personality that might otherwise be less available in real-time communication; this may be due to inhibition of executive functions in the orbitofrontal area of the brain (which supports inhibitory processing). With all addictions the brain is essentially hijacked through the piggybacking of primitive (survival-based) dopaminergic reward circuits, initially meant for insuring sustenance and procreation and that are supported by suppression of inhibitory processes found in the frontal cortex; this makes sense from an evolutionary biological perspective, as it enhances execution of quick-response, survival-based behavior. In essence, addiction may be seen as misplaced survival drives.

Ease of Access

Ease of access is a well-established contributory factor in all addictions; the ability to readily access intoxicating substances or behaviors increases the likelihood of compulsive or addictive use. Internet and video game availability functions as a neurobiological trigger, facilitating activation of limbic brain pathways in a kindling-like manner; once ignited, the neuropathways and behavior patterns are activated and run on auto pilot. In addition, anticipatory dopamine innervation can occur simply by the visual cue of a computer, smartphone, or other Internet/video game device, thus priming brain reward circuits.

Content Stimulation

The Internet through its various access portals essentially becomes a virtual delivery mechanism for powerful and stimulating content. Video games, pornography, infotainment, social media, shopping, surfing/scrolling, YouTube, 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* content to the nervous system with *ease of access*, thereby creating a *reduced threshold* in accessing and experiencing such stimulating content.

Synergistic Amplification

The combination of stimulating content, delivered with rapid speed, produces a *synergistic amplification* between *content* and the *Internet delivery mechanism*. Here, the whole is greater than the sum of its parts, and the combining of potent content with an accessible and efficient Internet delivery system produces an amplified and effective mood-altering dose.

Boredom intolerance

One of the most notable and frequent triggers of excessive Internet use, particularly on the smartphone, can be *boredom intolerance*. The ability to have a readily available Internet access portal, which is always on and accessible, facilitates the intolerance of being able to “do nothing”—for even brief periods of time. The more one surrenders to *screen simulation* and *attentional distraction*, the greater the neurobiological association between their Internet/smartphone use and avoidance of unpleasant emotions or circumstances.

Dissociation (Time Distortion)

The experience of an altered perception of time is a ubiquitous experience of the Internet medium.^{11,20,23} The Internet medium itself, combined with potentially stimulating content, alters the perception of time, thereby reflecting a psychoactive and mood-altered experience. There is a likely connection between the *distortion of time*

and the experience of dopamine-mediated pleasure responses, which likely has its roots in the development of mammalian dopamine reward circuits.

Perceived Anonymity

This phenomenon is a significant marker for the online experience. Texting, instant messaging, direct messaging, surfing/scrolling, chat, email, social media posts, shopping, stock trading, online gambling, and pornography are frequently experienced as anonymous or quasi-anonymous, thus supporting the perception of a private communication and e-commerce experience. Nothing could be farther from the truth; in our early research^{11,23} we found that the perception of *anonymity* was a significant factor in the attraction to and frequent use of the Internet. Users communicate, interact, and conduct business as if they are alone or in a way that reflects having a *personal* or *private* relationship with their device (and hence those whom they are communicating with through the Internet). Ironically, the Internet is perhaps the least anonymous of all communication mediums.

Activation of Neurobiological Reward Pathways

The Internet seems to activate the same mesolimbic reward pathways that are activated by various psychoactive substances and other addictive behaviors.²⁴ The efficient presentation of salient and rewarding stimuli in a variable format provides increase in extinction resistance and addictive potential of online behavior; anticipatory dopamine innervation (*The Maybe Factor*) further contributes to the powerfully captivating effects of the Internet medium with its correlated stimulating content. The short latency between the *click* or *tap* of a device and the rapid deployment of varied content provides a synergistically amplified experience. The faster an Internet device operates in accessing online content, the potentially greater the additive potential.

A VIRTUAL SLOT MACHINE

The Internet essentially functions as the *world's largest slot machine*. As noted, the Internet operates on a *variable ratio reinforcement schedule* due to the unpredictability in *what*, *when*, and *how desirable* the accessed content is. A slot machine operates similarly, where unpredictability (*The Maybe Factor*) keeps our brains tuned-in and vigilant; and encountering pleasurable (personally salient) stimuli facilitates a small and intermittent release of dopamine in the brain's reward center. Because these rewards are variable and unpredictable, frequent and compulsive checking of online and smartphone apps and content becomes a common occurrence. The behavior pattern of searching, scrolling, surfing, or scanning social media, such as YouTube, video games, pornography, shopping, news, information, and other forms of Internet content, becomes habitual and highly resistant to extinction. Checking phones can easily reach compulsive levels with hours of daily, dissociated use, regardless of the specific content accessed. Numerous studies^{7,25} support that addictive Internet and video game use is associated with dopamine release in the mesolimbic system, which may lead to a desensitizing reduction in dopamine receptor expression (downregulation), reward deficiency syndrome, and hypofrontality.^{5,20,25} There are numerous potential psychiatric sequelae for heavy Internet use, which may include reward deficiency-based depression, anxiety, impaired motivation, and inattention to balanced, real-time living behaviors.

The smartphone adds another dimension to Internet access with its frequent use of *notifications*. Users are constantly alerted via beeps, buzzes, and updates that inform them that *novel* information is waiting to be accessed; such notifications lead to the

anticipation of *potentially desirable* content, thus providing a dopamine release. Anticipatory dopamine innervation is typically greater than subsequent reward, and it is the anticipatory reward that may contribute to the kindling or priming effect for further use of an Internet device, analogous with how one might keep playing on a slot machine after winning even a small amount. There is also evidence that suggests that the mere sight of a smartphone (along with notifications and rings) stimulates the release of the stress hormone cortisol, in turn triggering a self-medicating (stress-reducing) response by repeatedly checking their smartphone device.^{3,4,26–28}

It seems that the most potent levels of dopamine innervation occur in conjunction with anticipation of reward, as compared with simply consuming the actual rewarding content itself—and anticipatory innervation may occur when one is *triggered* simply by the perceived availability of a screen device. The triggering effect from the presence of a smartphone may be analogous to the triggers, along with resulting urges and cravings, frequently seen with substance-based addiction behavior. The smartphone then may well be the *world's smallest slot machine*, fitting easily in one's purse or pocket and containing all the power and potency of a variably stimulating Internet access portal.

Smartphones can keep users on *automatic pilot*, responding to triggering stimuli on an automated, unconscious level, thus potentially inhibiting one from making healthy choices. Users may socially isolate, become intolerant of boredom, and maintain near-constant distraction levels with their devices—many addicted users become overstimulated, dopamine saturated, and attentionally impaired.

The new digital culture places less value on real-time experiences that are not broadcast or shared, as if our experiences have less value unless recorded, and then viewed, rated, and commented on by others. Echoic expressions of reflected self-esteem contribute to the phenomenon of social validation looping, where one repeatedly posts in order to receive social validation via likes, comments, and reposts; this process further contributes to the experience of fear of missing out, and the concern that one must continually update via social media while monitoring those updates, or one will fail to be noticed or socially included. Ironically, what we seem to be missing is the present-centered experience of our own lives and our own self-appraisal. Excessive Internet use may also contribute to health problems, including increased weight from sedentary behavior, eye strain, hand, finger, wrist, and upper back/neck strains, limited attentional capacity, hypertension, and stress from constant attentional vigilance.²⁹

Compulsive smartphone use leading to elevated distractibility can also become a serious health threat; recent data^{28,30} 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 distract drivers, because users engage in a variety of smartphone functions while driving.

TREATMENT CONSIDERATIONS

Treatment (as well as diagnostic nosology) of Internet addiction has not yet been standardized.^{31–34} Historically addiction medicine has often lacked treatment standardization for many addictions,³⁵ and there remains some disagreement regarding the exact definition of Internet addiction, what to label it, and whether to classify it as a unified diagnosis or as distinct subdiagnoses³⁶; regardless of these considerations, there is significant unmet public need for treatment services of screen-based behaviors.³³

A significant demand for treatment of Internet addiction exists in the United States; prevalence statistics suggest a range of 0.5% to 12%.^{33,34} Even greater demand exists in China, Taiwan, and South Korea, where the estimated prevalence among adolescents ranges from 1.6%³⁷ to 11.3%,³⁸ with some estimates placing 25% of youth as meeting criteria for IVGA. Despite considerable overlap in current measures for diagnosis, there is a lack of comprehensive and agreed-upon criteria; these factors contribute to the difficulty in precisely determining prevalence and therefore limit evaluating matched treatments. Treatment of addiction is often ultimately successful, but it frequently requires multiple treatment episodes before obtaining lasting sobriety; further, the very definition of *sobriety* with regard to IVGA is complicated in that abstinence is not fully attainable (as compared with substances) due to the necessary use of screen-based technologies for daily living.

SPECIFIED TREATMENT INTERVENTIONS

Once an adequate diagnosis of IVGA is made, the initial goal in treatment planning is to determine the level of motivation of the patient; the question of who is invested in the treatment process and outcome must be determined. In many cases, the patient may be a child, adolescent, or young adult, and treatment typically involves parents or loved ones; an attempt must be made to structure interventions based on the motivation and resources of the patient and family (or other support system).

It is also important to understand the developmental and psychosocial context of symptoms. Why is the patient presenting for treatment now? What developmental and biopsychosocial processes are ongoing for the patient? What stresses currently exist in patient's life? Are there social and relational problems that factor in?

Family reeducation is critical, especially around neurobiological education and helping parents understand that excessive or addictive use of the Internet or video games is not simply an act of willful defiance; such education is also helpful in reempowering the parents to help set appropriate boundaries, limits, consequences, and expectations. Parental involvement in treatment is essential for successful outcome when treating IVGA for younger patients. Strategies include boundaries and limit setting, as well as management of family technology through parenting skills—as well as with software and app-based blocking, limiting, and filtering. Modifying and controlling the patient's use or abuse pattern, marital factors (as there is often parental disagreement regarding screen use), medications, comorbidities, incentive induction, and positive reward transfer toward real-time living are key.

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

IVGA often presents with *reward deficiency syndrome* caused by downregulation of dopamine receptors after excessive dopamine release secondary to exaggerated neurotransmitter interactions in the mesolimbic system.^{39–42} Clinical considerations include screen-use history, tolerance, withdrawal, comorbidities, history of ADHD, possible genetic and epigenetic contributions, neurobiological mechanisms, and previous responses (if any) to treatment; it is suggested that behavioral (process) addictions such as IVGA resemble substance-based addictions and that excessive Internet use indeed presents with numerous features typically seen in the addiction spectrum. Winkler and colleagues⁴¹ found that both pharmacologic and psychological treatments were effective in treating Internet addiction (time spent online, as well as symptoms of depression, and anxiety)—although there is still a dearth of data specific to appropriate patient-treatment matching.

COGNITIVE-BEHAVORAL THERAPY

Numerous studies have suggested cognitive-behavioral therapy (CBT) is an effective treatment of Internet addictions.^{32,43–49} Patients are trained to recognize cognitive and behavioral triggers that encourage self-medication using the Internet, screens, and video games and how to alter thoughts and behaviors to promote more moderated use.

A meta-review of Chinese Internet addiction studies⁴⁸ supported the relative efficacy of CBT, and most contemporary addiction treatment models have a strong CBT component. As Greenfield⁵⁰ notes, many, if not most, psychotherapeutic and behavioral interventions have cognitive-behavioral components, but addiction medicine heavily relies on psychoeducational strategies and in identifying the cognitive, emotional, and behavioral triggers and relapse antecedents.

Meta-analyses by King and Delfabbro⁴⁶ and others⁴⁷ found that cognitive-behavioral strategies are efficacious in managing IVGA; and 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.^{51–53}

MOTIVATIONAL STRATEGIES: INTERVIEWING, ENHANCEMENT, AND HARM REDUCTION

Motivational interviewing and motivational enhancement are effective techniques to evaluate, establish, and enhance motivation for treatment and sobriety behaviors as well as in establishing the therapeutic alliance for treatment of addictions.⁵⁴ Patients seeking assistance for Internet-related disorders, as other addictions, have variable levels of readiness and motivation for change⁵⁵ and are frequently encouraged into treatment by a family member or loved one. 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 and are therefore less motivated for clinical intervention. Successful treatment barriers can be exacerbated by a lack of a clinician's experience in treating IVGA and potential variability of professional acceptance of the disorder as a legitimate diagnosis. These factors, along with the view that the Internet and video games are *harmless entertainment*, can provide roadblocks in the treatment process.

MOTIVATIONAL INTERVIEWING AND MOTIVATIONAL ENHANCEMENT

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

—Blaise Pascal

It is critical in the treatment of any substance or behavioral/process addiction that adequate treatment motivation exists. Many patients do not arrive for treatment at a high level of motivation, and therefore, attempts must be made to enhance treatment readiness and motivation and potentially enhance their willingness to receive help.⁵⁴

It is important for the clinician to be aware of personal judgments, feelings, fears, and frustrations toward individuals experiencing Internet or video game addiction and to be conscious of a natural tendency to judge patient's addictive behaviors and actions. Being conscious of ascribing a negative prognosis in the face of a chronic, relapsing disorder such as an addiction is paramount to being clinically helpful. Some general guidelines are as follows:

- Become familiar with the neurobiology of addiction (and IVGA in particular) and help educate the patient (and family) to understand the process of IVGA. Many dealing with this issue do not know about the neurochemical and neurobiological factors associated with their illness.
- Learn to assess your patient's *readiness to change*, so you may apply appropriate motivational interviewing and motivational enhancement⁵⁶ 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 (or lack thereof) and prognosis based on addiction-based behaviors.
- IVGA treatment and management can be challenging, but so are many chronic medical illnesses that we *still* attempt to treat.
- 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 and the psychological and biological factors found in addiction.
- Only 50% of the epidemiology for addiction seems to be genetic; the rest seems to be environmental/behavioral and epigenetic, which is the area where we, as clinicians, need to work.
- Remember (and remind the patient) that any improvement is a positive change and therefore reduces relative harm. Recovery from IVGA is *not all or none*, and small positive steps are always welcome.
- The longer the patient is able to moderate their use, the more likely that sustainable and balanced Internet and video game will occur.

READINESS FOR CHANGE AND TREATMENT

How many clinicians does it take to change a light bulb? One, but the light bulb must want to change.

The evaluation and management of patient motivation and readiness is a critical feature of Internet addiction treatment, just as it is with 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 level of motivation.⁵⁵ Stages of readiness for change are not always progressive, as patients frequently move back and forth among varying stages, requiring clinicians to maintain a flexible treatment approach. The stages of readiness and corresponding clinical goals are *precontemplation*, *contemplation*, *preparation*, *action*, *maintenance*, and *relapse*.

Precontemplation

In this early stage, the patient is not currently considering change. The clinician should validate a lack of readiness and normalize this experience. Clarify with the patient that the decision is theirs (although this becomes complicated when a parent is bringing a child or adolescent in for treatment). Encourage reevaluation of current behaviors and their consequences—without judgment. Stay curious and encourage the patient to be curious about themselves and about learning about their addiction. 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 other people (eg, parents, spouse, employer, friends) are concerned that they do.

Contemplation

In this stage, the patient is ambivalent about change or is “sitting on the fence.” The patient in contemplation is probably not considering changing within the very near future. The clinician’s goal is to validate their current lack of readiness and clarify that the decision regarding whether to change is theirs, although there may be natural consequences from their addictive behavior. Encourage evaluation of the pros and cons of behavior change and help to identify and promote positive potential outcome expectations.

Preparation

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

Action

Patients at this stage are practicing new behaviors. Clinicians should focus on restructuring cues and triggers, as well as strengthening external supports, including family relationships and support groups. Bolster self-efficacy for dealing with material and emotional obstacles. Help combat feelings of longing, urges, cravings, and triggers for excessive Internet, video gaming, and screen use, emphasizing the long-term benefits of recovery and change. Highlight the positives of a balanced relationship with technology.

Maintenance

The patient has successfully changed their behavior and demonstrates a continued commitment to sustaining new (and healthier) behaviors; this outcome can occur at any point after beginning treatment, but typically after 6 months or more. Plan for supportive follow-up. Reinforce self-regulation and limit setting including internal rewards for positive behavior change and discuss coping with potential relapse. All these stages are not absolute or cumulative, and patients may move back and forth in their individual recovery readiness and stages of readiness for change.

Relapse

Here the patient has resumed previous Internet and video game behaviors. Clinicians should evaluate possible triggers contributing to the relapse including urges, cravings, and thoughts about the relapse. Develop or reaffirm a clear relapse prevention plan to be prepared for possible future relapses and lapses. Reassess motivation and possible barriers to mindful and moderated use and be on the lookout for negative cognitions and self-incrimination. Help the patient plan stronger coping strategies, as 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 addiction recovery process, and Internet-based screen addictions are no exception.

Perhaps the greatest gift we can give in medicine is the installation of hope. Sometimes it is difficult for us as clinicians to feel hopeful or to adequately convey it to our

patients—especially when we see our patients relapsing and experiencing negative life consequences. Medical compliance and treatment adherence is about 50%, yet in the treatment of addictions, we somehow expect greater treatment compliance, and when we do not see obvious progress, we might interpret this as a lack of motivation in our patients, which can then interfere with effective treatment.

ABSTINENCE VERSUS MODERATED AND MINDFUL TECHNOLOGY USE

Because we need to use the Internet for so many aspects of living, it is difficult to achieve complete abstinence with IVGA. The best option is *moderated, mindful, and value-based* use and to remove or limit the most problematic (triggering) content areas through external limits and controls. Modified use via behavioral and neurobiological disruption and repatterning (identifying and changing the trigger or urge response pattern) can begin to alter the well-established reward circuits. The goal is to eventually have positive reward transfer develop for real-time behaviors. Eye movement desensitization reprocessing has been a helpful tool in reducing urges and triggers,^{35,57} as well as in treating concomitant social anxiety and social skills deficits.

Internet use disorder presents with a variety of unique characteristics in which addictive behaviors have become almost socially normative within our digital screen culture, further exacerbating denial among addicted users.⁵⁰ It seems we have come to accept the fact that we are all *somewhat* addicted to our screens, including video games and our smartphones. Internet entertainment (infotainment) reflect potentially addictive behaviors that have become acceptable within contemporary youth culture—the smartphone has rapidly become the dominant Internet access portal⁵⁸ and is often viewed as a necessary social tool and has been elevated to a *must-have* status.

A CLINIC-BASED TREATMENT PROGRAM FOR INTERNET AND VIDEO GAME ADDICTION AND EXCESSIVE SCREEN USE

Greenfield⁵⁰ developed a 7-step treatment process for IVGA and related screen use disorders. The model was developed for adolescents and young adults over a 20-year period while providing outpatient and intensive outpatient treatment of IVGA. This practical approach addresses treatment in a manner analogous to standard treatment protocols for other addictions, albeit with some variations, specific to screen behavior. This outline should not be treated as a lockstep or fixed treatment protocol but rather as a set of procedural guidelines. IVGA treatment must be flexible to be applied to the individual needs for each patient. Exacerbations, relapses, and treatment adjustments must be made throughout the process, and no 2 patients are alike; these guidelines can help inform the clinician on how to conceptually and clinically manage and treat IVGA and related screen use disorders.

The Center for Internet and Technology Addiction³⁷ uses a combination of psychoeducation and neurobiological education, motivational interviewing, motivational enhancement, harm reduction, psychotherapy, pharmacotherapy, treatment of comorbid and concurrent psychiatric issues, and eye movement desensitization reprocessing,⁵⁷ using a modified addiction management protocol.^{55,56}

Patient Engagement and Rapport Building

In this critical stage, a collaborative treatment relationship is developed for the management and treatment of IVGA. This first stage of treatment is perhaps the most critical component of a successful treatment process, because without a collaborative relationship, treatment motivation, adherence, and compliance will be greatly

reduced. It is key to building the treatment relationship and for assessing readiness for change, enhancing motivation, and increasing the patient's self-efficacy for potential positive change. Often, the addiction issues are not heavily addressed during the early phase of engagement.

Pattern Disruption

This phase is intended to disrupt the behavioral and functional aspects of the addiction and result in compulsive use patterns. The goal is to interrupt habitual coping, self-medication, and trigger-response loops and begin to allow new, more adaptive Internet and screen use to develop. Sometimes it is necessary to prescribe a period of relative abstinence (digital detox), with a particular focus on the most problematic content, for example, video gaming, pornography, social media, or shopping; very problematic content may need to be blocked and/or monitored at this stage in order to address the synergistic amplification of stimulating content and the Internet delivery mechanism. The goal is to help the patient begin to develop a more mindful, values-based use of the Internet and in so doing, begin the process of breaking neural pathways associated with their maladaptive use patterns. Because addiction involves disruptions of the mesolimbic reward circuitry, as well as antecedent and ritualistic behavioral patterns, we are attempting to shift this through actual pattern changes. We are using the neuroplastic and neurotrophic aspects of the brain-behavior interrelationship to gradually help rewire the addiction-behavior response pattern.

The goal is to begin to establish and strengthen new pathways and to begin to decrease the pattern of dopamine postsynaptic receptor (downregulation) associated with Internet-based addictive disorders. In so doing, we can begin to decrease the consequences of reward deficiency syndrome by minimizing excessive reward salience associated with screen use and slowly encouraging other forms of rewarding (dopaminergic) behavior. Ideally there will be the development of positive life consequences and rewards that are real-time oriented and naturalistic.

Trigger Identification

All addictions involve behavioral and situational triggers, which themselves have associated antecedents. It is critical to identify emotional and circumstantial triggers that kindle the addictive cycle of behavior. Availability and opportunity (ease of access), boredom intolerance, anxiety (frequently social anxiety), and academic/work avoidance are common triggers, but there may be other triggers that are unique to the specific patient. The major treatment goal of this phase is for the clinician to help the patient *identify* the triggers for their compulsive screen use and to establish more moderated screen use habits. The goal is for the patient to develop increased self-awareness (and self-control) by identifying behaviors that exacerbate addictive patterns of use and by developing alternate real-time pleasure sources. Anticipation of triggers can become a method to counter-act anticipatory dopamine innervation from smartphone notifications (as well as other triggers), which can become a pathway to excessive screen use.

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

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

Individuals experiencing Internet addiction are typically hyperfocused on screen access and content but unaware of their internal process. This lack of mindfulness, combined with time distortion/dissociation, perceived anonymity, and social media reliance, can impair real-time social connection—which may further exacerbate a desire to self-medicate. Nutritive social connection can be a partial antidote to IVGA, as the absence of real-time social connection can contribute to screen-induced social isolation. Internet addicts have little awareness of how much time they are spending online, thus further inhibiting self-reflection, trigger identification, and the monitoring of internal physiologic symptoms.

PHARMACOLOGY AND MEDICALLY AUGMENTED THERAPIES

Several recent studies have addressed the use of pharmacotherapy in the treatment of IVGA.^{59–66} Antidepressants^{59,61,63} and antipsychotics⁵⁹ have both been used with varying degrees of success, along with other pharmacologic agents. Evidence-based addiction medicine research has repeatedly demonstrated the need for the use of a combination of psychotherapeutic and psychoeducational approaches as the primary treatment of addiction, even while using medications. Pharmacotherapies may have promising usefulness as an adjunctive treatment of IVGA, as well as for management of comorbid symptomatology that is frequently found.

Several psychopharmacologic agents may be useful in medically augmented treatment of 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, W-methyl-D-aspartate receptor antagonists, and psychostimulants.^{59–68}

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 adult patients with IVGA was related to decreased craving for video games and cue-induced brain activity, Internet addiction scores, and time spend online.⁶⁵ 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 (13–45 year old) with excessive online gaming and major depressive disorder.⁶⁶ During the 8-week trial, those treated with bupropion showed improvement in depression and video game addiction symptoms and spent less time online than those treated with placebo. Bupropion seemed to be an effective adjunctive treatment of 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.⁴⁵ 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 of depression and video game addiction may be most effective when combined with CBT. There are obvious confounds in any study using antidepressant therapies for IVGA due to the frequent presentation mood inhibition due to reward deficiency syndrome.

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.⁶¹ An open-label trial of escitalopram (20 mg/d for 10 weeks) on 19 persons experiencing Internet addiction found significant decreases in weekly hours spent

online and improvements in global functioning in 11 patients (64.7%).⁶¹ 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), as well as other psychopharmacologic agents for the treatment of IVGA.⁶³

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 higher lifetime prevalence of major depression in Internet addicts. Clinical studies have suggested a close relationship between affective dysregulation, impulsivity, and symptoms of the obsessive-compulsive spectrum, for which serotonergic drugs are known to be effective.^{64,69,70} However, although 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).^{62,67,68,70}

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 seems to be a unique and distinct disorder with a specific symptom profile.

It has been hypothesized that quetiapine might be particularly useful for OCD⁶⁴ and may also be a safe and effective augmenting medication in cases with problematic Internet use. Atypical antipsychotics have been successfully used to remediate behavioral issues. In a review article Camardese and colleagues⁶² proposed that SSRIs may potentially be efficacious in the treatment of IVGA and related disorders⁶² associated with drug abuse, including impulsivity. Indeed, in our residential treatment program atypical antipsychotics have been found useful in management of anger and acting-out behaviors associated with withdrawal and dysregulation from excessive screen device use.

The role of psychostimulants in treatment of IVGA may be confounded by the frequent comorbidity of ADHD often seen in IVGAs. Indeed, it is uncommon for a patient to present with Internet addiction without preexisting or concomitant ADHD symptomatology; and pharmacologic interventions are often useful in addiction medicine as an adjunct for managing comorbid psychiatric symptoms, but less frequently for the pharmacologic management of urges, cravings, and triggers, which seems to be the case for psychostimulant management of IVGA. Many patients with IVGA who are treated with psychostimulants (without other targeted Internet addiction treatment) do not seem to benefit in terms of their addiction symptoms.

In an 8-week trial of methylphenidate treatment of 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 or self-management for children with ADHD, which is reflected in the high rates of ADHD in patients with IVGA.^{20,70} Perhaps the larger question is whether ADHD increases the incidence of IVGA or does IVGA increase levels of distractibility and decreased attention/concentration, further contributing to core ADHD symptoms, although there is likely to be an interactive and recursive process.

Opioid receptor antagonists inhibit dopamine release in the nucleus accumbens and ventral pallidum and other brain areas that mediate gratification, reinforcement,

compulsion, and perseverance. 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 in IVGA are currently limited to case reports.⁶⁷ One case describes a successful treatment of online pornography addiction with naltrexone.^{22,67} By blocking the capacity of endogenous opioids to trigger dopamine release in response to reward, naltrexone may, in theory, block the reinforcing nature of compulsive Internet and video game use,⁶⁹ 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. For the time being medications seem to remain adjunctive to more effective and well-established psychotherapeutic and behavioral interventions, as described throughout this article.

Blocking, Monitoring, and Filtering

When dealing with substance-based addictions, addiction treatment often uses abstinence from all abused substances (as well as other mood-altering substances). This goal seems appropriate, if not necessary, for effective substance use disorder treatment. With IVGA it is generally unrealistic (if not impossible) to avoid all Internet and screen use; many aspects of everyday life, including work, academics, banking, and most activities of daily living, are conducted online; Internet use is perhaps further exacerbated by our growing dependence on smartphones. The question remains whether it is possible to achieve abstinence from specific problematic areas of Internet use (such as video games, pornography, or social media) while continuing to use the Internet for necessary tasks in a mindful and moderate way.

An important goal for the treatment of Internet addiction is to monitor, limit, and possibly block specific *triggers*, including problematic content, apps, and Websites—as well as Internet content that serves as clear gateways to pathologic use. The initial goal is to detox (or at least significantly limit) the most problematic content and then to reestablish screen technology use (possibly without the most triggering applications and Websites). It is sometimes possible to later reintroduce problematic content in a limited or modified manner with less risk of relapse; however, in the case of an addiction to video games, pornography, or social media it may be necessary to maintain ongoing abstinence. Many heavy Internet and video game users use games, apps, or content that can instigate addictive use and may thus need to be ultimately avoided. In addition, overall daily screen use limits are almost always necessary in managing IVGA.

It should be noted that patients with a video game addiction often intersperse actual video gaming with watching recordings and streams of gaming on YouTube, Twitch, or other sites. This activity stimulates the addict and may trigger a craving to play, creating an increased likelihood for potential relapse. A qualified IT expert can help block, limit, or monitor such triggering sites or apps on the addict's devices, providing a buffer against triggering access to the most problematic sites and content, while allowing use of less problematic Internet use; this process can help create a delay that allows for the inhibitive orbitofrontal circuits to be more easily accessed, preventing the near-instant gratification from stimulating and addictive online content. We have seen how addictive Internet content, once accessed, operates on a variable reinforcement schedule, with ease-of-access often becoming an ignition point; IT blocks can serve to minimize potential relapse by disrupting extinction-resistant patterns.

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; such reports can also be used as a means of assessing the addict's overall

use patterns and offer a preintervention (before treatment) analysis of content, apps, and websites that might need to be targeted, blocked or limited.

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, patients' family members may attempt to manage their loved one's addiction via such blocks and filters, but 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 also attempt to sabotage such technical efforts.

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.²² As previously noted, many video game addicts, if blocked from playing their favorite games, will switch to other media modalities (eg, YouTube or Twitch) to watch others' gaming and experience gameplay vicariously or simply switch to binge-watching streamed television.

Reward deficiency syndrome

Addictions are, in part, supported and maintained by a reward deficiency syndrome, in which normal living seems flat and unrewarding compared with highly stimulating addictive behaviors. This desensitization (dopamine receptor upregulation) involves a weakening of circuits related to naturalistic reward, including social activities, work/academic reward, and delayed gratification of longer-term goals. Once an addict enters this state, previously reinforcing behaviors decrease and excessive amounts of time online increase. In addition, the addiction can be accompanied by a degree of developmental arrest with impairment of typical social, occupational, and academic milestones. Indeed, failure to launch is a frequent component of the IVGA patient, and patients typically need to resume healthy real-time living strategies to reintroduce naturalistic dopaminergic reinforcement.

In such cases of desensitization (upregulation of postsynaptic dopamine receptors) this can result in the weakening of circuits related to naturalistic rewards (eg, food, sex, self-care, socializing, work, or academic accomplishment). The Internet or video game addict may have a diminished capacity to enjoy such everyday pleasures and avoid delay of gratification, and the redevelopment of naturalistic reward stimulation therefore becomes essential in recovery. Nature abhors a vacuum, and as we decrease desensitized reward circuits, it is necessary to reestablish more naturalistic reward behaviors to serve as a prophylactic buffer in the recovery process.

Real-Time Living Strategies

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 a list of 100 real-time behaviors (nonscreen based) that are introduced and used when urges, cravings, or triggers are noted; the idea is to slowly reintroduce normalized reward from real-time living and more naturalistic 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 innervation in the nucleus accumbens and related brain reward structures. In the case of Internet and video game addicts, the inherent need for social competence, social validation, self-efficacy, accomplishment, and skills mastery becomes subsumed by Internet and screen-based activities.

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 been completed, the clinician must help to inoculate the patient to relapse. The irony of relapse prevention is that one must acknowledge and assume potential relapse to help prevent it; and identifying triggers and situations, and rehearsing how these will be addressed when they occur, becomes a crucial part of any successful treatment.

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 stages of identification, validation, and standardization. Although many of the general psychiatric and addiction treatments for Internet addiction are derived from established addiction medicine approaches, others are wholly novel and unique to these new digital drugs. Internet addiction treatment should rather be seen as a distinct subspecialty of addiction medicine requiring specialized behavioral/process addiction skills. Misdiagnosis is common, and many patients present for Internet addiction treatment only *after* numerous unsuccessful treatments failing to address the primary problem; frequently, treatment focuses solely on general psychiatric symptomatology, often with the erroneous bias that if such symptoms are corrected, compulsive screen use will diminish—this has not been supported at our clinic or in the literature. The treatment of Internet addiction has not yet attained the mature benchmark of evidence-based criteria, but research evidence continues to mount, and better designed and implemented research is on the horizon.

A common tenet in addiction medicine is 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 symptoms may be premorbid or cooccurring and may also exacerbate as addiction sequelae.

An important perspective in treating Internet and video gaming addiction is that there is no need to reinvent the wheel. Many well-established addiction treatment protocols and techniques have proved effective in correcting similar disruptions of the reward pathways of the brain, with or without psychiatric comorbidities. Internet use disorders may be a new *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 to help our patients who suffer from an addiction to the Internet and video games; we know what works in addiction medicine, and we know that addiction treatment often reflects an ongoing recovery process. With adequate patient motivation and targeted clinical care, healthier and sustainable technology use can be achieved and maintained over time.

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