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SPECIAL ISSUE

Gaming Addiction

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History

At the turn of the last century, maladaptive gaming practice was typically associated with solitary console gaming predominantly involving male children. It was rarely on the clinical radar as a cause or contributor to educational or behavioral difficulties for which psychological services were being sought (e.g., attention deficit hyperactivity disorder [ADHD], conduct disorder, obsessive compulsive disorder, oppositional defiant disorder, insomnia, and mood deregulation; Swingle, 2013, 2015a, 2015d, 2015e, 2016b; Swingle & Swingle, 2016).

Today all age ranges are at risk and the mode is all screen-based devices. The range of games has also now broadened, including pro and antisocial, solitary and group, as well as repetitive short and longer multilevel gaming cycles. Gaming choice and delivery method do not appear to grossly affect prevalence as the addiction is dominantly due to process, not content (see early works of D. N. Greenfield and Shaffer as well as P. Greenfield). The broadening of gaming type, scope, and delivery system has also led to more equal gender representation.

Definitions

DSM-V Internet gaming disorder, mild, moderate, or severe; condition for further study. An obsessive preoccupation with screen-based gaming that has ignored negative repercussions in interpersonal relationships, current academic or work performance, and lost opportunities thereof. Highly implicated in moderate and severe mood deregulation and neglect of self-care. Used as a mood regulator, often involves deceit and denial regarding hours used and inability to disengage. Strong alliance with comorbid or co-occurring anxiety, depression, and the obsessive-compulsive spectrum. (Specific to males also often associated with compulsive pornography consumption; see Swingle, 2013, 2015e). Choice of modality (e.g., console vs. cell phone) can vary extensively by age and gender. Withdrawal symptoms evident when disengagement occurs (e.g., depression, anger/tantruming, generalized anxiety, insomnia).

Failure to launch: No *DSM-V* classification; an observed social phenomenon of young males (late adolescence to 30s). Involves retreating from school or work opportunities, remaining financially dependent on family (or social services), and frequently still living in the home of a primary caretaker. Strong alliance with un- or underemployment and noncommittal interpersonal and screen-based (sexual/romantic) relationships wherein newfound free time is dedicated to gaming. In difference to Internet gaming disorder, however, individuals failing to launch often appear well adjusted in their peer group (on or offline) and do not appear discontent (Swingle, 2016a, 2016b).

Diagnoses

An official diagnosis of addiction requires a compulsive pathological component that is destructive to self, work, school, or relationships. In the case of gaming addiction this definition can be blurred by the central query: destructive to whom (e.g., self, parent, partner, society)? What can be agreed upon, however, is gaming addiction is a behavioral process addiction of brain circuitry regarding reward, motivation, and learning.

Mechanisms

Emergent electroencephalographic (EEG) research (otherwise known as EEG brainwave biofeedback or neurofeedback) on adults systematically shows deregulation in brainwaves associated with compromised abilities in self-quieting and calming (low theta and high beta in the occiput recorded at location O1 on the international 10/20 system), emotional deregulation (disparity over 15% in any measure between the left and right frontal lobes F3/F4), and various forms of alpha deregulation implicated in difficulties with processing and transitioning from states of attention to states of rest (Swingle, 2013, 2016b).

This EEG cluster pattern, however, is not unique to excessive gamers, being also commonly found in adults with other forms of addiction (e.g., alcohol, heroin, cocaine, crystal meth, sex, and pornography addiction). Similar findings have been made using other brain imaging

modalities. Although studies vary in their specific findings, fMRI studies have also found that excessive gamers share many of the same neurobiological mechanisms as substance abuse and pathological gambling. Dopaminergic pathways are implicated, as are multiple systems and regions associated with reward circuitry. Regions of the brain activated with online gaming addiction appear to further overlap with those activated with cue-induced craving in substance dependence. In the young, excessive gaming appears to further alter developmental processes regulating inhibitory mechanisms, hence associations with ADHD and other forms of attentional and behavioral disorders (see Swingle, 2013, 2016b, for full overview of literature).

Prevalence

Statistics on prevalence vary by age, region, and culture, and are highly influenced by emergent definition. In 2008 gaming addiction reached epidemic proportions and was labeled a serious public health issue in South Korea and China, where it was associated with critical health issues including pulmonary deaths in youth (Block, 2008; Shaw & Black, 2008). In the United States, a study by Gentile (2009) found that 8.5% of children and adolescents (8 to 18 years old) who game show symptoms of pathological addiction; 88% of people in this age group game. This would place the addiction rate at one in 10. In the study, Gentile found standard issues with education and health, but also theft to support the habit (see multiple works of Gentile, including 2009). In 2011 it was estimated that from 6% to 14% of all adults had a significant Internet problem. Depending on your age, activity, and where you lived, this number could be as high as 38%.

In 2017, definitions and negative realm of influence are marred by our ability to define for whom the addiction is problematic. Many afflicted enjoy full social and functional support (e.g., a home, and a method to pay for life's necessities as well as for the addiction, and the infrastructure that support them), and thus are arguably not perceived as problematic other than not contributing long or short term to the development of self or society. (Of note, compulsive YouTube searching/viewing is starting to replace gaming as a primary screen obsession of youth. It is possible that this, too, could shortly shift, for example, to compulsive binge viewing of esports.)

Assessment for Neurofeedback

A 19-channel full quantitative EEG assessment, compared to a normative database, has revealed any standard deviation ± 2 as a liability to the addiction (Swingle, 2013). This fits completely with theory that views gaming addiction as a comorbid or a co-occurring condition to other mental illness or psychosocial disquiet.

An individual five-point EEG (CZ, F3, F4, FZ, O1), compared to a clinical database, provides a higher degree of individual information that can be thereafter used as a map for individualized intervention. Patterns in both research and active clinical populations reveal the clusters as shown in order of prevalence, in the Table below.

Neurofeedback Intervention

In difference to other intervention modalities, the power of neurofeedback (as well as biofeedback) lies in the modality's ability to directly reverse the entrainment provided by the game(s). Excessive gaming trains the brain (and body physiology) to a very high state of arousal from which it cannot quiet. Both operant and classic conditioning (through auditory, visual, and sound feedback loops) directly help to reverse said conditioning.

Protocols Neurofeedback and Order of Protocols

Specifics of protocol sequencing will vary based upon individual assessment findings. A good base rule, however, is to follow the individual (five-point) map, not a standardized protocol pattern. That said, generalized quieting protocols are successful (theta 3–7 Hz up; beta 16–25 Hz down at O1; and hi beta 28–40 Hz down at FZ) should Patterns 1, 2, and 4 (in table) be prevalent on the individual brain mapping. If depression/emotional deregulation (Pattern 5) or one of the forms of ADHD (Patterns 3 and 6) have expressed in symptoms and appear on the EEG (inequality of F3 to F4 over 15% in any of its measures; hi frontal alpha and/or theta/beta ratios above 2.2 at location CZ and/or theta/SMR over 3.5 at location CZ or C4), these will also need to be addressed directly. Severity of symptoms should direct point of treatment entry. Feedback reward (audio/visual/sound) thresholds at all treatment locations 60–70% with consistent reinforcement schedule.

Success of Treatment

Age of introduction, chronological age, duration of excessive gaming practice (years), as well as the emotional environment of the client will greatly influence success rates. Developmental influence is also central (e.g., treatment length will be significantly shorter for a 9-year-old as well as an 18-, 50- or 70-year-old if they have been gaming excessively for only a year and have supportive structure. A 25-year-old who has been gaming since mid-childhood arguably has compromised/altered social and emotional development as well as significant brain entrainment to only respond to high stimuli (as per

Table. Five-point EEG (CZ, F3, F4, FZ, O1), compared to a clinical database

Pattern	Cluster	EEG Point	Range of Findings (%)[a]	Bandwidth Parameter	Notes	Associated Symptom Cluster
1.	Theta/beta <1.50	O1	100	theta 3–7; beta 16–25	The lower the ratio the more severe the symptoms.	Anxiety/agitation (insomnia)
2.	Elevated alpha in eyes-closed condition; change of alpha EO to EC of over 150%	O1	100	8–12	Prior to artifacting; note that computer artifacting programs will misinterpret EC alpha spindling as artifact and erase it from the data file.	
3.	Any secondary alpha deregulation; typically elevated alpha/theta ratios <1.2	F3/F4	89	alpha 8–12; theta 3–7		High frontal alpha ADHD mind chatter/poor organization and planning
4.	High hi beta/ beta ratios > .55	Fz	66–100	hi beta 28–40; beta 16–25	The higher the ratio the more severe the symptoms.	Compulsive perseveration/ fretting and OCD/intrusive mind chatter
5.	Any measure (theta, alpha, or beta)	F3< >F4 by 15%	40	theta 3–7; alpha 8–12; beta 16–25		Emotional deregulation
6.	Elevated theta/SMR over 3.50	Cz or C4	27	theta 3–7; SMR 13–15		Lack of body stillness, ADHD

Note. ADHD = attention deficit hyperactivity disorder; SMR = sensorimotor rhythm. [a]Percentages refer to range of findings in clinical and research data (Swingle, 2013, 2014, 2105a, 2015b, 2015c, 2015d).

gaming) as well as compromised inhibitory process learning (again as per gaming).

It is also likely that a specific family/parenting dynamic permitted the addiction to solidify. Similarly, a person in their 50s who has been gaming excessively only 1 year but is in transition (e.g., loss of spouse through death or divorce, loss of employment, etc.) will require longer treatment and is at higher recidivism risk (mourning and loss of purpose are confounding variables that must be addressed in tandem with addiction). Success of treatment can also be confounded by comorbid or co-occurring conditions as well as readiness for treatment. Many clients and their families are further in denial as well as precontemplative phases when psychological or neuro-therapeutic services are first sought (see standard cycles of addiction).

Except in the very young, all Internet addictions including gaming addiction are highly associated with

pre-existing subclinical disorders, full clinical comorbidity, as well as co-occurring disorders. Prior to 2015, academic literature was unified in finding that psychosocial problems were directly related to the development of problematic use (see Caplan & High, 2011). There is mounting evidence, however, particularly for children and youth, that social-societal and environmental shifts are equally at the core of this phenomenon; thus fully supporting epigenetic theory (Swingle, 2016b).

When excessive gaming is accepted (not moderated nor monitored) in critical or sequential phases of development (cognitive, social, and emotional, including attachment), it can and will alter said development (Swingle, 2016a, 2016b). Accordingly, for successful treatment to occur, both the gaming addiction and the environment in which it took hold must be addressed. For example, with children and youth, gaming consoles must be removed from the home, modems disabled when a child is alone, and parental availability/involvement heightened, such as families/co-habitants eating together and interacting more on a (meaningful) social and emotional level.

The preferred modality must also be taken into account. For those afflicted with console gaming addiction, "cold turkey" removal of the console is often sufficient for treatment to commence (as would be removal of access to heroin or cocaine with a drug addiction). If the preferred modality is a PC or a cell phone, however, the addiction falls into a similar realm to that of an eating disorder, wherein an individual must learn to regulate as opposed to eliminate the process behavior on a device that provides more than access to gaming. Here, complementary therapies such as cognitive behavioral therapy and explicit parenting strategies may also be of help.

The Role of Social Perception Within Family Dynamics

For multiple reasons (see Swingle, 2016b), gaming addiction is not perceived as having as strong a destructive force as other addictions. Individuals are also perceived as having more control over their behavior than would be expected in other forms of addiction. As such, full-fledged treatment failure and recidivism are high. Contributing to lack of success of treatment are parental abdication (e.g., a willingness to pay for treatment but an unwillingness to remove gaming devices or monitor behavior), fatigue and apathy, excess exposure to messages from vested interests (e.g., media, veiled advertising, industry public relations posturing as research and/or research sponsored directly by gaming and the i-tech industry claiming gaming is good for children), as well as perceived loss/lack of control of the role of screen-based technologies in modern life (Swingle, 2016a, 2016c). Treatment success rates are conversely very high with full family commitment facilitating client commitment once passed through withdrawal phase.

The Power of Neurofeedback

Neurofeedback and supportive structure are arguably a treatment of choice for any form of screen-based addiction, including gaming addiction. The relative success of neurotherapy lies in the modality going directly to the operational mechanism (quieting frequencies in the brain). Neurotherapy's success lies in the technology's ability to untrain (disentrain) the brain using the same mechanisms (operant and classical conditioning) as the games themselves used to foster the addiction. Unlike games, however, neurofeedback has a predictable as opposed to a varied reinforcement schedule and hence does not alter anticipatory cycles nor train the brain to want more. Its success, not so ironically, is that it is a little bit boring. It is an active calming process that lowers arousal templates.

Other Benefits of Neurotherapy

Neurotherapy is noninvasive, cost effective over the long term and, in contrast to pharmaceutical intervention, does not involve titration or withdrawal of said pharmaceuticals once the abatement of the addition itself is facilitated.

Successful treatment requires a series of sequential weekly sessions over the course of 3 months to a year. Length of treatment will vary based upon the presence or absence of comorbid, co-occurring conditions, unaddressed secondary gain, and family dynamics, all of which must be addressed in tandem with the primary symptom: addiction.

Development of alternate hobbies/activities, and a generalized re-commitment to self-sufficiency such as schooling or work and face-to-face social engagement, are also critical. Often home protocols are also prescribed such as calming harmonics.

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