DIAGNOSTIC APPROACH TO BEHAVIORAL OR "NON-SUBSTANCE" ADDICTIONS

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ABSTRACT

Until recently, non-substance related behavioral addictions were not categorized in diagnostic manuals of mental disorders. Addictive states are characterized by changed reinforcement contingencies, anhedonia, diminished capacity to experience pleasures due to reduced sensitivity to endogenous brain dopamine, and increased sensitivity to internal and external triggering factors. An underlying biological mechanism for urge-driven disorders may involve the pre-frontal cortex, nucleus accumbens, the ventral tegmental area, amygdala and hippocampus, which are considered to play a critical role in the characteristic behavioral impairments of addictive disorders. Recent literature implicates serotonergic, dopaminergic, noradrenergic, and opioidergic neurotransmitter systems in the pathophysiology of behavioral addictions. A reduction in the sensitivity of the brain reward system and hyperactivity towards addiction-associated stimuli was demonstrated in addiction disorders. Due to the lack of a diagnostic guide, different psychometric instruments were used to assess behavioral addictions, including pathological gambling, compulsive buying, internet addiction, video/computer game addiction, sexual addiction, and excessive tanning. Psychosocial interventions encourage the abstinence by lifestyle changes, and reinforce healthy behaviors via motivational enhancement and cognitive behavioral therapies. Pharmacologically, there are no medications currently approved for the treatment of behavioral addictions, but naltrexone, topiramate, and N-acetylcysteine have some promising effects.

Key Words: *Behavioral addictions, non-substance related addictions, neurobiologic mechanisms.* ***Nobel Med 2014; 10(1): 5-11***

DAVRANIŞSAL YA DA "MADDE-DIŞI" BAĞIMLILIKLARA TANISAL YAKLAŞIM

ÖZET

Yakın zamana kadar, madde-dışı bağımlılıklar psikiyatrik hastalıkların tanı koymaya yardımcı kılavuz kitabındaki sınıflamalarda yer almamaktaydı. Bağımlılık durumu, destek-takviye ya da ihtiyaç (reinforcement) değişiklikleri, zevk alamama, endojen beyin dopaminine karşı hassasiyetin azalması sonucu düşük zevk alma kapasitesi ve içsel ya da dışsal tetikleyici faktörlere karşı artış hassasiyet ile tanımlanır. Dürtü-kontrol bozukluklarının altında yatan biyolojik mekanizmalar prefrontal korteks, nükleus akkumbens, ventral tegmental alan, amigdala ve hippokampusu içine alır; bu alanların bağımlılık durumundaki tipik davranışsal bozukluklarda kritik bir rol oynadığı düşünülmektedir. Yakın zamandaki literatür, serotonerjik, dopaminerjik, noradrenerjik ve opioiderjik nörotransmitter sistemlerinin davranışsal bağımlılıkların patofizyolojisindeki rolünü vurgulamaktadır. Beyin ödül sistemindeki hassasiyetin azalması ile birlikte bağımlılık ile ilişkili uyarana karşı hiperaktivite, birçok bağımlılık bozukluklarında gösterilmiştir. Tanı koymaya yardımcı bir kılavuzun olmaması, patolojik kumar oynama, kompülsif satın alma, internet bağımlılığı, video/bilgisayar oyun bağımlılığı, seks bağımlılığı ve aşırı güneşlenme gibi çok sayıdaki davranışsal bağımlılıklarda farklı psikometrik testlerin kullanılmasına yol açmıştır. Psikososyal müdahaleler, motivasyonun artırılması ve bilişsel-davranışçı terapiler ile hayat tarzı değişikliklerini teşvik eder ve sağlıklı davranışları destekler. Farmakolojik olarak, davranışsal bağımlılıkların tedavisinde onaylanmış bir ilaç bulunmamaktadır; ancak, naltrekson, topiramat ve N-asetil sistein az da olsa ümit verici etkilere sahiptir.

Anahtar Kelimeler: Davranışsal bağımlılık, madde dışı bağımlılık, nörobiyolojik mekanizmalar. **Nobel Med 2014; 10(1): 5-11**

INTRODUCTION

Behavioral or "non-substance" addictions are syndromes analogous to substance addiction, and rather with a behavioral focus other than consumption of a psychoactive substance.[1] Current data support that behavioral addictions and substance addictions have many clinical features in common. They both are characterized by a recurrent pattern of behavior which is the failure to resist an impulse or an urge to be involved in acts potentially harmful for the person. These behaviors usually decreases anxiety and people experience an elevation of mood or "high" while performing these behaviors. In both substance and behavioral addictions the repetitive behaviors are ego-syntonic in nature in contrast to the ego-dystonic features of obsessive-compulsive symptoms but become more ego-dystonic over time. Also similar to withdrawal state people report an unpleasant or dysphoric mood while abstaining from the specific behavior.

Until recently, however, non-substance related behavioral addictions were not categorized in diagnostic manuals of mental disorders under substance use disorders or as a separate category. The Diagnostic and Statistical Manual (DSM), 4th Edition defines diagnostic criteria for several of such behavioral addictions including pathological gambling or kleptomania, under the title of impulse control disorders, as a different category than substance use disorders.[2,3] Other addictive behaviors such as compulsive buying, excessive tanning, computer/video game playing, and internet addiction are now being considered for inclusion in the forthcoming DSM. On the other hand, there is still debate ongoing about its classification as not every excessively conducted behavior is addictive behavior. In addition, not all impulse control disorders characterized by impulsivity, should be considered behavioral addictions. There is no consistent concept for diagnosis and treatment of excessive reward-seeking behaviors.[4] It is therefore of great importance to have a clear conceptualization of these so-called behavioral addictions with the aid of appropriate diagnostic instruments and established effective therapeutic implications.

Pathophysiology

Addictive states, whether drug-induced or not, are characterized by changed reinforcement contingencies, anhedonia, diminished capacity to experience pleasures due to reduced sensitivity to endogenous brain dopamine, and increased sensitivity to internal (such as anxiety or depressive symptoms) and external (such has environment associated with the behavior or drug use) triggering factors.[5,6] The brain rewards pathways that mediate the reinforcing effects of drugs and addictive behaviors fulfill a similar role in facilitating salient, out-of-control, and harmful non-drug behaviors.[7]

Neurobiological mechanisms

Preclinical and clinical studies suggest that an underlying biological mechanism for urge-driven disorders may involve the pre-frontal cortex, nucleus accumbens, the ventral tegmental area, amygdala and hippocampus, which are considered to play a critical role in the characteristic behavioral impairments of addictive disorders such as planning and decision-making, impulse control, and memory.[8-10] Alterations in dopaminergic pathways have been proposed as underlying the seeking of rewards (gambling, drugs), which in turn stimulate the release of dopamine to experience pleasure.[11] Among these alterations, diminished activity of the ventral medial prefrontal cortex was reported to be associated with impulsive decision making in risk/reward assessments and with decreased response to gambling cues in pathological gamblers.[8] Similar findings were also reported in craving associated with substance addiction.[12] Dopamine involvement in behavioral addictions was also suggested in medicated patients with Parkinson's disease.[13,14] Furthermore, higher levodopa doses were linked to greater likelihood of having a behavioral addiction.[13] On the other hand, contrary to dopaminergic involvement, dopamine D2/D3 receptor antagonists were observed to enhance gambling-related motivations.[15]

Recent literature implicates multiple neurotransmitter systems (including serotonergic, dopaminergic, noradrenergic, opioidergic) in the pathophysiology of behavioral addictions.[16] Among these, serotonin (5-HT) is involved with inhibition of behavior, and dopamine with learning, motivation, and the salience of stimuli, including rewards.[16,17] Low cerebrospinal fluid (CSF) levels of 5-hydroxyindole acetic acid (5-HIAA, a metabolite of 5-HT) were correlated with higher impulsivity and sensation-seeking behaviors.[18] On the other hand, further research is still needed to clarify the precise role of dopamine in behavioral addictions, as well as other possible encountering neurotransmitters.

Psychophysiological approaches

Only a few studies have focused on the underlying psychophysiological mechanisms of the development and maintenance of addictive behaviors.[19,20] A reduction in the sensitivity of the brain reward system and hyperactivity towards addiction-associated stimuli was demonstrated in addiction disorders. In addiction formerly neutral cues become associated with the →

regular use of drug or behavior, which will likely to become increasingly salient.[21,22] The sensitization is suggested to be related to an alteration of the "brain reward system" in which dopamine release is activated when addiction-associated cues are present even without the necessity of consumption/display of excessive behavior.[23] According to the model of incentive sensitization, processing is altered in both substance and behavioral addictions through a sensitization of the brain towards rewarding effects of the effector-either a drug or behavior.[24] After a period of time, regular use of the substance/behavior attributes incentive salience to the brain, leading to an irresistible urge or craving, while concurrently having diminished pleasure of the drug or behavior. Grüsser et al. investigated cue-induced craving in pathological gamblers, and found that cues were perceived as more emotionally arousing, pleasant, and dominant than the control group, even after year-long abstinence.[25] Emotions are thought to facilitate subsequent processing of information by directing attention towards a stimulus, constituting a bias to preferentially attend to the stimulus.[26] Psychophysiological approaches have also shown that cortical as well as peripheral responses were enhanced in response to the addicted drugs or behavior.[27] Furthermore, neurocognitive battery showed diminished performance on tests of inhibition, cognitive flexibility, and planning tasks, without any differences on tests of executive functioning in patients with non-substance addictions.[28]

Behavioral hypothesis

Individuals with behavioral addictions have high scores on self-report measures of impulsivity and sensation-seeking but generally low on measures of harm avoidance.[29-31] On the other hand, some behavioral addictions, such as internet addiction or pathological gambling, may also report high levels of harm avoidance.[32] These individuals have also high scores on measures of compulsivity, which may be limited to impaired control over mental activities and worries about losing control over motor behaviors.[33] Behavioral addictions are often preceded by a feeling of "tension or arousal" before the act and "pleasure or gratification" at the time of the act. Though, the essential feature of behavioral addictions was reported as the failure to resist an impulse, drive, or temptation to perform an act, even if it is harmful to the person or to others.[34] Phenomenologically, many people with behavioral addictions report an urge or craving state prior to initiating the behavior. They frequently have financial and marital problems, may be linked to illegal acts (such as theft, embezzlement, and writing bad checks) to either fund their addictive behaviors or cope with the consequences of the behavior.[35]

Genetics

There are only few genetics studies of behavioral addiction with pathological gambling, kleptomania, or compulsive buying.[36-38] These studies found that first-degree relatives had significantly higher lifetime prevalences of addictive disorders, and also other psychiatric disorders. The A1 allele at the D2 dopamine receptor locus was found to be increased in individuals with gambling.[39] The homozygous short allelic variant of the length polymorphism repeat in the promoter region of the serotonin transporter gene (SS-5HTTLPR) was also more frequently found in excessive internet users.[40]

Diagnosis

Due to the lack of a diagnostic guide, different psychometric instruments were used to assess behavioral addictions. Furthermore, the lack of statistical validation limits the expressiveness of most of the instruments and accurate diagnosis. Currently, pathological gambling is the only behavioral addiction with an established diagnosis in DSM-IV and ICD-10. The current DSM-IV-TR has designated formal diagnostic criteria for several of these disorders (e.g., pathological gambling, kleptomania), classifying them as impulse control disorders, a separate category from substance use disorders. Other behaviors (or impulse control disorders) have been considered for inclusion in the forthcoming DSM-compulsive buying, pathologic skin picking, sexual addiction (non-paraphilic hypersexuality), excessive tanning, computer/video game playing, and internet addiction.

Which behaviors to include as behavioral addictions is still open for debate. Not all impulse control disorders, or disorders characterized by impulsivity, should be considered behavioral addictions. Although many of the impulse control disorders (e.g., pathological gambling, kleptomania) appear to share core features with substance addictions, others, such as intermittent explosive disorder, may not. On this basis, the DSM-V Task Force has now suggested classification of pathological gambling as an impulse control disorder among "Addiction and Related Disorders", which would include both substance use disorders and "non-substance addictions" (Table 1).[34,41]

Several other behavioral addictions have also proposed diagnostic criteria, including compulsive buying, internet addiction, video/computer game addiction, sexual addiction, and excessive tanning.[41-46] These are usually based on the existing DSM-IV criteria for substance abuse or dependence. Further research is, however, needed to confirm and extend these diagnostic criteria. →

Table 1: First trimester thyroid hormone reference values from different countries measured with different methods.
At least three or more of the following criteria persisting for at least one month within the last year:
1. Excessive mental activity regarding corresponding behavior
2. Increased duration of physical activity regarding corresponding behavior
3. Failed assays of abandonment
4. Presence of withdrawal signs and symptoms such as psychomotor agitation, anxiety, obsessive thoughts and delusions, or imitative behaviors.
5. Progressive increase in exposure to corresponding behavior to reach previous satiety
6. Having social or working problems due to over-practiced behavior
7. Deceptive acts to perform corresponding behavior
8. Hedonic mood following performance followed by feeling of guilt.

Pathological gambling

In respect to the growing evidence suggesting pathological gambling and substance addictions have many clinical and neurobiological features in common, the DSM-V committee has proposed to classify pathological gambling under a new category which will be addictions and related disorders encompassing both substance use disorders and behavioral addictions. Excessive gambling is the most commonly described form of behavioral addictions. It has a significant and devastating impact on affected individuals, and their families as well. The precise assessment of clinically relevant, risky, problematic and pathologic gambling is crucial in its diagnosis.[47] Like many of the behavioral addictions the essential characteristic feature of problematic gambling is impulsivity. Additionally gamblers experience subjective cravings when they do not gamble, they experience euphoric mood state similar to drug highs, and they also show withdrawal symptoms when not gambling, similar to substance use disorders.

In clinical assessment the most commonly used and thoroughly evaluated screening instrument is the "South Oaks Gambling Screen", which was derived from the diagnostic criteria used by the DSM-III-R for pathological gambling.[48,49] The "Canadian Problem Gambling Index" was newly developed as a new instrument to assess problematic gambling in the general public, which questions the frequency and duration of gambling activities, DSM-IV criteria, South Oaks Gambling Screening, and gambling-related attitudes, expectancies of winning and cognitive occupation.[50] It is well known that cognitive involvement plays an important role in the development and maintenance of pathological gambling.[51,52] Gamblers who experience gambling as exciting, socially meaningful and focus on winning strategies usually have a higher score.

Compulsive buying

Compulsive shopping is not a newly defined disorder Krapelin identified it and gave it the name "oniomania" a century ago, translated as buying mania. Although compulsive shopping has a historical background there is still not a consensus on the difference between normal shopping and compulsive buying. Experts define compulsive buying as a disorder presented with compulsive thoughts or impulses to buy unnecessary or large amounts of items despite its negative consequences. However, only recently it has been suggested to be classified under behavioral addiction disorders.

In a case report from Turkey, a 34-year old man was reported with a complaint of sadness, unwillingness and hopelessness for 2 months, while 4 years of uncontrolled buying behavior was present in past medical history.[53] Although uncontrolled buying behavior is frequently discussed to be involved in context of Mood Disorder and Obsessive Compulsive Disorder, this case was accepted as a symptom of behavioral addiction due to external cues specific to addiction and hedonic state following the act related with addiction.[53]

One of the first instruments used in the diagnosis of excessive buying is the "Compulsive Buying Measurement Scale", which evaluates the tendency to spend, feeling an urge to buy or shop, post-purchase guilt, and family environment.[54] The structured "Minnesota Impulsive Disorder Interview" assesses several psychopathological symptoms reflecting impulse control disorders; an only part of the instrument is to screen compulsive buying.[55] Recently, Christo and his colleagues developed a short form of the "PROMIS Addiction Questionnaire", which assesses behavioral addictions (work, food, sports, sex and shopping) together with substance addictions. A detailed evaluation of the psychometric characteristics of compulsive buying still waits to be performed.[56]

Compulsive exercise

Compulsive exercising is a process in which individuals engage themselves in exercise out of pleasure and expect satisfaction despite any obstacles or withdrawal symptoms.[57] One of the diagnostic instruments used to assess exercise addiction is "Commitment to Running Scale".[58] The "Exercise Beliefs Questionnaire" assesses social desirability, physical appearance, mental and emotional functioning, and vulnerability to disease and aging.[59] On the other hand, due to the lack of psychometric characteristics, final estimations are difficult to define an individual as addicted to running. The "Exercise Dependence Scale" evaluates compulsive exercise based on the DSM-IV criteria for substance dependence, and rather reliably differentiates the exercisers as at-risk, dependent or →

non-dependent addiction as well as physiological and non-physiological behavior.[60,61]

Workaholism

There are very few of instruments to possess the characteristics and distinct aspects of behavior. Moreover, most of these instruments are not based on theory and propose different dimensions. Mentzel equates workaholism with alcoholism and utilizes Jellinek's diagnostic criteria for alcoholism.[62,63] The "Work Attitude Questionnaire" investigates commitment to work and the extent of healthy versus unhealthy attitudes and behavioral patterns regarding work.[64] A high commitment combined with beneficial attitudes and behavior concerning health indicates unhealthy workaholism. No reliability and validity studies have been published yet. Mudrack and Naughton developed an instrument estimating the tendency to engage in non-required work activities, and to intrude actively on the work of others.[65]

Computer addiction

The relevance of excessive computer use has increasingly been discussed. The instruments to assess computer addiction are mostly based on the diagnostic criteria of pathological gambling and substance addictions. The DSM-IV-JV (Juvenile/ Video game) is based on DSM-IV and a reliable instrument for diagnosing pathological video game use in adolescence.[66] The "Internet Addiction Test" for adults, and the "Computer-Related Addictive Behavior Inventory" were developed to record computer-associated addictive behavior with a satisfactory reliability.[67,68]

Internet addiction

The popularity of the internet has increased in all parts of the society during the last decades, and in correspondence, a variety of instruments were developed to assess internet addiction.[4] Still, internet addiction is a relatively new concept that DSM-IV has not recognized yet. Most of the definitions of compulsive internet use are based on the DSM-IV criteria for substance addiction and impulse control disorders; though, few instruments were also developed. The "Internet-Related Addictive Behavior Inventory"[69] has a satisfactory reliability. A German instrument "Internet Addiction Scales" was designed to assess addiction-immanent features such as loss of control, withdrawal symptoms, development of tolerance, continued execution of the excessive behavior despite negative consequences; and this instrument was proven to be both reliable and valid for diagnosis.[70] Recently, the "Sample Questions for a Screening Interview Assessing Problematic Internet Use" represented a semi-standardized instrument for the assessment of problematic internet use, though its reliability and validity have yet to be demonstrated.[71]

Table 2: A shematic approach in the management of patients with behavioral addition.

1. Confirm the diagnosis of behavioral addition
2. Rule out semptomatic causes and eliminate, if possible
3. Evaluate the urge of the patient for treatment
4. Plan motivational interviews
5. Give behavioral tasks and observe the compliance
6. Be prepared for unexpected situations and relapses
7. Apply cognitive-behavioral treatment
8. Plan close follow-up with family members
9. Search for other approaches to increase and/or maintain compliance.

Sexual addiction

Sex addiction or hypersexual disorder is thought as a non-paraphilic sexual desire disorder and has been proposed to be classifed in Sexual Disorders in DSM-V. One of the challenges in diagnosing hypersexual disorder in clinical practice is that hypersexuality may often be only a symptom of an underlying psychiatric disorder.

Excessive sexual behavior is difficult to examine due to scarce number of valid instruments. The complexity of the estimation of the frequency or quantity of risky sexual activities contributes the difficulty in obtaining relevant addiction-related aspects, such as loss of control and development of tolerance.[72,73] The only screening test of sexual addiction was designed to provide hints of the existence of the symptom complex; however, it is limited to be administered to homosexual males and not validated for females.[4,74]

Management

Treatment of behavioral addictions should be managed by both psychosocial and pharmacological approaches.[75] A schematic approach was designed in Table 2, summarizing the suggested management of patients with behavioral addition.[57] Psychosocial interventions include self-help approaches, motivational enhancement, and cognitive behavioral therapies, which have been used to treat pathological gambling, compulsive sexual behavior, kleptomania, pathologic skin picking, and compulsive buying.[34,75-79] These interventions mainly rely on relapse prevention model encouraging the abstinence by making lifestyle changes and reinforcing the healthy behaviors. There is no single standard method defined for the treatment of behavioral addiction, but combinations of cognitive and behavioral therapies, in addition →

to pharmacological agents, have yielded promising results. Individualized and group psychotherapy has been reported to provide some additional benefit. Finally, family support plays an important role in the assignment of tasks given to the patient, and family therapy should be included in the management of behavioral addictions.

Pharmacologically, there are no medications currently approved for the treatment of behavioral addictions. Naltrexone, a mu-opioid receptor antagonist approved for the treatment of alcoholism and opioid dependence, has efficiently been used in the treatment of pathological gambling and kleptomania, suggesting that mu-opioid receptors might play a similar role in behavioral addictions - as in substance addictions - through modulation of the dopaminergic mesolimbic pathway.[80,81] Medications that alter glutamatergic activity have also been used in behavioral addictions. Topiramate, an anti-convulsant agent blocking the AMPA subtype of glutamate receptor, was shown to be effective in the treatment of pathological gambling, compulsive buying, and compulsive skin picking.[82] N-acetylcysteine, an amino acid that restores extracellular glutamate concentration in the nucleus accumbens, similarly reduced pathological gambling.[83] These studies suggest that glutamatergic modulation of dopaminergic tone in the nucleus accumbens may also be a common mechanism for behavioral as well as substance addictions.[84]

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DELIVERING DATE: 14 / 09 / 2012 • **ACCEPTED DATE:** 21 / 06 / 2013

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