2019 Annual International Conference on ADHD:

The Intersection of ADHD and Addiction; Myths & Truths

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  - I, Todd Love, DO NOT have a financial interest/arrangement or affiliation with the hosting organization that could be perceived as a real or apparent conflict of interest in the context of the subject of this presentation.

Disclaimer

- Not an MD; Not offering medical advice
- Academic bias; possibly overly technical
- Pro-med approach
- Bias towards experience

ADHD Disclosure/Disclaimer (owning it)

- Yes, I've got ADHD. Which means I have the potential to...
  - *...talk fast, jump around, interrupt myself, trail off, etc.*
- Freeze response at podium
  - Confession: *It I look like I'm reading, I probably am*
- Please hold questions until the end.
- Reference styles will vary (too boring & tedious to fix)

3 Myths about ADHD & Addiction

1. Stimulant medication treatment of ADHD in childhood can lead to addiction later in life.

2. Long-term use of stimulant medication will lead to addiction.

3. People with ADHD will abuse their stimulant medication

3 Myths about Addiction Treatment for people with ADHD

1. ("We don't need to screen for that")

2. "People with ADHD must discontinue their stimulant medication while in treatment for addiction in order to get sober"

3. "People with ADHD and history of substance abuse will be unable to safely use their medication to manage their ADHD symptoms after they become sober"

3 Myths about ADHD & Internet-related Addictions:

1. "Too much Internet use/gaming causes ADHD"
2. "ADHD boys have more problems with Internet addictions than girls"
3. "It's a child/adolescent problem, not a problem for adults"

What is Addiction?

Among other things, it involves...

- Impulsivity
  - Inability to delay gratification
- Novelty seeking
- Inattention
- Executive Function challenges

...and much more stuff not mentioned here.

What is ADHD?

Among other things, it involves...

- Impulsivity
  - Inability to delay gratification
- Novelty seeking
- Inattention
- Executive Function challenges

...and much more stuff not mentioned here.

Correlations between ADHD & Addiction:

- Research reports 15–25 % of adults and 50-60% of adolescents with Substance Use Disorder also have ADHD

- Compared with control subjects without ADHD, children with ADHD were:
  - twice as likely to have a lifetime history of nicotine use
  - nearly 3 times more likely to report nicotine dependence in adolescence/ adulthood
  - almost 2 times more likely to meet diagnostic criteria for alcohol abuse or dependence
  - 1.5 times more likely to meet criteria for marijuana use disorder
  - twice as likely to develop cocaine abuse or dependence; and
  - more than 2.5 times more likely to develop an SUD overall.

Lee, S. S., et al. (2011). "Prospective association of childhood attention-deficit/hyperactivity disorder (ADHD) and substance use and abuse/dependence: a meta-analytic review." Clinical psychology review 31(3): 328-341.

Addiction can be worse when associated with ADHD

A More Complicated Course of SUD Is Associated with ADHD

- More severe SUD
- Higher rates of other psychiatric comorbidities
- Longer course of SUD
- Lower retention in SUD treatment
- Less remission from SUD

ADHD Treatment = Addiction Prevention

- 60% reduction in SUD associated w/ treatment of ADHD

Whats the connection between ADHD & Addiction?

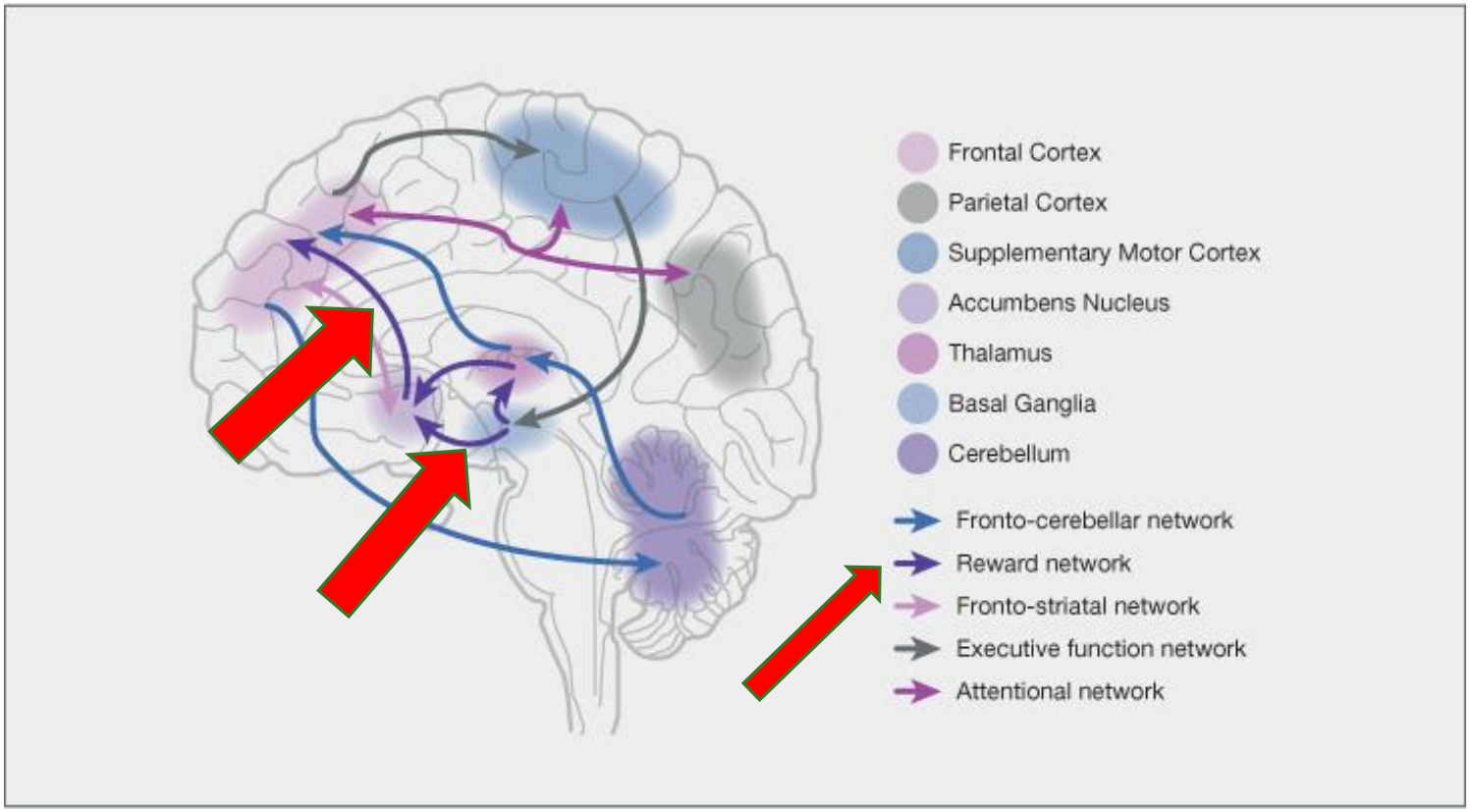
Physiological

- ADHD brain has an inherent neurobiological predisposition
- More likely to respond positively to addictive stimuli
- Impulse control issues & Poor judgment (EF)
- Craves Novelty

Psychological

- Curious, more likely to experiment
- Self-medicating
  - Anxiety
  - Boredom
  - Stress – work, school, relationships
  - Low self esteem, shame, emotional trauma, etc.
    - The self-medication hypothesis is compelling in ADHD considering that the disorder is chronic and often associated with demoralization and failure, factors frequently associated with SUD.

Addiction Neurobiology

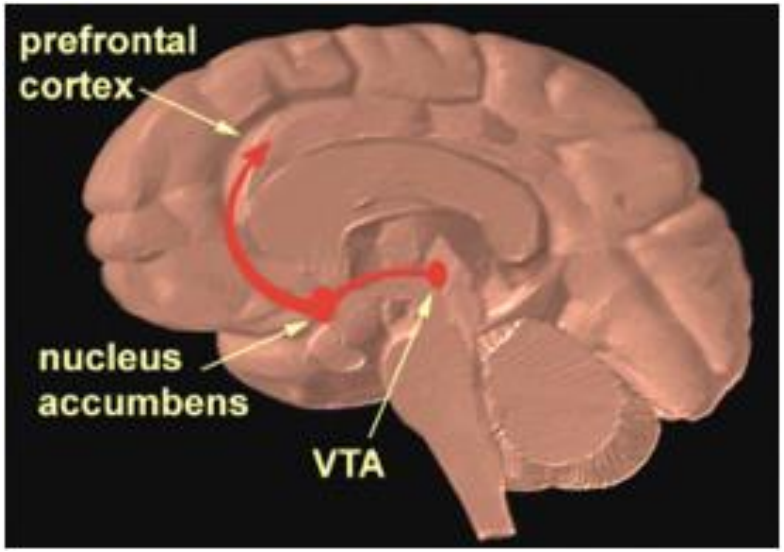


- Purper-Ouakil D, Ramoz N, Lepagnol-Bestel AM, et al. Neurobiology of attention deficit/hyperactivity disorder. *Pediatr Res 2011*; 69: 69R-76R./

Addiction Neurobiology

Mesocorticolimbic Dopamine System/Network:

- **Mesolimbic pathway:** (horizontal red line) Midbrain, limbic, emotions, etc. Pathway that is most closely associated with impulsivity & motivation.
- **Mesocortical pathway:** (vertical red line) Downward connection from frontal lobe to midbrain. associated with cognitive functions such as executive functions.



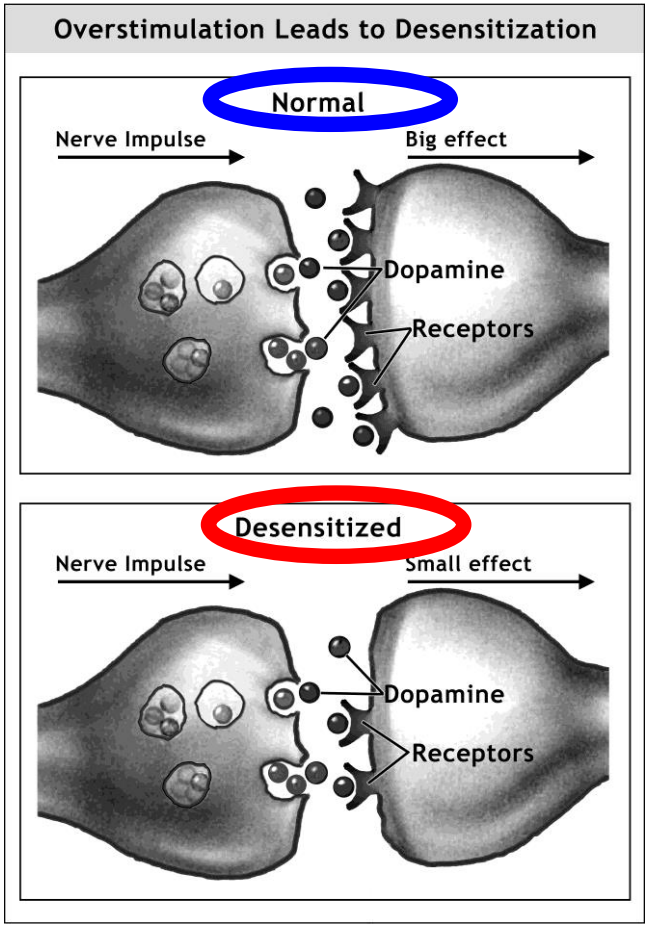
Addiction Neurobiology – 3-Phase model

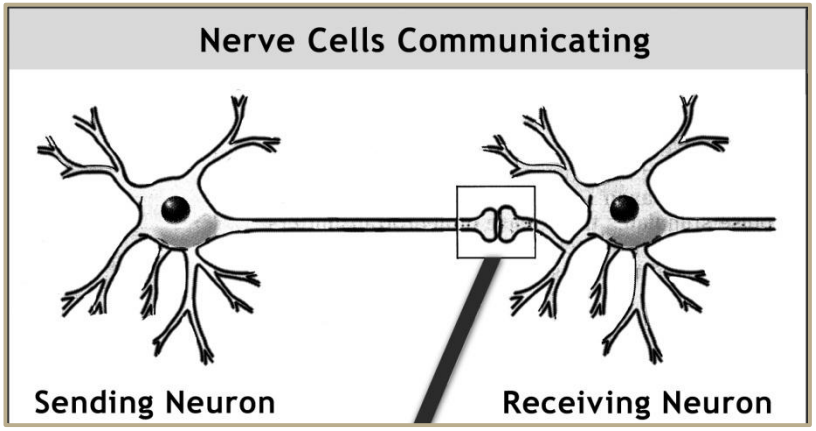
- **Stage 1: Binge/intoxication**
  - "Sensitization" "Thrills & excitement"
- **Stage 2: Withdrawal/negative affect**
  - "Desensitization" "Numbed pleasure response"
  - *(ADHD natural state - boredom)*
- **Stage 3: Preoccupation/anticipation**
  - "Hypofrontality: Willpower erodes"
  - *(ADHD natural state - impulsivity)*

+ Dysfunctional Stress Circuits

- Can make even minor stress lead to cravings and relapse because they activate powerful sensitized pathways.
  - "Anti-Reward"
  - *(ADHD innate stress reactivity)*

Another fancy science slide – Neural Synapses





- **Addiction results in a change in dopamine dopamine signaling.**
  - ***In some respects, this somewhat similar to the natural starting state of the ADHD brain****

Dopamine & Addiction

- van Holst, R. J., et al. "Increased Striatal Dopamine Synthesis Capacity in Gambling Addiction." Biol Psychiatry (2017).
- Majuri, J., et al. "Dopamine and Opioid Neurotransmission in Behavioral Addictions: A Comparative Pet Study in Pathological Gambling and Binge Eating." Neuropsychopharmacology 42.5 (2017): 1169-77.
- Nutt, D. J., et al. "The Dopamine Theory of Addiction: 40 Years of Highs and Lows." Nat Rev Neurosci 16.5 (2015): 305-12.
- Trifilieff, Pierre, and Diana Martinez. "Imaging Addiction: D< Sub> 2</Sub> Receptors and Dopamine Signaling in the Striatum as Biomarkers for Impulsivity." Neuropharmacology 76 (2014): 498-509.
- Huys, Q. J., et al. "The Role of Learning-Related Dopamine Signals in Addiction Vulnerability." Prog Brain Res 211 (2014): 31-77.
- Blum, Kenneth, et al. "Neurogenetics and Nutrigenomics of Reward Deficiency Syndrome (Rds): Stratification of Addiction Risk and Mesolimbic Nutrigenomic Manipulation of Hypodopaminergic Function." Omics for Personalized Medicine. Springer, 2013b. 365-98.
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- George, Olivier, Michel Le Moal, and George Koob. "Allostasis and Addiction: Role of the Dopamine and Corticotropin-Releasing Factor Systems." Physiology & behavior 106.1 (2012): 58-64.
- Volkow, N. D., et al. "Addiction: Beyond Dopamine Reward Circuitry." Proc Natl Acad Sci U S A 108.37 (2011): 15037-42.
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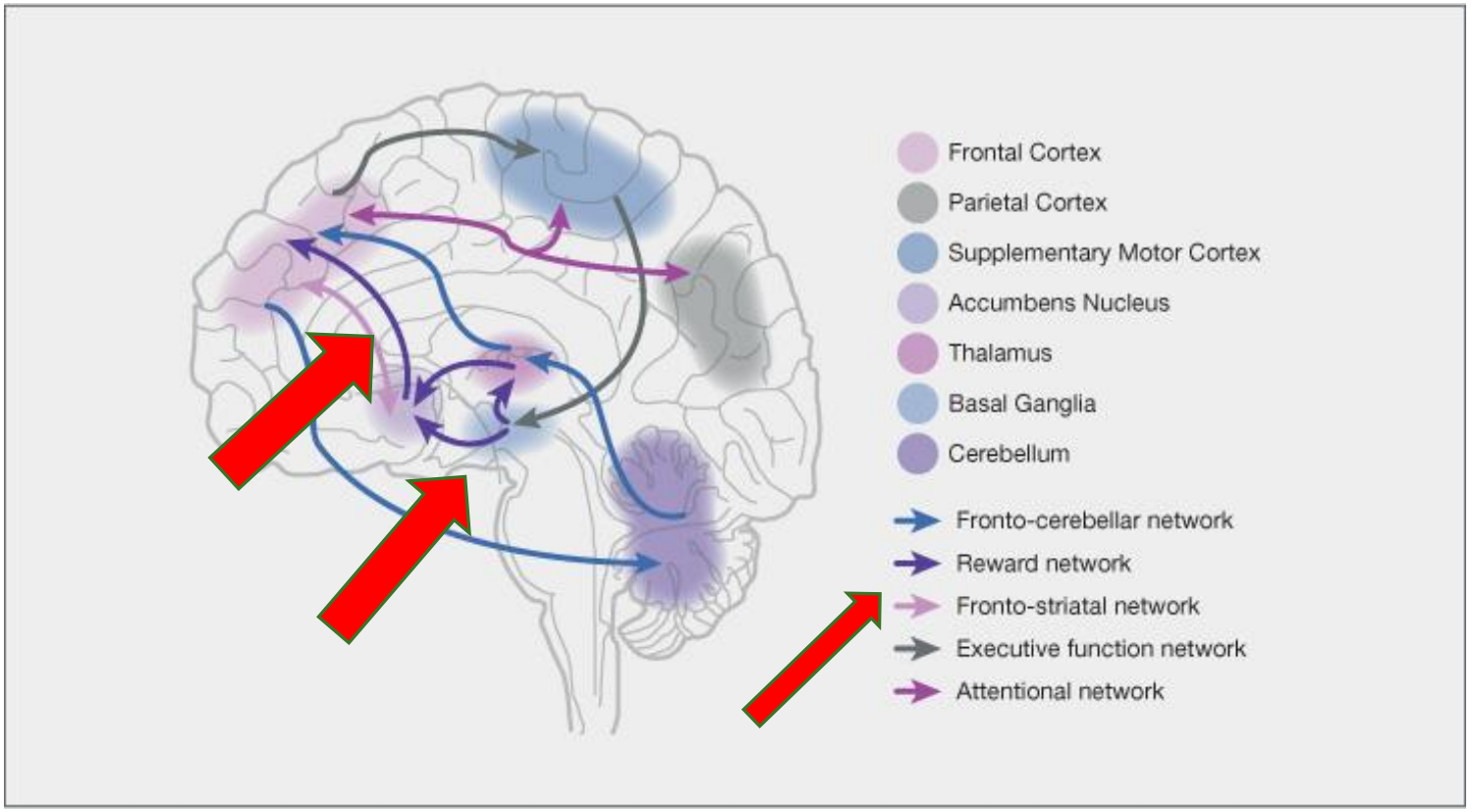
- Volkow, N. D., et al. "Dopamine in Drug Abuse and Addiction: Results from Imaging Studies and Treatment Implications." Mol Psychiatry 9.6 (2004): 557-69.

ADHD Neurobiology



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Neurobiological Overlap of ADHD and Addiction

- Yang, D.Y., et al. (2019). "Orbitofrontal dysfunction during the reward process in adults with ADHD: An fMRI study." *Clin Neurophysiol 130*(5): 627-633.
- "This study reveals depressed dopamine activity in <brain> regions in adults with ADHD … and … suggests that dopamine dysfunction ... may also contribute to substance abuse comorbidity in ADHD."
  - Volkow, N. D., et al. (2007). "Depressed dopamine activity in caudate and preliminary evidence of limbic involvement in adults with attention-deficit/hyperactivity disorder." *Arch Gen Psychiatry, 64*(8): 932-940.

Dopamine & ADHD

- Fernandez-Jaen, A., et al. "Cingulate Cortical Thickness and Dopamine Transporter (Dat1) Genotype in Children and Adolescents with Adhd." J Atten Disord 22.7 (2018): 651-60.
- Volkow, N. D., et al. "Motivation Deficit in Adhd Is Associated with Dysfunction of the Dopamine Reward Pathway." Mol Psychiatry 16.11 (2011): 1147-54.
- Volkow, N. D., et al. "Evaluating Dopamine Reward Pathway in Adhd: Clinical Implications." JAMA 302.10 (2009): 1084-91.
- Volkow, N. D., et al. "Depressed Dopamine Activity in Caudate and Preliminary Evidence of Limbic Involvement in Adults with Attention-Deficit/Hyperactivity Disorder." Arch Gen Psychiatry 64.8 (2007): 932-40.
- Swanson, J. M., et al. "Etiologic Subtypes of Attention-Deficit/Hyperactivity Disorder: Brain Imaging, Molecular Genetic and Environmental Factors and the Dopamine Hypothesis." Neuropsychol Rev 17.1 (2007): 39-59.
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- Dougherty, D. D., et al. "Dopamine Transporter Density in Patients with Attention Deficit Hyperactivity Disorder." Lancet 354.9196 (1999): 2132-3.
- Swanson, J. M., et al. "Association of the Dopamine Receptor D4 (Drd4) Gene with a Refined Phenotype of Attention Deficit Hyperactivity Disorder (Adhd): A Family-Based Approach." Mol Psychiatry 3.1 (1998): 38-41.

Dopamine and ADHD – some key findings

- Imaging studies have shown that brain dopamine neurotransmission is disrupted in ADHD, & these deficits may underlie core symptoms of inattention and impulsivity.
- The ... dopamine pathway, which projects from the VTA in the midbrain to the NAc is critically involved in reward and motivation, and has been hypothesized to underlie the reward and motivational deficits observed in ADHD.
- Studies showed decreased NAc activation with processing of reward in participants with ADHD.
- The lower than normal D2/D3 receptor - availability in the - midbrain - supports the hypothesis of an impairment of the dopamine reward pathway in ADHD.
- The reward deficits in ADHD are characterized by a failure to delay gratification..., and preference for small immediate rewards over larger delayed rewards

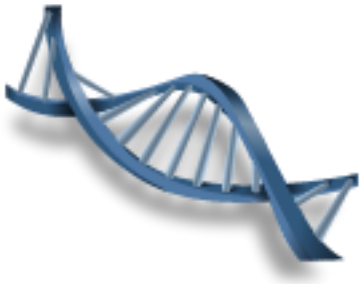
Volkow, N. D., et al. (2009)."Evaluating dopamine reward pathway in ADHD: clinical implications." *JAMA* 302(10)

Dopamine and ADHD

- "...the D2/D3 receptor measures ... implicate the dopamine reward pathway in the symptoms of inattention in ADHD. This could provide an explanation of why the attentional deficits in individuals with ADHD are most evident in tasks that are considered boring, repetitive, and uninteresting."
  - Volkow, N. D., et al. (2009). "Evaluating dopamine reward pathway in ADHD: clinical implications." *JAMA 302*(10): 1084-1091. *(Journal of the American Medical Association)*
- Dr. Nora Volkow, Director of the National Institute on Drug Abuse (NIDA)

Potential ADHD-related Genes

- *ADGRL3*
- DAT1 – (480 bp)
- DBH – TaqI (A2 allele)
- DRD2
- DRD4 – (7 + Repeat)
- MAOA
- SNAP25
- *<more>*



Faraone, S. V. and E. Mick (2010). "Molecular genetics of attention deficit hyperactivity disorder." *Psychiatr Clin North Am 33*(1): 159-180.

Caffeine to Self-Medicate ADHD

- *Adolescents with ADHD were nearly twice as likely to use more caffeine than were adolescents without ADHD*
  - Walker, L. R., Abraham, A. A., & Tercyak, K. P. (2010). Adolescent caffeine use, ADHD, and cigarette smoking. *Children's Health Care, 39*(1).
- ...potential for caffeine treatment to normalize frontocortical dopaminergic function and to abrogate attention and cognitive changes characteristic of ADHD.
  - Pandolfo, P., et al. (2013). "Caffeine regulates frontocorticostriatal dopamine transporter density and improves attention and cognitive deficits in an animal model of attention deficit hyperactivity disorder." *Eur Neuropsychopharmacol 23*(4).
- Caballero, M., et al. (2011). "Caffeine improves attention deficit in neonatal 6-OHDA lesioned rats, an animal model of attention deficit hyperactivity disorder (ADHD)." *Neurosci Lett 494*(1).

Nicotine to Self-Medicate ADHD

- ...nicotine may be useful in treating the symptoms of ADHD. Nicotine caused an overall significant reduction in reaction time on the CPT, as well as, ... , a significant reduction in another index of inattention... It is concluded that nicotine deserves further clinical trials with ADHD.
  - Levin, E. D., et al. (1996). "Nicotine effects on adults with attention-deficit/hyperactivity disorder." *Psychopharmacology (Berl) 123*(1).
- This small study provided evidence that nicotine treatment can reduce severity of attentional deficit symptoms and produce improvement on an objective computerized attention task.
  - Levin, E. D., et al. (2001). "Effects of chronic nicotine and methylphenidate in adults with attention deficit/hyperactivity disorder." *Exp Clin Psychopharmacol 9*(1).
- Nicotinic modulating agents are being evaluated for the treatment of ADHD.
  - Wilens, T. E. and N. R. Morrison (2011). "The intersection of attention-deficit/hyperactivity disorder and substance abuse." *Curr Opin Psychiatry 24*(4)
- Smokers with ADHD, and ADHD females in particular, experience greater withdrawal severity during early abstinence.
  - McClernon, F. J., et al. (2011). "Smoking withdrawal symptoms are more severe among smokers with ADHD and independent of ADHD symptom change: Results from a 12-day contingency-managed abstinence trial." *Nicotine & Tobacco Research 13*(9)

Cannabis and ADHD

- *Recreational:* 53% of non-daily users and 57% of daily users met criteria for ADHD
- *Self-medication:* Truth, or false perception?

Unfortunate paradox regarding using cannabis to self-medicate ADHD:

- Cannabis may provide some relaxation and relief from emotional intensity of ADHD
- Cannabis also furthers EF problems, such as *decreased motivation and increased memory problems*.
- ↑mood ≠ ↓ADHD symptoms

- The prevalence of ADHD in adults seeking treatment for cannabis use disorders is estimated to be between **34%** and **46%**
- Results revealed that only inattentive symptoms predicted problematic cannabis use in women, whereas hyperactive and impulsive symptoms, but not inattentive symptomatology, predicted cannabis misuse in men

3 Myths about ADHD & Addiction

1. Stimulant medication treatment of ADHD in childhood can lead to addiction later in life.

2. Long-term use of stimulant medication will lead to addiction.

3. People with ADHD will abuse their stimulant medication

1: Childhood stimulant use does *NOT* lead to Addiction

- "Pharmacologic treatment of ADHD does not appear to increase the risk for development of SUD in ADHD patients."
  - Wilens, T. E. and H. P. Upadhyaya (2007). "Impact of substance use disorder on ADHD and its treatment." *J Clin Psychiatry 68*(8):e20.

- "This study concurs with 11 previous studies in finding no compelling evidence that stimulant treatment of children with ADHD disorder leads to an increased risk for substance experimentation, use, dependence, or abuse by adulthood."
  - Barkley, R. A., et al. (2003). "Does the treatment of attention-deficit/hyperactivity disorder with stimulants contribute to drug use/abuse? A 13-year prospective study." *J Pediatrics 111*(1): 97-109.

Stimulant use can *REDUCE* the risks for Addiction

i.e. Medications may offer a protective effect

- "Consistent with findings in untreated ADHD in adults, untreated ADHD was a significant risk factor for SUD in adolescence. In contrast, pharmacotherapy was associated with an 85% reduction in risk for SUD in ADHD youth."
  - Biederman, J., et al. (1999). "Pharmacotherapy of attention-deficit/hyperactivity disorder reduces risk for substance use disorder." *Pediatrics, 104*(2): e20-e20.

- Conclusions: We found no indication of increased risks of substance abuse among individuals prescribed stimulant ADHD medication; if anything, the data suggested a long-term protective effect on substance abuse
  - Chang, Z., et al. (2014). "Stimulant ADHD medication and risk for substance abuse." *J Child Psychol Psychiatry 55*(8): 878-885.

Childhood ADHD Treatment = Addiction *Prevention*

- The earlier the age of starting medications, the lower the risk of eventually developing a SUD
- Starting stimulant medications prior to the age of 9 creates the lowest risk of later SUD
  - McCabe, et. al. (2016). Age of onset, duration, and type of medication therapy for attention-deficit/hyperactivity disorder and substance use during adolescence: a multi-cohort national study. *Journal of the American Academy of Child & Adolescent Psychiatry*, *55*(6), 479-486.
- **The greatest risk is NOT properly treating childhood ADHD**

2: Long-term stimulant use does NOT lead to Addiction

- "ADHD medication was not associated with increased rate of substance abuse. Actually, the rate during 2009 was 31% lower among those prescribed ADHD medication... Also, the longer the duration of medication, the lower the rate of substance abuse."
  - Chang, Z., et al. (2014). "Stimulant ADHD medication and risk for substance abuse." *J Child Psychol Psychiatry, 55*(8): 878-885.
- Humphreys, Eng, & Lee. (2013) Stimulant Medication and Substance Use Outcomes: A Meta-analysis, *JAMA Psychiatry 70*(14):740-749.
  - Neurotypical Brain ≠ ADHD Brain

3: Stimulant medication rarely abused by ADHD'ers

- Neurotypical Brain ≠ ADHD Brain
  - Starbucks Syndrome
  - Zombie Mode
- Psychostimulants, … are effective first-line pharmacotherapy for ADHD and when used appropriately in individuals with ADHD do not appear to be frequently abused by patients. … *Short-acting psychostimulant formulations may have higher potential for abuse, misuse, and diversion*..
  - Kollins, S. H. (2008). "ADHD, substance use disorders, and psychostimulant treatment: current literature and treatment guidelines." *Journal of attention disorders, 12*(2): 115-125.
- Extended-Release Stimulant Preparations have Lower Abuse Liability Than Immediate Release: Linked to Dopamine Transporter Binding and Likeability
- *"Generation Adderall"*, New York Times article, 10/16/2016

3 Myths about Addiction Treatment for people with ADHD

1. ("We don't need to screen for that")
2. "People with ADHD must discontinue their stimulant medication while in treatment for addiction in order to get sober"
3. "People with ADHD and history of substance abuse will be unable to safely use their medication to manage their ADHD symptoms after they become sober"

1: Addiction Treatment Programs MUST Screen for ADHD

Addiction Treatment Programs: Inpatient/Outpatient

- Generally screen for and treat dual diagnosis
  - Mood Disorders: Bipolar, Depression, etc (nearly always screened for)
  - Thought Disorders: Schizophrenia, etc (sometimes screened for)
  - Attention Disorders: ADHD (*infrequently screened for*)
    - The ASRS-v1.1 demonstrated acceptable sensitivity and specificity in a sample of treatment-seeking alcoholics
      - Reyes, M. M., et al. (2019). "The clinical utility of ASRS-v1. 1 for identifying ADHD in alcoholics using PRISM as the reference standard." Journal of attention disorders **23**(10): 1119-1125.

- Given the generally high prevalence of adult ADHD, all treatment seeking SUD patients should be screened and, after a confirmed diagnosis, treated for ADHD since the literature indicates poor prognosis of SUD in treatment seeking SUD patients with ADHD
  - van de Glind, G., et al. (2014). "Variability in the prevalence of adult ADHD in treatment seeking substance use disorder patients: results from an international multi-center study exploring DSM-IV and DSM-5 criteria." *Drug and alcohol dependence 134*: 158-166.

2a: Addiction Tx MUST include ADHD Tx

- People with both ADHD and addiction problems need to have these two issues treated concurrently
- "Given the generally high prevalence of adult ADHD, all treatment seeking SUD patients should be screened and, after a confirmed diagnosis, treated for ADHD since the *literature indicates poor prognosis of SUD in treatment seeking SUD patients with ADHD*"
  - van de Glind, G., et al. (2014). "Variability in the prevalence of adult ADHD in treatment seeking substance use disorder patients: results from an international multi-center study exploring DSM-IV and DSM-5 criteria." *Drug and alcohol dependence 134*: 158-166.
- Non-stimulant medications: Strattera
  - Takes 4-6 weeks before benefits kick-in, and 12-24 weeks for optimal efficacy. (per Eli Lily).
  - Results in potential for iatrogenic harm
  - Doesn't decrease relapse rates

2b: Addiction Tx can include ADHD Rx

Stimulant medication can be beneficial for people with ADHD in addiction treatment

- When treating co-occurring ADHD and cocaine dependence with stimulant medication, abstinence is most likely preceded by improvement in ADHD, which tends to occur early with medication treatment
  - Levin, F. R., et al. (2018). "How treatment improvement in ADHD and cocaine dependence are related to one another: A secondary analysis." *Drug and alcohol dependence 188*:.
- Use of stimulant medication will NOT make addiction problems worse.
  - Carpentier & Levin. (2017) "Pharmacological treatment of ADHD in addicted patients: what does the literature tell us?." *Harvard review of psychiatry 25(*2).
- "No evidence in *any* of the treatment studies where we've used stimulants in active substance use in ADHD where we saw worsening of the substance abuse"
  - - Tim Wilens, MD, Additude webinar
- Stimulant treatment resulted in an almost two-fold reduction in cigarette smoking and SUD in adolescent girls with ADHD
  - Wilens TE, et al. (2008) Effect of prior stimulant treatment for attention- deficit/hyperactivity disorder on subsequent risk for cigarette smoking and alcohol and drug use disorders in adolescents. *Arch Pediatr Adolesc Med.*

European Consensus Statement on Treating ADHD + SUD

- Simultaneous and integrated treatment of ADHD and SUD, using a combination of pharmaco- and psychotherapy, is recommended.
  - Crunelle, C., et al. (2018). "International consensus statement on screening, diagnosis and treatment of substance use disorder patients with comorbid attention deficit/hyperactivity disorder." *Eur Addict Res 24(*1).
- The use of stimulant treatment for ADHD ... can be useful to reduce ADHD symptoms without worsening the SUD, and should not be avoided.
  - Kooij, J., et al. (2019). "Updated European Consensus Statement on diagnosis and treatment of adult ADHD." *Eur Psychiatry 56*.
- Treatment for adults with ADHD and substance abuse should include a combination of addiction treatment/psychotherapy and <ADHD> pharmacotherapy.
  - Wilens, T. E. (2004). "Impact of ADHD and its treatment on substance abuse in adults."

ADHD'ers may benefit from their Rx while in SUD treatment

- Higher doses of Adderall XR linked to greater treatment outcomes for ADHD people addicted to cocaine

- "*Often, stimulants are withheld from individuals with co-occurring substance use disorders because of concern of diversion and clinical worsening. Instead, this study found the opposite– patients benefited from treatment. Thus, under closely monitored conditions, pharmacotherapy should be promoted, not barred".*

  - Levin, et al. (2015) "Extended-release mixed amphetamine salts vs placebo for comorbid adult attention-deficit/hyperactivity disorder and cocaine use disorder: a randomized clinical trial." *JAMA psychiatry* 72(6).

3: L-T Use of ADHD Rx can support L-T Addiction Recovery

- Methylphenidate treatment reduces ADHD symptoms and the risk for relapse to substance use in criminal offenders with ADHD and substance dependence. (amphetamine)
  - Konstenius, M., et al. (2014). "Methylphenidate for attention deficit hyperactivity disorder and drug relapse in criminal offenders with substance dependence: a 24-week randomized placebo-controlled trial." *Addiction 109*(3).
- Higher doses of methylphenidate were associated with long-term treatment adherence in individuals with ADHD and SUD.
  - Skoglund, C., et al. (2016). "Factors associated with adherence to methylphenidate treatment in adult patients with attention-deficit/hyperactivity disorder and substance use disorders." *Journal of clinical psychopharmacology 36*(3).
- *"Interestingly, in reviewing neuroimaging findings, some have conjectured that ADHD and SUD-related craving share neurobiological similarities, and that treatment of ADHD may REDUCE CRAVING for substances and subsequently REDUCE RISK FOR RELAPSE to substance use"*

12-step position(s)

- Common local position:
  - A person must quit ALL medications, particularly "addictive drugs", in order to get sober.
  - Irrelevant if the medication is properly prescribed for a medical purpose
- Official position:
  - Second, the spirituality of AA does not compete with medicine. Alcoholics Anonymous published work is very clear that it is 'wrong to deprive any alcoholic of medication which can alleviate or control other disabling physical and/or emotional problems' and that 'no AA member plays doctor' [34, p.11].
    - Alcoholics Anonymous. *The AA member medications and other drugs.* New York: Alcoholics Anonymous World Services (Undated pamphlet).

PAUSE AND TRANSITION

Behavioral Addiction

Historical Concept of Addiction

- "*A chronic, relapsing brain disease that is characterized by compulsive drug seeking and use, despite harmful consequences*" (NIDA, 2012)

- Addictive behaviors are Not a new concept:
  - Orford (1985) "Excessive Appetites" – gambling, eating, sex
  - Marlatt, Baer, Donovan, & Kivlahan (1988) "Addictive behaviors"
  - Multiple overlaps b/t behavioral addictions and chemical addictions: Comorbidity, course, genetic contribution, neurobiology, phenomenology (craving, intoxication, withdrawal), tolerance, and treatment response (Grant, Potenza, Weinstein, & Gorelick, 2010; Leeman & Potenza, 2013) (more & more & more ...)
  - About Reward, not Pleasure
  - Anticipation

Behavioral Addiction

ASAM The Voice of Addiction Medicine
American Society of Addiction Medicine

- A primary, chronic disease of brain reward, motivation, memory and related circuitry...This is reflected in an individual pathologically pursuing reward and/or relief by substance use and other behaviors. (ASAM, 2011)

Tolerance and Withdrawal

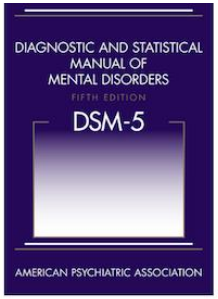
- **Tolerance** results from a homeostatic adaptation to chronic increased levels of dopamine in the Reward Center (potentially caused by alcohol, gambling, gaming, porn, sex, etc.)
  - Need more to maintain desired state
- **Withdrawal** – incorrectly thought to require external chemical consumption
  - Withdrawal is negative mood state resulting from loss of artificially elevated levels of dopamine due to cessation of chronic activities (chemical consumption or behavioral patterns)
- Addiction Withdrawal ≠ Physiological Detoxification

Example Addictive Behaviors

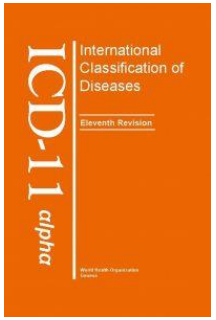
- Lifestyle-related
  - Gambling Disorder, Shopping Addiction, Sex Addiction,
- Technology-related
  - Internet-related Addictions
  - Social Networking Addiction
  - Facebook Addiction / Instagram Addiction
  - Smartphone Addiction
- Food-related
  - Binge Eating
    - Brunault, P., et al. (2019). "Adulthood and childhood ADHD in patients consulting for obesity is associated with food addiction and binge eating, but not sleep apnea syndrome." *Appetite 136*: 25-32.
    - Cortese, S., Bernardina, B. D., & Mouren, M. C. (2007). Attention-deficit/hyperactivity disorder (ADHD) and binge eating. *Nutrition reviews, 65*(9), 404-411.

Gambling Disorder

- Now officially an addiction in both the DSM-5 & ICD-11(upcoming)
  - Substance-Related and Addictive Disorders
    - Substance-Related Disorders
      - Drugs, alcohol, nicotine, caffeine
    - Non-Substance-Related Disorders
      - Gambling Disorder



  - Disorders due to substance use or addictive behaviors
    - Disorders due to substance use
      - Drugs, alcohol, nicotine, caffeine
    - Disorders due to addictive behaviors
      - Gambling Disorder



Gambling Disorder & ADHD

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Gambling Disorder & ADHD

- Common research findings:
  - ~25% of people with Gambling Disorder also meet criteria for ADHD
  - ADHD predicts earlier onset and greater severity of gambling problems
  - ADHD a risk factor for the persistence of gambling problems over time
- "...a considerable proportion of treatment-seeking problem gamblers report ADHD…They highlight the *need for specialist gambling agencies to develop screening, assessment, and management protocols for co-occurring ADHD to enhance the effectiveness of treatment*."
  - Waluk, O., et al. (2016). "The relationship between problem gambling and attention deficit hyperactivity disorder." *Journal of Gambling Studies*.
- "It seems that stabilization of dopamine signaling that occurs when ADHD is treated is itself also a treatment for certain forms of problem gambling."
  - Abouzari, M., et al. (2015). "Interactions among attention-deficit hyperactivity disorder (ADHD) and problem gambling in a probabilistic reward-learning task." *Behavioural brain research*
- Interesting recent findings:
  - Gamblers with ADHD significantly more prone to betting on a sporting event or animal races
  - *None* of the gamblers with ADHD reported problems with purchasing lottery tickets
    - Compared to 6% of problem gamblers without ADHD
      - Reid, R., et al. (2018) "Characteristics of Treatment Seeking Problem Gamblers with Adult Adhd." *International Journal of Mental Health and Addiction*.

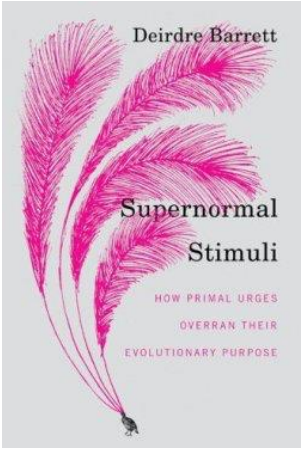
Internet-Related Addictions

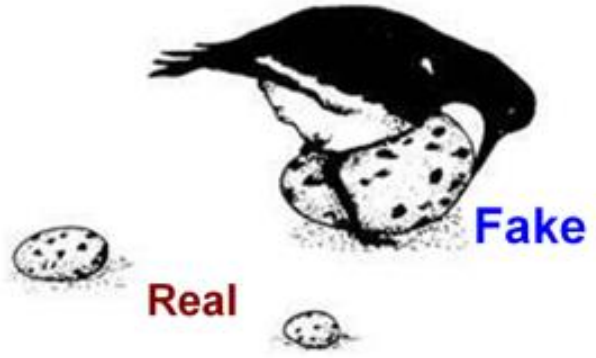
- Internet Addiction
- Internet Gaming Disorder
- Internet Pornography Addiction

- Problematic Internet Use
- Problematic Gaming
- Problematic Pornography Use

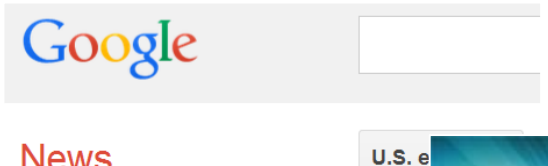
Supernormal Stimulus

- Tinbergen
  - Bird Eggs & Butterfly Wings
- Deirdre Barrett





Information Overload – Classical Conditioning

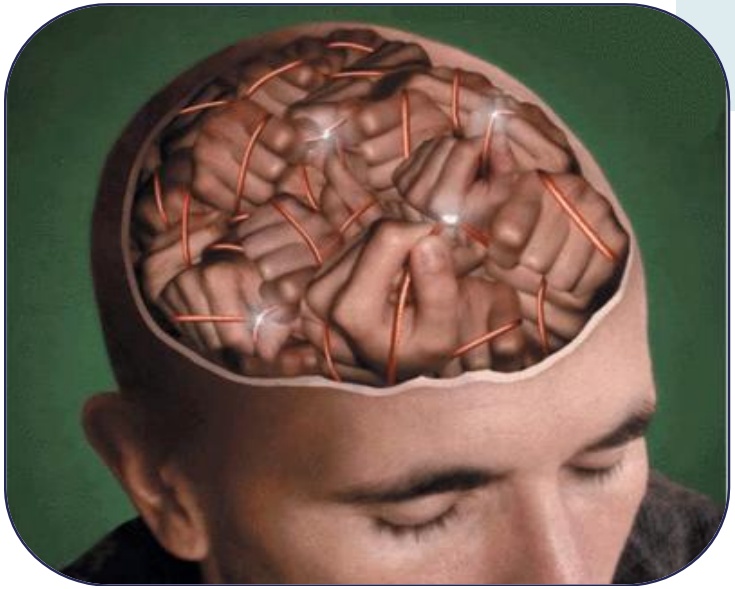


Dopamine and the Internet

- Anticipation
- Searching & Seeking
- Endless Novelty

Neurobiology of Internet-related Addictions

Neuroplasticity: the brain's ability to change and adapt as a result of experience



1. Sensitization
2. Desensitization
3. Hypofrontality

(4. Dysfunctional Stress Circuits)

Neuroscience Research on Internet Addiction in the last 5 years

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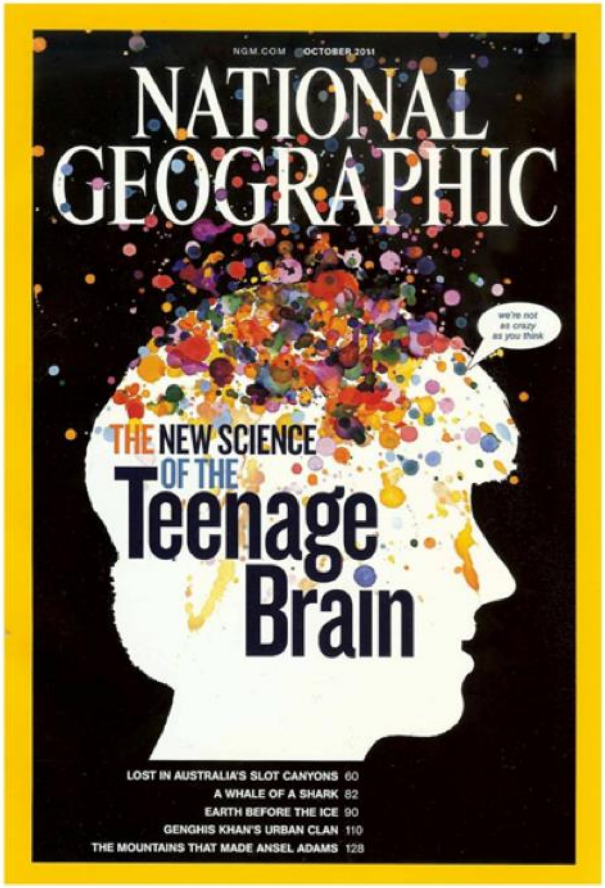
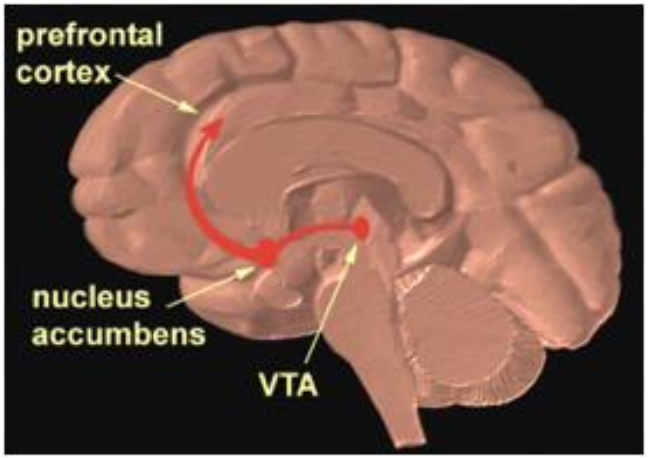
Special Considerations: Adolescent Brains





Consequences without addiction: Decreased motivation & failure-to-launch
Video: Philip Zimbardo Ted Talk: "The Demise of Guys"

- .

Myth: Too much Internet use/gaming causes ADHD

- "Too much Internet use/gaming causes ADHD"
  - Wrong!
    - Impossible if ADHD is "pre-wired" in the brain.
    - $A \Rightarrow B$
    - $B \not\Rightarrow A$

- *However*:
  - ...inattention and hyperactivity symptoms in Internet Addiction should not solely be accounted by an independent ADHD disorder but should consider the possibility of ... symptoms related to Internet Addiction.
  - Functional and structural brain abnormalities associated with excessive and pathologic Internet usage might be related to these ADHD-like symptoms.
    - Kim, D., et al. (2017). "Association between childhood and adult attention deficit hyperactivity disorder symptoms in Korean young adults with Internet addiction." *Journal of Behavioral Addictions* *6*(3).

Internet Addiction

- Officially Proposed for DSM-5 *(not accepted)*
  - Block (2008) 4 key components: *excessive use, withdrawal, tolerance, & adverse consequences*
  - Potential subtypes: *Gaming, Porn, Gambling, Shopping, etc*
- Internet Addiction Disorder (IAD)
- Internet Use Disorder (IUD)
- Compulsive Internet Use (CIU)
- Problematic Internet Use (PIU)
- Internet Communication Disorder (ICD) (SNS focused)

Internet Pornography Addiction (IPA)

- #2 of 3 original subtypes of Internet Addiction
- Alternate terms for IPA
  - IPVD – Internet Pornography Viewing Disorder
  - IPD – Internet Pornography Use Disorder
  - PPU – Problematic Pornography Use
- "*Compulsive Sexual Behavior Disorder*" (CSB)
  - Newly official ICD-11 diagnosis

Internet Gaming Disorder (IGD)

- #1 of 3 originally proposed subtypes of Internet Addiction
- Listed in Section III "Conditions for further study" in the DSM-5
- Accepted by WHO as "Gaming Disorder" in the ICD-11

- Other terms:
  - Internet Gaming Addiction
  - Online Gaming Addiction
  - Problematic Online Game Use (POGU)
  - Problem Video Game Playing (PVGP)
  - Video Game Addiction // Video Gaming Disorder

Research on ADHD and Internet Addiction in Korea

- Lee, D., et al. (2019). Preliminary evidence of altered gray matter volume in subjects with internet gaming disorder: associations with history of childhood attention-deficit/hyperactivity disorder symptoms. *Brain Imaging Behav*.
- Park, J. H., et al. (2017) Comparison of Qeeg Findings between Adolescents with Attention Deficit Hyperactivity Disorder (Adhd) without Comorbidity and Adhd Comorbid with Internet Gaming Disorder. *Journal of Korean Medical Science*.
- Lee, D., et al. (2017) Altered Functional Connectivity in Default Mode Network in Internet Gaming Disorder: Influence of Childhood Adhd. *Prog Neuropsychopharmacol Biol Psychiatry*.*
- Kim, D., et al. (2017) Association between Childhood and Adult Attention Deficit Hyperactivity Disorder Symptoms in Korean Young Adults with Internet Addiction. *Journal of Behavioral Addictions*.*
- Park, J. H., et al. (2016) Effectiveness of Atomoxetine and Methylphenidate for Problematic Online Gaming in Adolescents with Attention Deficit Hyperactivity Disorder. *Human Psychopharmacology: Clinical and Experimental*.
- Han, D. H., et al. (2009) The Effect of Methylphenidate on Internet Video Game Play in Children with Attention-Deficit/Hyperactivity Disorder. *Compr Psychiatry*.
- Yoo, H. J., et al. (2004) Attention Deficit Hyperactivity Symptoms and Internet Addiction. *Psychiatry Clin Neurosci*.
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Research on ADHD and Internet Addiction in Taiwan

- Yen, C.-F., et al. (2019). Correlations of Internet Addiction Severity with Reinforcement Sensitivity and Frustration Intolerance in Adolescents with Attention-Deficit/Hyperactivity Disorder: The Moderating Effect of Medications. *Frontiers in Psychiatry*.
- Chou, W. J., et al. (2018) Boredom Proneness and Its Correlation with Internet Addiction and Internet Activities in Adolescents with Attention-Deficit/Hyperactivity Disorder. *Kaohsiung J Med Sci*.
- Yen, J. Y., et al. (2017) Association between Internet Gaming Disorder and Adult Attention Deficit and Hyperactivity Disorder and Their Correlates: Impulsivity and Hostility. *Addictive behaviors*.
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- Chen, Y. L., et al. (2015) Adhd and Autistic Traits, Family Function, Parenting Style, and Social Adjustment for Internet Addiction among Children and Adolescents in Taiwan: A Longitudinal Study. *Research in Developmental Disabilities*.
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- Yen, J. Y., et al. (2007) The Comorbid Psychiatric Symptoms of Internet Addiction: Attention Deficit and Hyperactivity Disorder (Adhd), Depression, Social Phobia, and Hostility. *J Adolesc Health.*

Research on ADHD and Internet Addiction in China & Japan

China

- Shi, M., & Du, T. (2019). Associations of personality traits with internet addiction in Chinese medical students: the mediating role of attention-deficit/hyperactivity disorder symptoms. *BMC Psychiatry*.
- Wang, B. Q., et al. (2017) The Association between Attention Deficit/Hyperactivity Disorder and Internet Addiction: A Systematic Review and Meta-Analysis. *BMC Psychiatry*.
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- Nie, J., et al. (2016) Impaired Inhibition and Working Memory in Response to Internet-Related Words among Adolescents with Internet Addiction: A Comparison with Attention-Deficit/Hyperactivity Disorder. *Psychiatry Research*.

Japan

- Tateno, M., et al. (2018) Internet Addiction and Attention-Deficit/Hyperactivity Disorder Traits among Female College Students in Japan. *Journal of the Korean Academy of Child and Adolescent Psychiatry*.
- So, R., et al. (2017) The Prevalence of Internet Addiction among a Japanese Adolescent Psychiatric Clinic Sample with Autism Spectrum Disorder and/or Attention-Deficit Hyperactivity Disorder: A Cross-Sectional Study. *Journal of Autism and Developmental Disorders*.
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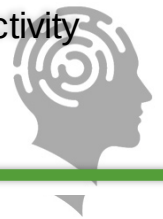


Research on ADHD and Internet Addiction in Europe

Germany

- Paulus, F., et al. (2017) Computer Gaming Disorder and Adhd in Young Children—a Population-Based Study. *International Journal of Mental Health and Addiction*
- Bielefeld, M., et al. (2017) Comorbidity of Internet Use Disorder and Attention Deficit Hyperactivity Disorder: Two Adult Case–Control Studies. *Journal of Behavioral Addictions*.

France

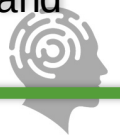
- Bioulac, S., et al. (2008) Attention Deficit/Hyperactivity Disorder and Video Games: A Comparative Study of Hyperactive and Control Children. *Eur Psychiatry*.

Italy

- Benedetto, L., & Ingrassia, M. (2019). Problematic Internet Use and sensation seeking in adults with ADHD symptoms. *Journal of Clinical & Developmental Psychology*

UK

- Panagiotidi, M., et al. (2018) The Relationship between Internet Addiction, Attention Deficit Hyperactivity Symptoms and Online Activities in Adults. *Comprehensive Psychiatry*.
- Panagiotidi, M. (2017) Problematic Video Game Play and Adhd Traits in an Adult Population. *Cyberpsychology, Behavior and Social Networking*.
- Finlay, F, et al. (2014) G355 Internet Addiction Disorder/Problematic Internet Use and ADHD. *Archives of Disease in Childhood*.



Research on ADHD and IAD in Turkey

Turkey

- Evren, C., et al. (2019). Relationships of Internet addiction and Internet gaming disorder symptom severities with probable attention deficit/hyperactivity disorder, aggression and negative affect among university students. *ADHD Attention Deficit and Hyperactivity Disorders*.
- Evren, C., et al. (2019). Relationship of alcohol and/or cannabis use in the last year and the severity of the Internet gaming disorder symptoms. *European Neuropsychopharmacology*
- Evren, B., et al. (2019). The impact of depression, anxiety, neuroticism, and severity of Internet addiction symptoms on the relationship between probable ADHD and severity of insomnia among young adults. *Psychiatry Res*.
- Evren, B., et al. (2018) Relationship of Internet Addiction Severity with Probable ADHD and Difficulties in Emotion Regulation among Young Adults. *Psychiatry Research*.
- Mutluer, B. T., et al. (2017) Incidence of Internet Addiction in Adult Attention Deficit Hyperactivity Disorder. *European Psychiatry*.
- Dalbudak, E., et al. (2015) The Impact of Sensation Seeking on the Relationship between Attention Deficit/Hyperactivity Symptoms and Severity of Internet Addiction Risk. *Psychiatry Res*
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Research on ADHD and IAD in Brazil, Canada, & Hungary

Brazil

- Schmidek, H. C., et al. (2018). Internet Addiction and Attention Deficit Hyperactivity Disorder (ADHD): integrative review of the literature. *Jornal Brasileiro de Psiquiatria*.

Canada

- Weiss, M. D., et al. (2011). The screens culture: impact on ADHD. *Atten Defic Hyperact Disord*.

Hungary

- Bőthe, B., et al. (2019). Investigating the associations of adult ADHD symptoms, hypersexuality, and problematic pornography use among men and women on a largescale, non-clinical sample. *J Sex Med*.

Research on ADHD and Internet Addiction in the USA

- Dawson, A. E., et al. (2019). Exploring how adolescents with ADHD use and interact with technology. *Journal of adolescence*.
- Stavropoulos, V., et al. (2019). Associations between attention deficit hyperactivity and internet gaming disorder symptoms: Is there consistency across types of symptoms, gender and countries? *Addictive Behaviors Reports*.
- Mathews, C., et al. (2019). Video game addiction, ADHD symptomatology, and video game reinforcement. *Am J Drug Alcohol Abuse*.
- Engelhard, M., & Kollins, S. (2019). The Many Channels of Screen Media Technology in ADHD: a Paradigm for Quantifying Distinct Risks and Potential Benefits. *Curr Psychiatry Rep*.
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- Chan, P. & Rabinowitz, T. (2006) A cross-sectional analysis of video games and attention deficit hyperactivity disorder symptoms in adolescents. *Annals of General Psychiatry*.

Research on ADHD and Internet Addiction in Korea

Neuroimaging:

- Lee, D., et al. (2017) "Altered Functional Connectivity in Default Mode Network in Internet Gaming Disorder: Influence of Childhood ADHD."
  - Our findings suggest that altered neural networks for executive control in ADHD would be a predisposition for developing IGD.

Brainwave analysis:

- Park, J. H., et al. (2017) "Comparison of Qeeg Findings between Adolescents with ADHD w/o Comorbidity & ADHD Comorbid with Internet Gaming Disorder."
  - Compared to the ADHD-only group, the ADHD+IGD group showed <notable brainwave differences>.
  - Adolescents who show greater vulnerability to ADHD seem to continuously play Internet games to unconsciously enhance attentional ability. (*self-medicating?*)

Medication-related studies:

- Park, J. H., et al. (2016) "Effectiveness of <Strattera> & Methylphenidate for Problematic Online Gaming in Adolescents with ADHD."
- Han, D. H., et al. (2009) "The Effect of Methylphenidate on Internet Video Game Play in Children with ADHD"
  - Internet Gaming might be a means of self-medication in children with ADHD.
  - MPH might be evaluated as a potential treatment of Internet addiction.

Research on ADHD and Internet Addiction in Taiwan

- Yen, C., et al. (2019). "Correlations of Internet Addiction Severity with Reinforcement Sensitivity and Frustration Intolerance in Adolescents with Attention-Deficit/Hyperactivity Disorder: The *Moderating Effect of Medications*."
  - Higher fun seeking and higher frustration intolerance were associated with more severe IA symptoms in people with ADHD..
  - Receiving medication for treating ADHD moderated the association between fun seeking and severity of IA symptoms.
- Chou, W., et al. (2018) "Boredom Proneness and Its Correlation with Internet Addiction and Internet Activities in Adolescents with Attention-Deficit/Hyperactivity Disorder."
  - Boredom was...
    - ... significantly associated with a high tendency to engage in online gaming
    - ... significantly associated with a low tendency to engage in online studies
- Chou, W., et al. (2016) "Social Skills Deficits and Their Association with Internet Addiction and Activities in Adolescents with Attention-Deficit/Hyperactivity Disorder."
  - Social skills deficits should be considered targets in prevention and intervention programs for treating Internet addiction among adolescents with ADHD.
- Yen, J., et al. (2009) "The Association between Adult ADHD Symptoms and Internet Addiction among College Students: The Gender Difference."
  - Association between ADHD and Internet addiction was more significant among female college students

Research on ADHD and Internet Addiction in China & Japan

China

- Wang, B., et al. (2017): "The Association between ADHD and Internet Addiction" (~)
  - Individuals with IA were associated with more severe symptoms of ADHD.
  - The monitoring of Internet use of patients suffering from ADHD is also necessary.
- Li, W., et al. (2016): "The Association of Internet Addiction Symptoms with…Novelty Seeking… among Adults with ADHD" (~)
  - The results ... indicated that impulsiveness, loneliness, ...were significant predictors of Internet addition among adults with ADHD.

Japan

- Tateno, M., et al. (2018): "IAD & ADHD Traits among Female College Students in Japan." (~)
  - The rates of IA in students with and without ADHD were 18.2% and 1.0%, respectively.
  - Results ... demonstrated the relation between IA & self-evaluated ADHD traits among female college students in Japan.
  - Appropriate education for students on how to use the internet properly will be necessary to prevent IA.

Research on ADHD and Internet Addiction in Europe

Germany

- Paulus, F. W, et al. (2017) "Computer Gaming Disorder and ADHD in Young Children" (~)
  - Studied nursery school kids.
  - Boys play computer games more often and longer than girls.
  - Boys were rated more often to be at risk or to have a computer gaming disorder than girls.
  - Children with elevated ADHD scores showed significantly higher computer gaming disorder scores.
  - Clinically relevant **inattention** scores were associated with longer and more computer gaming

UK

- Panagiotidi, M., et al. (2018) "The Relationship between Internet Addiction, ADHD Symptoms and Online Activities in Adults." (~)
  - Our results suggest that younger adults with higher level of ADHD symptoms could be at higher risk of developing Internet Addiction.
- Panagiotidi, M. (2017): "Problematic Video Game Play & ADHD Traits in an Adult Population." (~)
  - Adults with higher level of ... **inattention symptoms** could be at higher risk of Internet Addiction

Research on ADHD and Internet Addiction in Turkey

Turkey

- Evren, C., et al. (2019). “Relationship of alcohol and/or cannabis use in the last year and the severity of the Internet gaming disorder symptoms.”
  - The severity of IGD is related with both alcohol use problems and cannabis use problems.
- Evren, B., et al. (2018) "Relationship of Internet Addiction Severity with Probable ADHD and Difficulties in Emotion Regulation among Young Adults."
  - Difficulties in Emotion Regulation predicted Internet Addiction.
  - Both Inattentiveness & hyperactivity/impulsivity of ADHD were related with the severity of IA
- Dalbudak, E., et al. (2015) "The Impact of Sensation Seeking on the Relationship between ADHD and Severity of Internet Addiction Risk."
  - Inattention & boredom aversion key risk factors
- Dalbudak, E., et al. (2014) "The Relationship of Internet Addiction Severity with ADHD Symptoms in Turkish University Students” (~)
  - The severity of ADHD symptoms predicted the severity of Internet Addiction
  - University students with severe ADHD symptoms, particularly hyperactivity/impulsivity symptoms may be considered as a risk group for IA

Research on ADHD and Internet Addiction in the USA

- Stavropoulos, V., et al. (2019). "Associations between attention deficit hyperactivity and internet gaming disorder symptoms: Is there consistency across types of symptoms, gender and countries?"
  - Emergent adults appear to be more regular gamers than the stereotypically believed adolescents.
  - ADHD+IGD rates higher in USA than in Australia. Attributed to our cultural emphasis on personal achievements and competition.
  - *Therefore, and in relation to gaming in particular, it could be assumed that in-game achievements would exacerbate gaming involvement (and thus IGD risk) more for hyperactive-impulsive, as well as inattentive, male, USA gamers*
- Mathews, C. L., et al. (2019). "Video game addiction, ADHD symptomatology, and video game reinforcement."
  - "*Gamers who have greater ADHD symptom severity may be at greater risk for developing symptoms of video game addiction and its negative consequences, regardless of type of video game played or preferred most*"

Research on ADHD and Internet Addiction in the USA

- Duke University Research paper:
  - *"Individuals with attention-deficit hyperactivity disorder (ADHD) may be unusually sensitive to screen media technology."*
  - *Display characteristics, media multitasking, device notifications, SMT addiction, and media content all may uniquely impact the ADHD phenotype.*
  - *Each can be investigated with a digital health approach and counteracted with device-based interventions.*
  - *Further study should quantify how distinct dimensions of SMT use relate to ADHD.*
    - Engelhard & Kollins (2019). "The Many Channels of Screen Media Technology in ADHD: a Paradigm for Quantifying Distinct Risks and Potential Benefits." *Curr Psychiatry Rep 21*(9).

Common Findings about ADHD and Internet Addiction

- ~20% of young adults with ADHD struggle with Internet Addiction
- Often co-occurs with Depression and/or Anxiety
- The severity of ADHD symptoms links to the risk for and severity of Internet Addiction
- All subtypes of ADHD are vulnerable to IAD
- Both males & females with ADHD are equally vulnerable to Internet Addiction
- There is an overlap between ADHD brain wiring and IAD brain wiring
- ADHD meds can help with ADHD+IAD treatment
- Social skills deficits in ADHD'ers are tied to IAD risk
- ADHD-specific risk factors include:
  - *Sensation Seeking, Frustration Intolerance, Boredom Aversion*

3. Myths about ADHD & Internet-related Addictions

1. "Too much Internet use/gaming causes ADHD"
2. "ADHD boys have more problems with Internet addictions than girls"
3. "It's a child/adolescent problem, not a problem for adults"

Escapism/Avoidance vs. Problematic Use vs Behavioral Addiction

INTERNET USE *(Shopping, Surfing, Chatting, etc., etc., etc.)*

- Escapism / Avoidance
  - Common in todays world
  - *"Anti-mindfulness"*
- Problematic Use
  - Behavior is starting to have life consequences
    - Work, school, relationships (intimate, family, friends, etc.).
- Behavioral Addiction
  - Addiction-related brain changes have occurred

Internet Gaming – not always a "disorder"

- Generation Z = The "iGeneration" (born 1995-2002) (ages 6-23)
  - 94% online daily, 25% online "almost constantly"
  - Regular gaming is todays norm
- Pro-social aspects
  - What appears as isolating may actually be socializing
  - Professional gaming – e-Sports
- Clinical aspects for multiple populations

Demographcs of todays gamers

64% OF US HOUSEHOLDS OWN A DEVICE THAT THEY USE TO PLAY VIDEO GAMES.

The average gamer is **34 YEARS OLD.**

Gamers age 18 or older represent more than **70 PERCENT** of the video game-playing population.

60 PERCENT of Americans play video games daily.

ADULT WOMEN represent a greater portion of the video game-playing population (33%) than boys under 18 (17%).

"Essential Facts About the Video Game Industry," www.theesa.com, 2018

eSports; it's a thing, a big thing

REUTERS

Business Markets World Politics TV More

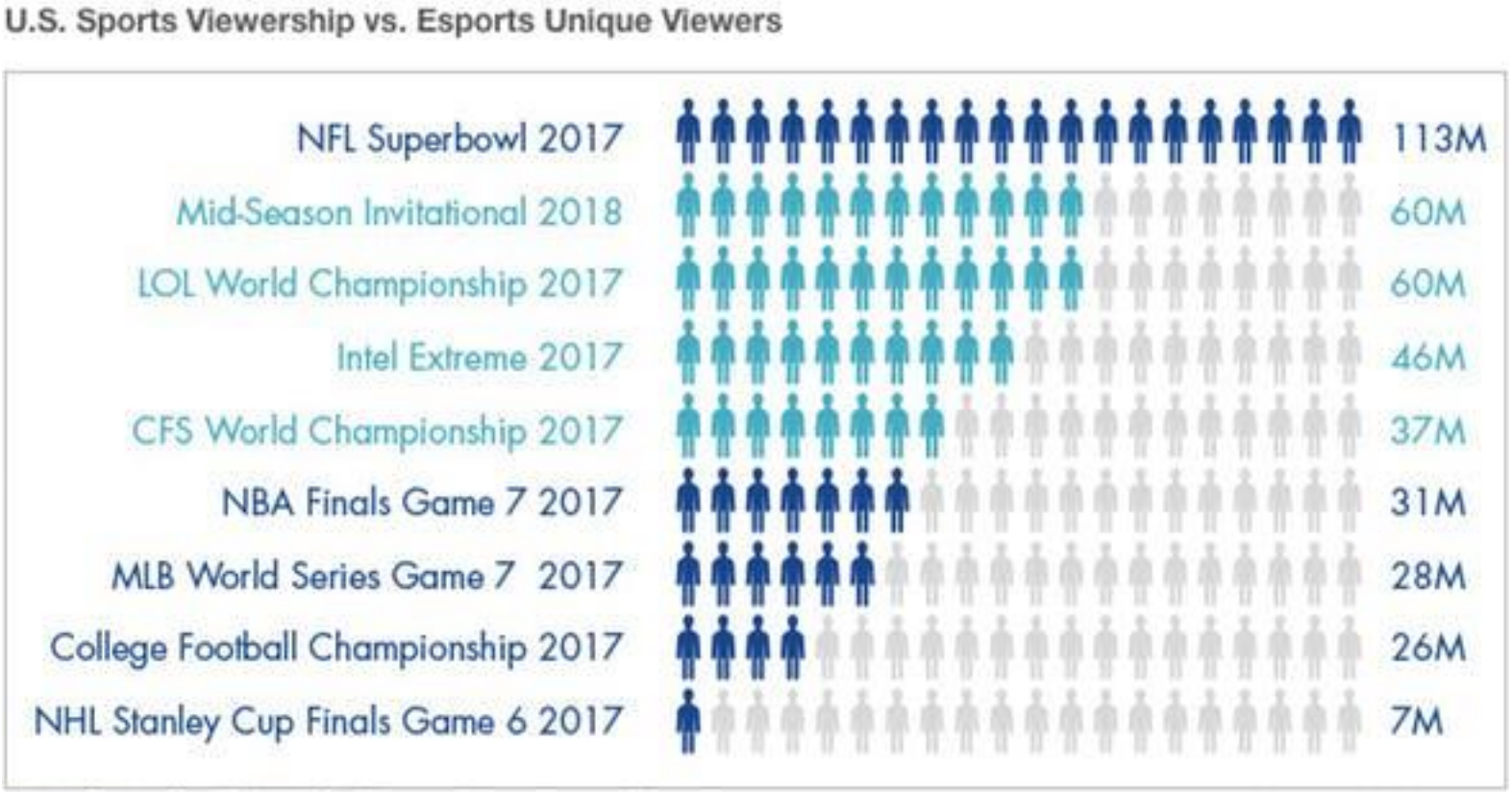
TECHNOLOGY NEWS FEBRUARY 12, 2019 / 11:05 AM / 8 MONTHS AGO

Global esports revenues to top $1 billion in 2019: report

Hilary Russ 3 MIN READ

NEW YORK (Reuters) - Global esports revenues will hit $1.1 billion in 2019, up 27 percent since last year amid ballooning revenues from advertising, sponsorship and media rights to competitive video gaming, a report said on Tuesday.

eSports viewership vs regular sports viewership



Philadelphia Fusion - professional eSports team

Comcast's New Esports Arena: You Can Stop the "Parents' Basement" Jokes Now

David Murrell 3/25/2019, 2:27 p.m.

Think esports aren't "real" sports? Tell that to the $50 million arena to be built for our local Overwatch League franchise.

Rendering courtesy of Comcast Spectacor.

PHILADELPHIA FUSION

OVERWATCH LEAGUE

Harrisburg University Storm – 2019 ESPN CEC champions

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PSC

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Therapeutic Use of Video Games & "Digital Medicine" for ADHD

- Engelhard & Kollins (2019). "The Many Channels of Screen Media Technology in ADHD: a Paradigm for Quantifying Distinct Risks and Potential Benefits."
  - Novel digital therapeutics for ADHD demonstrate that specific forms of SMT can also have positive effects.
  - SMT devices themselves can serve as a self-monitoring study platform and deliver digital interventions.

- BRAVO =Beyond the tReatment of the Attention deficit hyperactiVity disOrder
  - The BRAVO project aims to create an advanced therapeutic environment based on an innovative ICT system able to help young patients with ADHD to improve their health conditions.

- Treatments leverage art, music, storytelling, and reward cycles to keep patients engaged and immersed for the delivery of therapeutic activity.
- Akili's prescription digital medicine is delivered through a creative and immersive action video game experience.

Healthy Internet Use Tips for the Digital Age

- *Net Negotiations* - productive family dialog regarding technology use
- *Digital Diet* – keep a digital log to control/monitor how much consume
- *Digital Nutrition* - make better choices about what to consume; learn to choose between healthy/unhealthy Internet content

Tech solutions – protect yourself from yourself

- Web blockers and filters
  - Disney Circle
  - OpenDNS
  - Freedom.to

freedom

FocusMe

circle WITH Disney

OpenDNS

Oh, T

3 Myths about ADHD & Addiction

Myth: Stimulant medication treatment of ADHD in childhood can lead to addiction later in life.

Truth: Stimulant medication treatment of ADHD in childhood *reduces the risks* for later addiction problems.

Medications offer a protective effect.
The greater risk is not properly treating childhood ADHD.

Myth: Long-term use of stimulant medication will lead to addiction.

Truth: Long-term use of stimulant medication helps prevent addiction onset.

Myth: People with ADHD will abuse their stimulant medication.

Truth: Neurotypical Brain ≠ ADHD Brain

3 Myths about Addiction Treatment for people with ADHD

Myth: ("We don't need to screen for that")

Truth: Addiction treatment programs *must* screen for ADHD.

Myth: People with ADHD must discontinue their stimulant medication while in treatment for addiction in order to get sober.

Truth: ADHD and Addiction should be treated *concurrently*.

Myth: People with ADHD and a history of substance abuse will be unable to safely use their medication after they become sober.

Truth: Long term use of ADHD stimulant medications *reduces the risk for addiction relapse*.

3 Myths about ADHD & Internet-related Addictions

Myth: "Too much Internet use/gaming causes ADHD"

Truth: Impossible if ADHD is "pre-wired" in the brain.

- $A \Rightarrow B$
- $B \not\Rightarrow A$

Myth: ADHD males have more problems with Internet addiction than females.

Truth: Males & females with ADHD are *equally vulnerable* to Internet Addiction

Myth: It's a child/adolescent problem, not a problem for adults"

Truth: ~20% of young adults with ADHD struggle with Internet Addiction

70% of gamers are over 18 yrs old. More adult women than teen boys.

FIN

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