


2023 ANNUAL INTERNATIONAL CONFERENCE ON ADHD:

LETS TALK MORE  
ABOUT ADHD AND ADDICTION

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- Not an MD; Not offering medical advice
- Academic bias; possibly overly technical
  - (Some references in large lists are representative only, not all have been fully vetted)
- Reference styles will vary (too boring & tedious to fix)
- Pro-med approach
- Bias towards experience




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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.



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## Myths to be debunked


### Myths about ADHD and Addiction

1. Stimulant medication treatment in childhood leads 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

### Myths about ADHD and Addiction Treatment

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 after they become sober

### Myths about ADHD and 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
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## 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.*
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## 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.*
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## Correlations between ADHD and Addiction

- ~25–40 % of people with Substance Use Disorder also have ADHD
  - ~25% of people with Gambling Disorder also meet criteria for ADHD
  - ~20% of young adults with ADHD struggle with Internet Addiction
  - ~50% more likely to develop a drug, alcohol or nicotine disorder
    - Faraone, S., et al. (2021). The world federation of ADHD international consensus statement: 208 evidence-based conclusions about the disorder. *Neuroscience & Biobehavioral Reviews*, 128.
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### 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**

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### Some connections between ADHD and 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

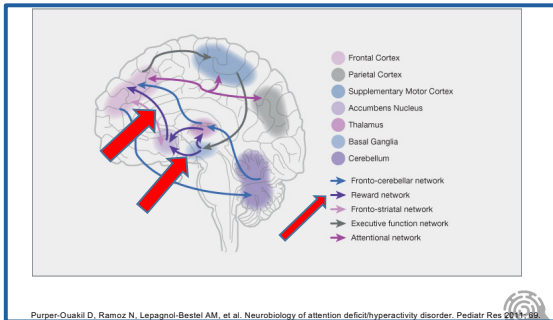
#### Psychological

- 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.

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### Addiction Neurobiology



Purper-Ouakil D, Ramoz N, Lepagnol-Bestel AM, et al. Neurobiology of attention deficit/hyperactivity disorder. *Pediatr Res* 2013; 74: 1-12.

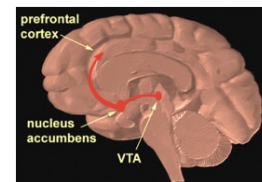
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### Addiction Neurobiology

#### 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.



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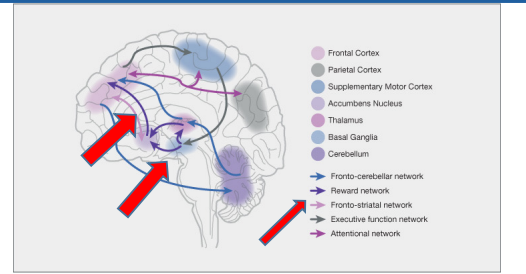
### Example recent research on Dopamine & Addiction

- Gilley, E. D., et al. (2024). The Future is Now for Precision Genomic Addiction Medicine as a Frontline Modality for Inducing "Dopamine Homeostasis" in Reward Deficiency Syndrome (RDS). *Current Pharmaceutical Biotechnology*.
- Peters, J. (2023). Electronic gambling machines and dopamine. *PsyArXiv Preprints*.
- Kim, K., & Pisciotta, M. R. (2023). Nicotine addiction: More than just dopamine. *Current opinion in neurobiology*.
- Hu, R.-R., et al. (2023). Blockade of the Dopamine D3 Receptor Attenuates Opioids-Induced Addictive Behaviours Associated with Inhibiting the Mesolimbic Dopamine System. *Neuroscience Bulletin*.
- Crews, C. S. (2023). The Neurobiology of Addiction: The Role of Dopamine. *Honors Theses*.
- Schultz, W. (2022). Dopamine reward prediction error coding. *Dialogues in clinical neuroscience*.
- Fel, Y. Y., et al. (2022). Maladaptive or misunderstood? Dopamine fasting as a potential intervention for behavioral addiction. *Lifestyle Medicine*.
- de Jong, J. W., et al. (2022). Mesocortical dopamine heterogeneity: what do dopamine firing and release have to do with it? *Annu Rev Neurosci*.
- Wise, R. A., & Jordan, C. J. (2021). Dopamine, behavior, and addiction. *J Biomed Sci*.
- Poisson, C. L., et al. (2021). Dopamine Circuit Mechanisms of Addiction-Like Behaviors. *Front Neural Circuits*.
- Wise, R. A., & Robble, M. A. (2020). Dopamine and Addiction. *Annu Rev Psychol*.
- Liu, Y., et al. (2020). The Mesolimbic Dopamine Activity Signatures of Relapse to Alcohol-Seeking. *J Neurosci*.
- Solinas, M., et al. (2019). Dopamine and addiction: what have we learned from 40 years of research. *J Neural Transmission*.

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### ADHD Neurobiology

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

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### Example research on Dopamine & ADHD (last 10 years)

- Liu, D., et al. (2023). Cry1A11 mutation induces ADHD-like symptoms through hyperactive dopamine D1 receptor signaling. *JCI insight*.
- Véronneau-Velieux, F., et al. (2022). A mechanistic model of ADHD as resulting from dopamine phasic/tonic imbalance during reinforcement learning. *Frontiers in Computational Neuroscience*.
- Takko, T., et al. (2022). Driving risks of young drivers with symptoms of attention deficit hyperactivity disorder: association with the dopamine transporter gene VNTR polymorphism. *Nord J Psychiatry*.
- Perugi, G., De Rosa, U., & Barbuli, M. (2022). What value do norepinephrine/dopamine dual reuptake inhibitors have to the current treatment of adult attention deficit hyperactivity disorder (ADHD) treatment: a meta-analysis? *Pharmacological Research-Modern Chinese Medicine*.
- Li, X., et al. (2022). Effect of traditional Chinese Medicine on ADHD animal behavior and brain tissue dopamine and cAMP: A network meta-analysis. *Pharmacological Research-Modern Chinese Medicine*.
- Kraus, J., et al. (2022). ADHD in adolescence and adulthood, with a special focus on the dopamine transporter and nicotine. *Dialogues in clinical neuroscience*.
- Kanarik, M., et al. (2022). ADHD co-morbidities: A review of implication of gene x environment effects with dopamine-related genes. *Neurosci Biobehav Rev*.
- Dum, R., et al. (2022). Dopamine Receptor Expression and the Pathogenesis of Attention-Deficit Hyperactivity Disorder: a Scoping Review of the Literature. *Current Developmental Disorders Reports*.
- Abdi, A., et al. (2022). Polymorphism of dopamine transporter gene 3'-UTR VNTR in Iranian Azeri Turkish patients with ADHD. *International Journal of Pediatrics*.
- Meng, H. R., et al. (2021). Functional MHC1 deficiency induces ADHD-like symptoms with increased dopamine D1 receptor expression. *Brain Behav Immun*.
- Mariggió, M. A., et al. (2021). DRD1 and DRD2 receptor polymorphisms: genetic neuromodulation of the dopaminergic system as a risk factor for ASD, ADHD and ASD/ADHD overlap. *Frontiers in neuroscience*.
- Bacani, A., et al. (2021). Effects of the dopamine transporter gene on neuroimaging findings in different attention deficit hyperactivity disorder presentations. *Brain Imaging Behav*.
- Mortimer, N., et al. (2019). Dissociation of impulsivity and aggression in mice deficient for the ADHD risk gene Adgr3: Evidence for dopamine transporter dysregulation. *Neuropharmacology*.
- McLaughlin, T., et al. (2018). Pro-dopamine regulator, KB2202, attenuates hoarding and shopping behavior in a female, diagnosed with SUD and ADHD. *J Behav Addict*.
- Fernandez-Jaen, A., et al. (2018). Cingulate Cortical Thickness and Dopamine Transporter (DAT1) Genotype in Children and Adolescents With ADHD. *J Atten Disord*.
- Pandolfo, P., et al. (2013). Caffeine regulates frontocortical dopamine transporter density and improves attention and cognitive deficits in an animal model of attention deficit hyperactivity disorder. *Eur Neuropsychopharmacol*.

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### Dopamine and ADHD – some key findings

- 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.
- 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).


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### Dopamine and ADHD *(continued)*

- "...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)




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### Potential ADHD-related Genes

- **ADGRL3**
- DAT1 – (480 bp)
- DBH – TaqI (A2 allele)
- **DRD2**
- **DRD4** – (7 + Repeat)
- HTR1B
- MAOA
- SNAP25
- <more>



Faraone, S. V. and E. Mick (2010). Molecular genetics of attention deficit hyperactivity disorder. *Psychiatr Clin North Am* 33(1)  
 Wimberley, T., et al. (2020). Genetic liability to ADHD and substance use disorders in individuals with ADHD. *Addiction*, 115(7)



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### Cannabis and 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 **further EF problems**, such as **decreased motivation and increased memory problems**.
- **↑mood ≠ ↓ADHD symptoms**
- Individuals with ADHD may be at an **increased risk of experiencing cannabis use problems due to deficits in self-regulation**
  - Hernandez, M., & Levin, F. R. (2022). Attention-Deficit Hyperactivity Disorder and Therapeutic Cannabis Use Motives. *Psychiatric Clinics*.
- *Although some studies indicated that cannabis improved ADHD symptoms, most studies indicated it worsened or had no effect on ADHD symptoms. Given the current evidence, cannabis is not recommended for people with ADHD.*
  - Francisco, A. P., et al. (2022). Cannabis use in attention-Deficit/hyperactivity disorder (ADHD): A scoping review. *Journal of psychiatric research*.




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### 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



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Fact: 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.

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Fact: Stimulant use can **REDUCE** the risks for Addiction

*i.e. Medications may offer a protective effect*

- 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).
- “Findings clearly show an *association between early, persistent stimulant treatment and lower risk of substance use...*”
  - Kennedy, T. M., & Molina, B. S. (2023). Translating the nuanced risk for substance use among adolescents treated for attention-deficit/hyperactivity disorder (ADHD) into clinical practice: a commentary on McCabe et al.(2023). *Journal of Child Psychology and Psychiatry*.

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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).
- **The greater risk is NOT treating childhood ADHD**

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

- *The rate (of substance abuse) 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).
- (and many more not cited here. 150+ papers scanning 40 years investigating the topic of ADHD and substance use/abuse)

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### Fact: Stimulant medication rarely abused by ADHD'ers

- Neurotypical Brain  $\neq$  ADHD Brain
  - "Starbucks Syndrome" or "Zombie Mode" instead of euphoria
- 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.
  - Kollins, S. H. (2008). "ADHD, substance use disorders, and psychostimulant treatment: current literature and treatment guidelines." *Journal of attention disorders*, 12(2).
- The experience of consensus group members was that individuals are more likely to be poorly compliant with stimulant medication or choose to stop taking it, rather than seek higher doses.
  - Young, S., et al. (2023). Identification and treatment of individuals with ADHD and substance use disorder: An expert consensus statement. *World Journal of Psychiatry*, 13(3).
- Regularly forgetting to take your medication is NOT addict behavior

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### 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"

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### 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)
- 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

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### 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.
- Non-stimulant medications: Strattera
  - Takes 4-6 weeks before benefits kick-in, and 12-24 weeks for optimal efficacy. (per Eli Lilly).
  - Results in potential for iatrogenic harm
  - Doesn't decrease relapse rates

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### 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).
- It is essential that individuals with ADHD and SU/SUD are not deprived of effective medications
  - Young, S., et al. (2023). Identification and treatment of individuals with attention-deficit/hyperactivity disorder and substance use disorder: An expert consensus statement. *World J. Psychiatry*, 13(3).

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### European Consensus Statement on Treating ADHD + SUD

- Simultaneous and integrated treatment of ADHD and SUD, using a combination of pharmac- 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.

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### 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...
  - 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).

↑ ADHD mgmt = ↑ life mgmt = ↓ chaos = ↓ relapse risks

**ADHD medications are pro-recovery**

- The overarching opinion was that long-acting forms of stimulant medication should be prescribed.
  - Young, S., et al. (2023). Identification and treatment of individuals with attention-deficit/hyperactivity disorder and substance use disorder: An expert consensus statement. *World Journal of Psychiatry*, 13(3)

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### 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).


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## • PAUSE AND TRANSITION



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## 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 (this is what the "infinite scroll" app design hijacks)

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## Behavioral Addiction



- 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)

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## 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, sexual pursuit, 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

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### Behavioral Addiction Withdrawal Symptoms

- Anxiety
- Restlessness
- Irritability
- Insomnia
- Fatigue
- Poor concentration
- Depression
- Mood swings
- Social isolation
- Headaches



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### Gambling Disorder

- Official addiction in both the DSM-5 & ICD-11

- 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



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### Example research on Gambling Disorder & ADHD in the last 8 years

- Vitró-Alcaraz, C., et al. (2023). Do attention-deficit/hyperactivity symptoms influence treatment outcome in gambling disorder? *Compr Psychiatry*.
- Tanaka, M., et al. (2023). The Paradoxical Clinical Course of Persons with Gambling Disorder and Comorbid ADHD. *J Gambi Studies*.
- Liansari, R. M., & Slate, K. (2023). Management of Gambling Disorder with Attention Deficit Hyperactivity Disorder (ADHD): A case report. *Journal of Behavioral Addictions*.
- Allable, M., et al. (2022). Pathological Gambling in ADHD: A Review. *J. Drug Alcohol Res.*
- Theule, J., et al. (2019). Exploring the relationships between problem gambling and ADHD: A meta-analysis. *J. Atten. Disord.*
- Silbernagl, M., et al. (2019). Comorbidity Patterns Among Patients With Opioid Use Disorder and Problem Gambling: ADHD Status Predicts Class Membership. *Journal of dual diagnosis*.
- Brandt, L., & Fischer, G. (2019). Adult ADHD is associated with gambling severity and psychiatric comorbidity among treatment-seeking problem gamblers. *J. Atten. Disord.*
- 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*.
- 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*.
- Waluk, O., et al. (2016). The relationship between problem gambling and attention deficit hyperactivity disorder. *J Gambi Stud*.
- Theule, J., et al. (2016). Exploring the relationships between problem gambling and ADHD: A meta-analysis. *J. Atten. Disord.*
- Retz, W., et al. (2016). Association of attention-deficit/hyperactivity disorder with gambling disorder. *J Neural Transm (Vienna)*.
- Fatseas, M., et al. (2016). Gambling behaviors and psychopathology related to Attention-Deficit/Hyperactivity Disorder (ADHD) in problem and non-problem adult gamblers. *Psychiatry Res.*
- Romo, L., et al. (2015). Gambling and ADHD in a Population of French Students. *J Gambi Stud*.
- Chamberlain, S. R., et al. (2015). Impact of ADHD symptoms on clinical and cognitive aspects of problem gambling. *Compr Psychiatry*.
- Abouzari, M., et al. (2015). Interactions among attention-deficit hyperactivity disorder (ADHD) and problem gambling in a probabilistic reward-learning task. *Behavioural brain research*.

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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
- "Clinicians needs to be cognizant of the greater risk of ADHD symptoms when working with problem gamblers and vice versa."
  - Theule, J., et al. (2019). Exploring the relationships between problem gambling and ADHD: A meta-analysis. *Journal of attention disorder*, 23(12)
- "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 findings from UCLA:
  - 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*.

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Escapism/Avoidance vs. **Problematic Use** vs **Behavioral Addiction**

- **Escapism / Avoidance**
  - Common in today's 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**
  - Individual struggles to regain control over their behavior
  - May experience preoccupation, need for increasing intensity, cravings, withdrawals

Not all Problematic Use = Addiction

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**Internet-related Addictions**

- Internet Addiction
  - **Internet Addiction Test (IAT)** (translated into 20+ languages)
- Internet Gaming Disorder
- Internet Pornography Addiction
- Social Networking Addiction
  - **Bergen Facebook Addiction Scale (BFAS)** (translated into 10+ languages)
  - **Bergen Social Media Addiction Scale (BSMAS)**
- Smartphone Addiction
  - **Smartphone Addiction Scale—Short Version (SAS-SV)**
  - **Nomophobia Questionnaire (NMP-Q)**
    - Translated into Arabic, Greek, Persian, Chinese, Portuguese, Italian, and Spanish

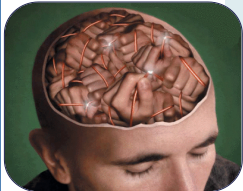
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**Neurobiology of Internet-related Addictions**

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



1. Sensitization
2. Desensitization
3. Hypofrontality
4. Dysfunctional Stress Circuits

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**Example Neuroscience Research on Internet Addiction (dated slide, many newer studies exist)**

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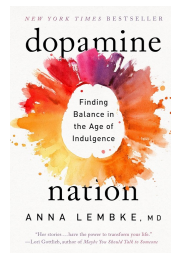
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## Dopamine and the Internet

- Anticipation
- Searching & Seeking
- **Endless Novelty**



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## Internet Addiction

- Officially Proposed for DSM-5 *(not accepted)*
  - Block (2008) 4 key components: *excessive use, withdrawal, tolerance, & adverse consequences*
  - Proposed potential subtypes: *Gaming, Porn, Gambling, Shopping, etc.*



AMERICAN  
PSYCHIATRIC  
ASSOCIATION

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## 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 (2013)
  - Despite huge body of research, **still** no official diagnosis in DSM-5-TR (2022) 🙄🙄
- Accepted by WHO as "Gaming Disorder" in the ICD-11

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## Internet Pornography Addiction (IPA)

- #2 of 3 original subtypes of Internet Addiction

Unnecessarily controversial (and illogical).

- ☒ Gambling **can** develop into an addiction ☒ (official)
- ☒ Internet Gaming **can** develop into an addiction ☒ (official internationally)
- ☐ Chronic overuse of social media **can** develop into an addiction ☐
- ☐ Chronic overuse of smartphones **can** develop into an addiction ☐
- ☐ Chronic overuse of the internet in general **can** develop into an addiction ☐
- ☒ Chronic overuse of internet pornography **cannot** develop into an addiction. **!?**



- "Compulsive Sexual Behavior Disorder" (CSB)
  - Official ICD-11 diagnosis

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## Internet Addiction and ADHD

• Is there an intersection between Internet Addiction and ADHD?

• **Tip: The answer is YES**

• Note that studies conflate types of internet use—gaming, pornography, social media, screentime overuse in general, etc.

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### New paper: ADHD and prolonged screen time use (STU) \*

- These findings shed new light on the **shared neural overlaps between ADHD symptoms and prolonged STU**, and provide evidence that the polygenic risk for ADHD is related, via **white matter microstructure** and the ADHD trait, to **STU**.
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Study funded by the National Key R&D Program of China, National Natural Science Foundation of China, Shanghai Municipal Science and Technology Major Project, Shanghai Center for Brain Science and Brain-Inspired Technology

\*I can't vouch for the quality or outcomes of this study. Referenced for the purpose of illustrating the scope of international research on this topic.

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### Research on ADHD and Internet Addiction in Japan, Indonesia, and India

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### Research on ADHD and Internet Addiction in Europe

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### Research on ADHD and IAD in Australia, Brazil, Canada, & Iran

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### 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

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### 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 today's norm
- Pro-social aspects
  - What appears as isolating may actually be socializing
  - Professional gaming – e-Sports
- Clinical aspects for multiple populations

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Some Tech Solutions – protect yourself from yourself




• This is an unpaid representative list. There are many other products available.  
• My apologies to those whose programs weren't included.

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Some Internet Gaming Disorder recovery resources




• "Healthy Gamer"  
• ADHD module in "Guide to Mental Health"

Internet and Technology Addicts Anonymous  
In person meetings available in 10 countries and 20 US states

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Some Internet Pornography Addiction peer-based recovery resources



The community programs all have pro's and con's. People need to determine their own right fit.

SPAA formal Doctor's Opinion written by Anna Lembke, MD

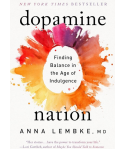
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Healthy Internet Use Tips for the Digital Age

*Tips from Dr. Kimberly Young, original author on Internet Addiction:*

- *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



1. Learn how to break addiction
2. Enjoy indulgences in moderation
3. Restore balance to our lives

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Summary review: 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  $\neq$  ADHD Brain

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Summary Review: 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.

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Summary review: 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.

- $A \Rightarrow B$
- $B \nRightarrow A$

**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.

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FIN

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