

The Attention Deficit Disorder Association (ADDA)
Friday Night Virtual Series – Its alright, its Friday night
Problematic Internet/Mobile Phone Use

Todd L. Love, PsyD, JD, MBA, LPC, BCC
Private Practice, Athens, GA and Online
todd@doctoddlove.com
www.doctoddlove.com
706-383-7401



Disclosures & Conflicts of Interest

- Paid Consulting, Honorariums, or Financial Compensation from:
 - *Nobody*

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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.



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 in front of camera
 - Confession: *It I look like I'm reading, I probably am*

- Slide formatting and reference styles will vary (too boring & tedious to fix)



3 types of non-productive Internet use

- Escapism / Avoidance
 - Common in today's world
 - "Anti-mindfulness"

- Problematic Use
 - Internet use is starting to create life consequences
 - Work, school, relationships (intimate, family, friends, etc.).

- Behavioral Addiction
 - Use becomes out of control
 - Addiction-related brain changes have occurred



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.



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.



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.



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 frontocostriatal 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 **further**s 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**



Correlations between ADHD & Addiction:

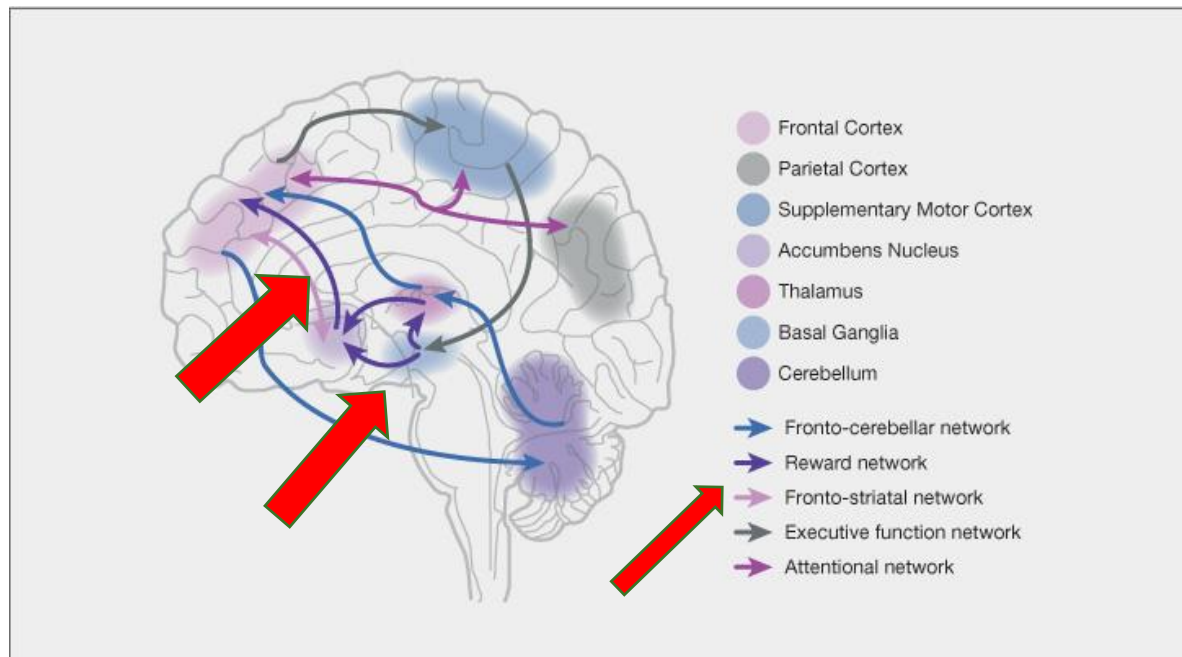
- Research reports 15–25 % of adults and 50-60% of adolescents with Substance Use Disorder also have ADHD

ADHD Treatment = Addiction Prevention

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



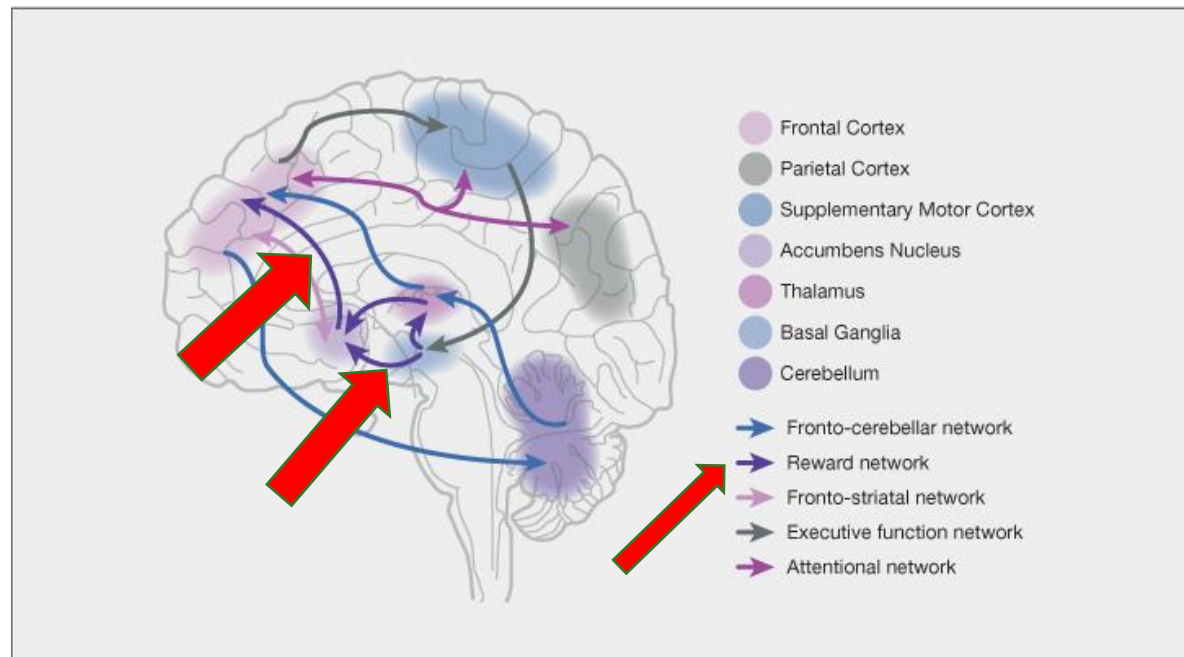
ADHD Neurobiology



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



Addiction Neurobiology



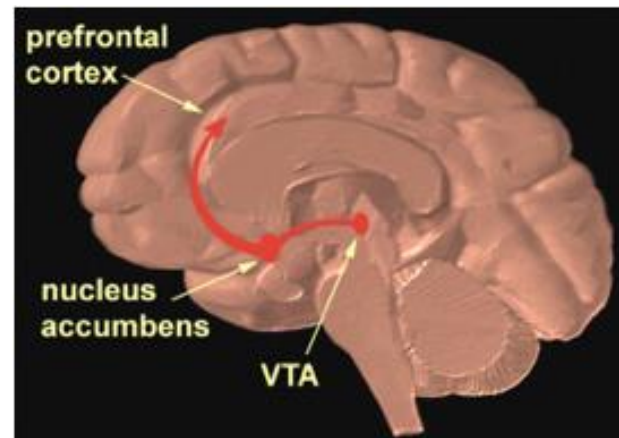
- Purper-Ouakil D, Ramoz N, Lepagnol-Bestel AM, et al. Neurobiology of attention deficit/hyperactivity disorder. *Pediatr Res* 2011; 69: 69R-76R./



Reward Network

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

Overstimulation Leads to Desensitization

Normal

Nerve Impulse → Big effect

Dopamine

Receptors

Desensitized

Nerve Impulse → Small effect

Dopamine

Receptors

Nerve Cells Communicating

Sending Neuron

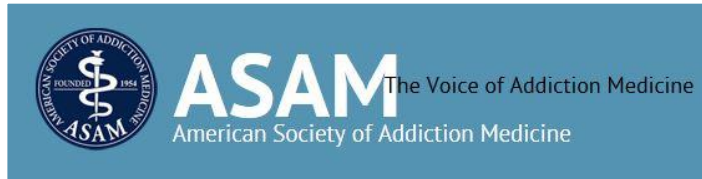
Receiving Neuron

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

Behavioral Addictions

Historical Concept of Addiction

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



- 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)
- About Reward, not Pleasure
- Anticipation



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.)
- **Withdrawal** is negative mood state resulting from loss the artificially elevated levels of dopamine due to cessation of chronic activities (chemical consumption or behavioral patterns)
- **Addiction Withdrawal ≠ Physiological Detoxification**



Internet Addiction Withdrawal Symptoms

- Anxiety
- Restlessness
- Irritability
- Insomnia
- Fatigue
- Poor concentration
- Depression
- Mood swings
- Social isolation
- Headaches
- Severe loss of libido (“the flatline”)



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
 - *“evidence that gambling behaviors activate reward systems similar to those activated by drugs of abuse and produce behavioral symptoms comparable to those produced by the substance use disorders”*



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
- “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

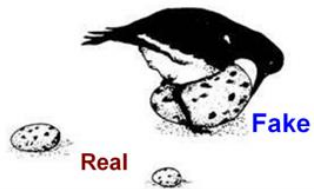
- Reminder, not all Problematic Internet Use = Internet Addiction



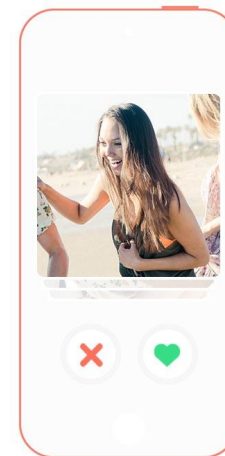
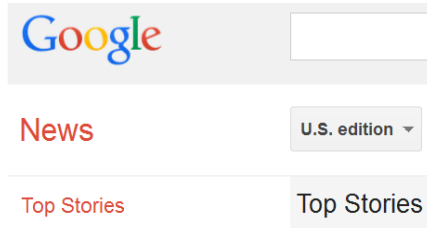
Supernormal Stimulus

- Tinbergen

- Bird Eggs & Butterfly Wings



Information Overload – Classical Conditioning



Funny Cats COMPILATION 2015 - Funny Videos 2015 - 720p

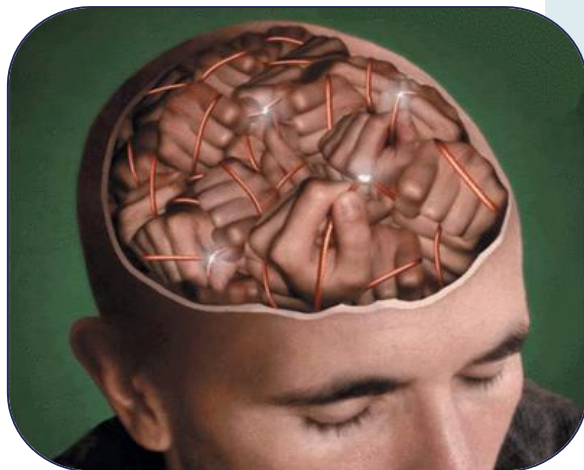
Dopamine and the Internet

- 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

- Park, Jeong Ha, et al. "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* 32.3 (2017): 514-21.
- Brand, Matthias, et al. "Integrating Psychological and Neurobiological Considerations Regarding the Development and Maintenance of Specific Internet-Use Disorders: An Interaction of Person-Affect-Cognition-Execution (I-Pace) Model." *Neuroscience & Biobehavioral Reviews* 71 (2016): 252-66.
- Zhu, Y., H. Zhang, and M. Tian. "Molecular and Functional Imaging of Internet Addiction." *Biomed Res Int* 2015 (2015): 378675.
- Yuan, K., et al. "Core Brain Networks Interactions and Cognitive Control in Internet Gaming Disorder Individuals in Late Adolescence/Early Adulthood." *Brain Struct Funct* (2015).
- Wang, Y., et al. "Decreased Prefrontal Lobe Interhemispheric Functional Connectivity in Adolescents with Internet Gaming Disorder: A Primary Study Using Resting-State Fmri." *PLoS One* 10.3 (2015): e0118733.
- [Love, T., et al. \(2015\). "Neuroscience of Internet Pornography Addiction: A Review and Update." *Behav Sci \(Basel\)* 5\(3\): 388-433.](#)
- Wang, H., et al. "The Alteration of Gray Matter Volume and Cognitive Control in Adolescents with Internet Gaming Disorder." *Front Behav Neurosci* 9 (2015): 64.
- Liu, J., et al. "Functional Characteristics of the Brain in College Students with Internet Gaming Disorder." *Brain Imaging Behav* (2015).
- Lin, X., et al. "Impaired Risk Evaluation in People with Internet Gaming Disorder: Fmri Evidence from a Probability Discounting Task." *Prog Neuropsychopharmacol Biol Psychiatry* 56 (2015): 142-8.
- Lin, X., et al. "Abnormal Gray Matter and White Matter Volume in 'Internet Gaming Addicts.'" *Addict Behav* 40 (2015): 137-43.
- Li, W., et al. "Brain Structures and Functional Connectivity Associated with Individual Differences in Internet Tendency in Healthy Young Adults." *Neuropsychologia* 70 (2015): 134-44.
- Kuhn, S., and J. Gallinat. "Brains Online: Structural and Functional Correlates of Habitual Internet Use." *Addict Biol* 20.2 (2015): 415-22.
- Ko, C. H., et al. "Altered Gray Matter Density and Disrupted Functional Connectivity of the Amygdala in Adults with Internet Gaming Disorder." *Prog Neuropsychopharmacol Biol Psychiatry* 57 (2015): 185-92.
- Chen, C. Y., et al. "Brain Correlates of Response Inhibition in Internet Gaming Disorder." *Psychiatry Clin Neurosci* 69.4 (2015): 201-9.
- Wee, Chong-Yaw, et al. "Disrupted Brain Functional Network in Internet Addiction Disorder: A Resting-State Functional Magnetic Resonance Imaging Study." *PloS one* 9.9 (2014): e107306.
- Tian, M., et al. "Pet Imaging Reveals Brain Functional Changes in Internet Gaming Disorder." *Eur J Nucl Med Mol Imaging* 41.7 (2014): 1388-97.
- Sun, Y., et al. "Assessment of in Vivo Microstructure Alterations in Gray Matter Using Dki in Internet Gaming Addiction." *Behav Brain Funct* 10 (2014): 37.
- Meng, Y., et al. "The Prefrontal Dysfunction in Individuals with Internet Gaming Disorder: A Meta-Analysis of Functional Magnetic Resonance Imaging Studies." *Addict Biol* 20.4 (2014): 799-808.
- Ko, C. H., et al. "Altered Brain Activation During Response Inhibition and Error Processing in Subjects with Internet Gaming Disorder: A Functional Magnetic Imaging Study." *Eur Arch Psychiatry Clin Neurosci* 264.8 (2014): 661-72.
- Kim, J. E., et al. "Neural Responses to Various Rewards and Feedback in the Brains of Adolescent Internet Addicts Detected by Functional Magnetic Resonance Imaging." *Psychiatry Clin Neurosci* 68.6 (2014): 463-70.
- Jung, YC, et al. "P-72altered Cingulate-Hippocampal Synchrony Correlate with Aggression in Adolescents with Internet Gaming Disorder." *Alcohol and alcoholism* 49.suppl 1 (2014): i67-i68.
- Dong, G., et al. "Cognitive Flexibility in Internet Addicts: Fmri Evidence from Difficult-to-Easy and Easy-to-Difficult Switching Situations." *Addict Behav* 39.3 (2014): 677-83.
- Ding, W. N., et al. "Trait Impulsivity and Impaired Prefrontal Impulse Inhibition Function in Adolescents with Internet Gaming Addiction Revealed by a Go/No-Go Fmri Study." *Behav Brain Funct* 10 (2014): 20.
- Choi, JS. "Sv08-2neurophysiological and Neuroimaging Aspects between Internet Gaming Disorder and Alcohol Use Disorder." *Alcohol and Alcoholism* 49.suppl 1 (2014): i10-110.
- Brand, M., K. S. Young, and C. Laier. "Prefrontal Control and Internet Addiction: A Theoretical Model and Review of Neuropsychological and Neuroimaging Findings." *Front Hum Neurosci* 8 (2014): 375.

Video: Love Child documentary trailer



Internet Addiction Disorder

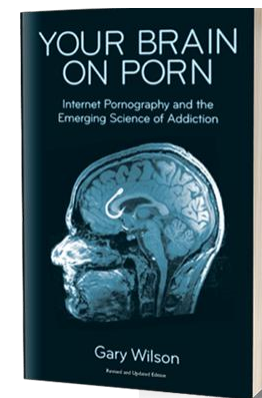
- Officially Proposed for DSM-5 (*not accepted*)
 - Block (2008) 4 key components: *excessive use, withdrawal, tolerance, & adverse consequences*
 - Potential subtypes: *Gaming, Porn, Gambling, Shopping, etc*
 - *“Information Seeking”*

- Various terms used in research
 - 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 (*not accepted yet*)
- Myriads of studies on psychological, sociological, clinical, treatment, etc.
- Rapidly growing area of neuroscience research
- Links to studies can be found at yourbrainonporn.com



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



Internet Addiction and ADHD

○ Is there an intersection between Internet Addiction and ADHD?

○ Tip: The answer is YES



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.*
- Cho, S. C., et al. (2001) Biogenetic Temperament and Character Profiles and Attention Deficit Hyperactivity Disorder Symptoms in Korean Adolescents with Problematic Internet Use. *Cyberpsychology, Behavior and Social Networking.*



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*.
- Chou, W. J., et al. (2016) Social Skills Deficits and Their Association with Internet Addiction and Activities in Adolescents with Attention-Deficit/Hyperactivity Disorder. *Journal of behavioral addictions*.
- 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*.
- Yen, J. Y., et al. (2009) The Association between Adult Adhd Symptoms and Internet Addiction among **College Students**: The Gender Difference. *Cyberpsychol Behav*.
- 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*.
- Li, W., et al. (2016) The Association of Internet Addiction Symptoms with Impulsiveness, Loneliness, Novelty Seeking and Behavioral Inhibition System among **Adults** with Attention-Deficit/Hyperactivity Disorder (Adhd). *Psychiatry Research*.
- 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*.
- Tateno, M., et al. (2016) Internet Addiction and Self-Evaluated Attention-Deficit Hyperactivity Disorder Traits among Japanese **College Students**. *Psychiatry and Clinical Neurosciences*



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*
- Dalbudak, E., et al. (2014) The Relationship of Internet Addiction Severity with Attention Deficit Hyperactivity Disorder Symptoms in [Turkish University Students](#); Impact of Personality Traits, Depression and Anxiety. *Compr Psychiatry*.



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

- Bóthe, 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*.
- Mazurek, M. & Engelhardt, C. (2013) Video game use in boys with autism spectrum disorder, ADHD, or typical development. *Pediatrics*.
- 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:

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

Brainwave analysis:

- Compared to the ADHD-only group, the ADHD+IGD group showed *<notable brainwave differences>*.
 - Park, J. H., et al. (2017) "Comparison of Qeeg Findings between Adolescents with ADHD w/o Comorbidity & ADHD Comorbid with Internet Gaming Disorder."

Medication-related studies:

- Internet Gaming might be a means of self-medication in children with ADHD.
- MPH might be evaluated as a potential treatment of Internet addiction.
 - Han, D. H., et al. (2009) "The Effect of Methylphenidate on Internet Video Game Play in Children with ADHD"



Research on ADHD and Internet Addiction in Taiwan

- 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.
 - 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*."
- 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. (2018) "**Boredom Proneness** and Its Correlation with Internet Addiction and Internet Activities in Adolescents with Attention-Deficit/Hyperactivity Disorder."
- Association between ADHD and Internet addiction was more significant among female college students
 - Yen, J., et al. (2009) "The Association between Adult ADHD Symptoms and Internet Addiction among College Students: The Gender Difference."



Research on ADHD and Internet Addiction in China & Japan

China

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

Japan

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



Research on ADHD and Internet Addiction in Europe

Germany

- 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
 - Paulus, F. W, et al. (2017) "Computer Gaming Disorder and ADHD in Young Children" (~)

UK

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



Research on ADHD and Internet Addiction in Turkey

Turkey

- Difficulties in Emotion Regulation predicted Internet Addiction.
- Both Inattentiveness & hyperactivity/impulsivity of ADHD were related with the severity of IA
 - Evren, B., et al. (2018) "Relationship of Internet Addiction Severity with Probable ADHD and Difficulties in Emotion Regulation among Young Adults."
- Inattention & boredom aversion key risk factors
 - Dalbudak, E., et al. (2015) "The Impact of Sensation Seeking on the Relationship between ADHD and Severity of Internet Addiction Risk."
- 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
 - Dalbudak, E., et al. (2014) "The Relationship of Internet Addiction Severity with ADHD Symptoms in Turkish University Students" (~)



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*



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
- ADHD-specific risk factors include:
 - *Sensation Seeking, Frustration Intolerance, Boredom Aversion*



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



Demographics of today's gamers



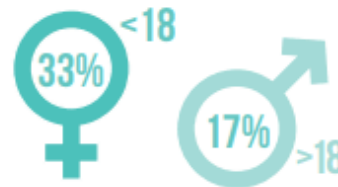
64% OF US HOUSEHOLDS OWN A DEVICE THAT THEY USE TO PLAY VIDEO GAMES.

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



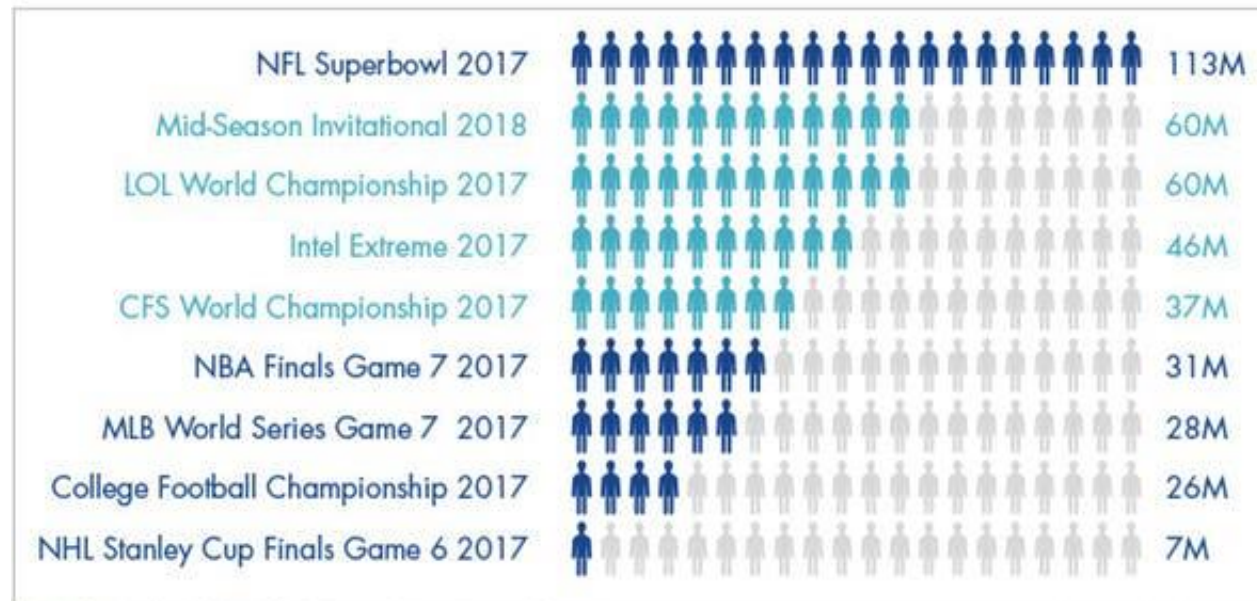
eSports; it's a thing, a big thing



The screenshot shows a Reuters news article. At the top left is the Reuters logo. To the right are navigation links: Business, Markets, World, Politics, TV, and More. Below the navigation is a horizontal line. Underneath, it says 'TECHNOLOGY NEWS' followed by the date and time: 'FEBRUARY 12, 2019 / 11:05 AM / 8 MONTHS AGO'. The main headline is 'Global esports revenues to top \$1 billion in 2019: report'. Below the headline is the author's name 'Hilary Russ' and a '3 MIN READ' indicator. To the right of the read time are social media icons for Twitter and Facebook. The first paragraph of the article reads: '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.' In the bottom right corner of the article frame, there is a small circular icon with a stylized 'S' inside, resembling a brain or a network.

eSports viewership vs regular sports viewership

U.S. Sports Viewership vs. Esports Unique Viewers



Source: Sports Media Watch, Statista.com, dotesports.com, lollesports.com.

MARKET REALIST

Source: VanEck




Philadelphia Fusion - professional eSports team

Comcast's New Philadelphia Esports Arena: A First Look 10/19/19, 12:10 PM

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.

<https://www.phillymag.com/news/2019/03/25/esports-arena-philadelphia-fusion/> Page 1 of 4



PHILADELPHIA
FUSION






Harrisburg University Storm – 2019 ESPN CEC champions

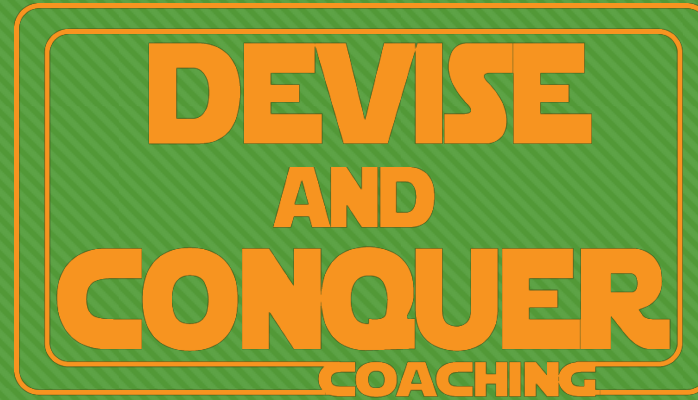


Therapeutic Use of Video Games & “Digital Medicine” for ADHD

- 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.
 




Brittany Smith

<https://conquer.consulting>

Related Links & slides:

<https://conquer.consulting/2019-adhd-conference-tech-presentation-links>

The world is in constant competition for our attention.

○ Apps are coopting cognitive processes that evolved for our survival

○ Alerts

○ Badges

○ Notifications

○ Games

○ Clickbait

○ Auto-play

○ Infinite-Scroll apps



Notifications = Orienting Response

- Notification sounds trigger the “Orienting Response”
 - Environmental capture of attention
- Engages potential survival instincts for things that aren’t that important
- Different for those with ADHD

- *“That alarm goes off all the time and it doesn’t bother me.”*
- Just because it doesn’t get you motivated, does NOT mean it doesn’t disrupt you.



Orienting Response in ADHD

- *Think those notification sounds aren't interfering with work?*
- Electroencephalogram (EEG) studies of orienting response and attention
 - Compared attention responses of folks with and without ADHD
 - Target vs. non-target (stuff to ignore) sounds
 - Non-target sounds: familiar vs. unfamiliar (new) sounds
- Folks with ADHD:
 - Have their attention more easily grabbed by *repeated* sounds that aren't related to the task at hand
 - Keep more sustained attention on familiar distracting sounds



The mere presence of a device is distracting..

- Smartphone in other room
 - 🖱
- Smartphone in bookbag
 - 🖱
 - Smartphone on desk
 - 🖱 🖱



The big question...

“WHAT TO DO ABOUT IT?”



Internet Addiction Treatment – Severe cases

- Residential treatment
- Counseling and Therapy
- Medication – Naltrexone
 - Mayo Clinic Case Study on the efficacy of Naltrexone in treating Internet Pornography Addiction (Bostwick & Bucci, 2008)
 - Decreased sensitization to porn use via loss of salience, essentially dismantling the impact of previous reward related learning.
- But don't forget to treat the ADHD too!

reSTART

Bellview, WA



“Rebooting” from Porn-Induced Erectile Dysfunction (PIED)



Reboot Nation



Time Magazine cover article (04/11/2016)



Reminder: Not always an addiction, but still a problem

- Not all Problematic Internet Use means Internet Addiction
 - **But doesn't mean that its still not problematic**
 - Listen to your intuition and address it accordingly

- Escapism / Avoidance
- Problematic Use
- Behavioral Addiction



Tech solutions – protect yourself from yourself

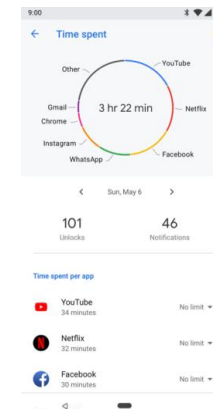
- Time Tracking
- Selective blocking
- Content filtering & Accountability



Time tracking programs



RescueTime



- Disclaimer: Not endorsing any products.
- Just listing what I know about



Screen Time

Search

Marisa Cavanna

- App Usage
- Notifications
- Pickups
- Downtime
- App Limits
- Always Allowed
- Content & Privacy
- Options

Daily Usage This Week Today

2h 52m per day 23m below average

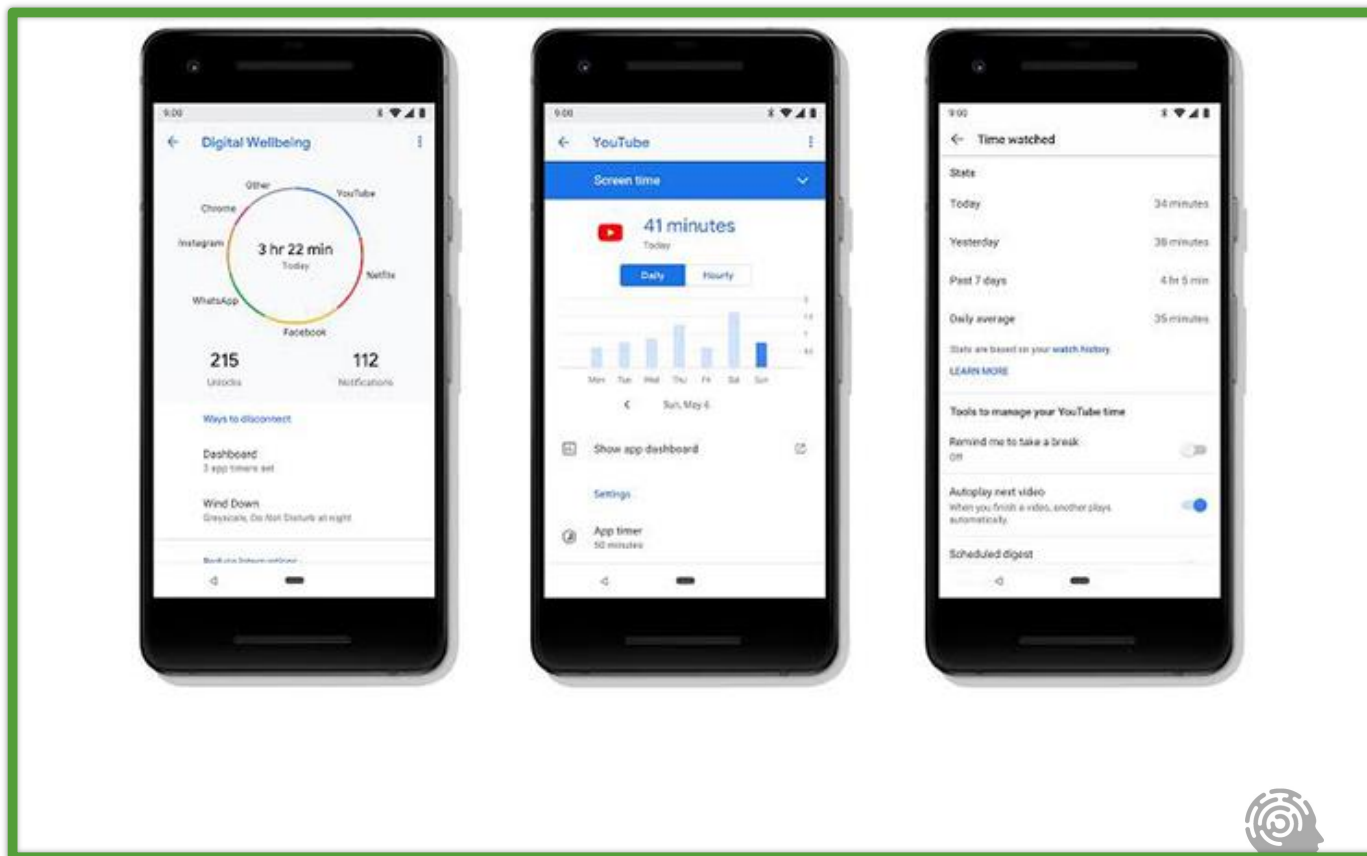
Legend: Productivity (blue), Social Networking (orange), Entertainment (light blue)

Summary: Productivity 1h 22m, Social Networking 1h 5m, Entertainment 25m

Show:	Apps	Categories	Time	Limits
	All Apps		9h 17m	
	Safari		2h 5m	
	Messages		1h 44m	⌚
	FaceTime		43m	⌚
	Mail		37m	
	Xcode		30m	

All Devices Updated today at 9:41 AM

Google's "Digital Wellbeing" on Android devices



Understand your time in a way you never have before



Automatic Time Tracking (No Manual Entry!)

RescueTime automatically tracks the time you spend on apps, websites, and even specific documents without timers or any manual entry. You'll get detailed reports on exactly where your time goes and what's getting in the way of your productivity.

Detailed Reports, Trends, and Insights

Discover the truth about your working habits, find time sinks, and set smart goals so you can track your progress as you become more productive and focused.

One-Click Offline Time Tracking

Not everything happens online. RescueTime automatically prompts you to one-click add Offline Time when you've been away so you have a full picture of your day.

Improve your productivity and reclaim your focus



Your Weekly Report
For the week of May 10, 2020

Over the past week, you logged

30h 41m

↑ 3 more hours than the previous week

Your productivity pulse

84

about the same as the previous week



Most of your time went towards:

- 67% Comm/Schedule
- 12% Business
- 6% Reference
- 5% Shopping
- 3% Design/Comp.

Top applications and websites:

- 12h 39m vsee
- 4h 1m Mail
- 2h 54m secure.simplepractice.com
- 1h 35m calendar
- 1h 30m meet.google.com

Lite accounts are limited to 3 months of data.
You have **1,043 hours** of data you're missing out on.

[Unlock your full history ▶](#)

Total Time Logged

1,296h 55m

That's 1 month, 3 weeks, 5 days, 0 hours, 55 minutes, and 50 seconds

Total Productive Time

1,009h 35m

That's 1 month, 1 week, 0 days, 1 hour, 35 minutes, and 28 seconds

Total Distracting Time

150h 22m

That's 6 days, 6 hours, 22 minutes, and 15 seconds

Programs to help prevent Internet distractions



freedom



FocusMe



More features to help you do what you love.



BLOCK WEBSITES

Whether it's Facebook, ESPN, or Youtube, block an unlimited number of distracting websites so you can focus on what matters.



BLOCK APPS

Spending too much time on apps? Freedom lets you block time-wasting apps—from email clients to addictive games.



BLOCK THE INTERNET

When you need a break or a focus boost, block the whole internet with the click of a button.



BLOCK ALL EXCEPT

Create custom whitelists. Block all websites except for the ones you need to access.



LOCKED MODE

For the days when your willpower needs an extra boost, enable Locked Mode to prevent you from ending a block session. Keep your focus, your commitment to your goals, and break your most pernicious habits.



ADVANCE SCHEDULING

Start a block on the fly or schedule blocks in advance that will begin automatically. You can also create recurring blocks to help make productivity a habit.

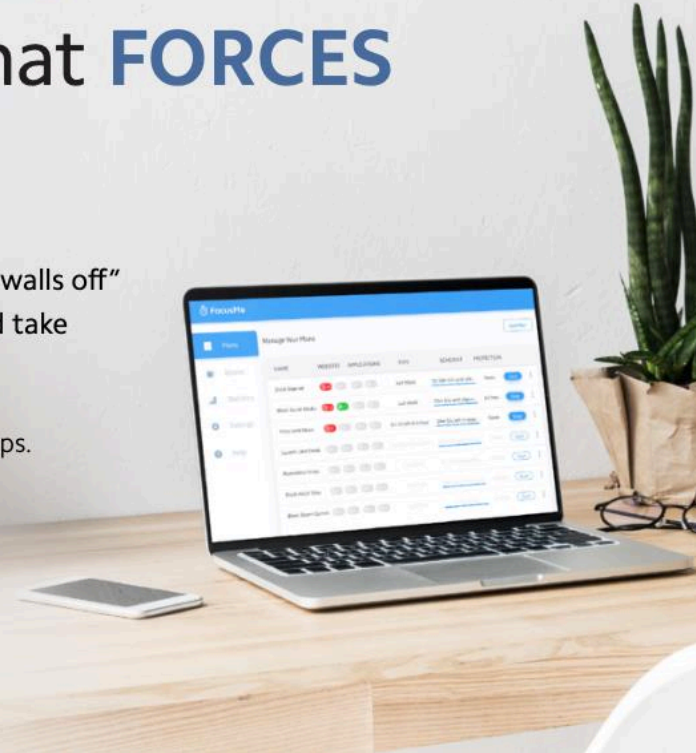
[Home](#)[How It Works](#)[Get It Now](#)[FAQs](#)[Guides](#)[Blog](#)[Sign in](#)

CONQUER DISTRACTION & DIGITAL ADDICTION

The Powerful App That **FORCES** You to Focus!

No cheating. FocusMe is a fully-customizable tool that “walls off” online temptation to instantly increase productivity and take countless hours of your life back...

- ✓ **Block, limit, or ration** use of time-sucking websites & apps.
- ✓ **Build better habits** for long-term willpower.
- ✓ **Powerful “force” mode** when you need to go nuclear.
- ✓ **Try It Free Now.** No Credit Card Required.
- ✓ **Works on** Windows, Mac, 100% Free on Android!

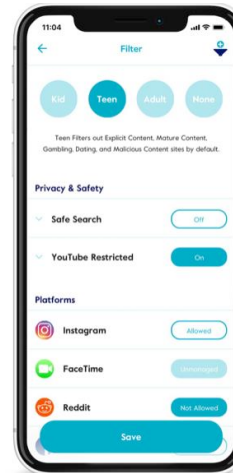


Full lockdown programs for Internet content filtering

- Application based
- Whole house solutions

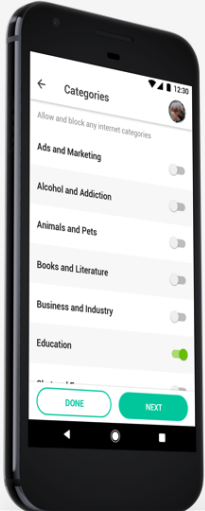


OpenDNS



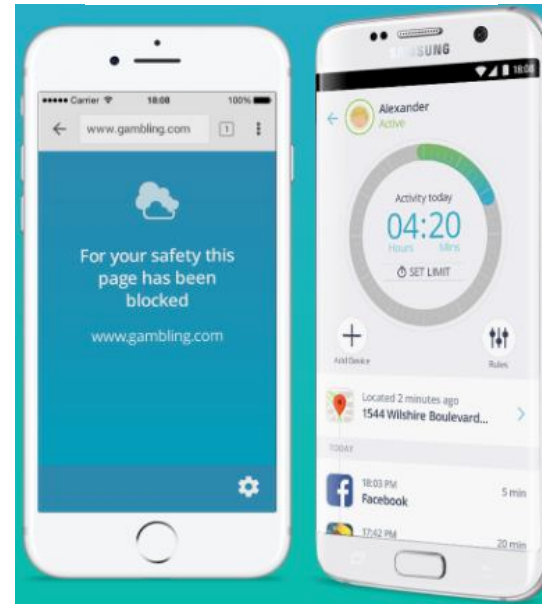
circle
WITH DISNEY





Advanced Internet Filtering

Create a safe learning environment for your kids. Our popular internet filter scans online content dynamically in real time, going beyond just URLs & keywords.



The image shows two smartphones side-by-side. The left phone displays a blocked page from 'www.gambling.com' with the message 'For your safety this page has been blocked'. The right phone shows the Qustodio dashboard for a user named 'Alexander', featuring a circular activity timer set to 04:20, a location history entry for '1544 Wilshire Boulevard...', and a list of recent app usage including Facebook.

Defeat Porn. Together.

Covenant Eyes is designed to help you and those you love live free from pornography.



Partner Up to Defeat Porn

Your allies will receive comprehensive reports of your screen activity, lessening the temptation to look at porn.



Life-Changing Conversations

Through meaningful conversations, your allies will be there to pick you up when you fall down, and cheer you on when you succeed.



Break Bad Habits For Good

With the help of your allies, you can soar to new heights both online and offline, and say goodbye to porn forever.





DEVISE AND CONQUER COACHING

Brittany Smith

<https://conquer.consulting>

Related Links & slides:

<https://conquer.consulting/2019-adhd-conference-tech-presentation-links>

Become Your Own Wizard

- Become aware of the pitfalls on your smartphone
- Possible fixes to be more productive on your devices
- Tips to design your own computing experience
- Preplan to set yourself up for success
- Geeky tips and tricks



**DEVISE
AND
CONQUER
COACHING**



Make technology work for you

1. Create a Focused Computing Environment

- Reduce / customize notifications
- Reduce stress from bad reminders
- Clean up our Screens

2. Technology & Happiness

- Leisure time and happiness
- Habit-Forming Devices
- Build Positive Habits

3. Gettin' Nerdy with it

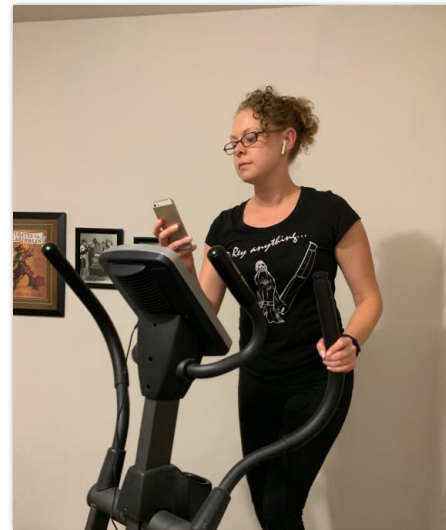
- Accessibility options
- Automation



Make mobile work for you

- You can do focused work while exercising
- Capture your amazing ideas from anywhere
- Task/grocery list always with you
- Anxiety about getting bored?
 - Always *something* to work on in your pocket

**DEVISE
AND
CONQUER
COACHING**



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



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.



Know Brain, Know Gain:
Making Technology Work *with* Your ADHD



Brittany Smith

<https://conquer.consulting>





Todd L. Love, PsyD, JD, MBA, LPC, BCC

Private Practice, Athens, GA and Online

todd@doctoddlove.com

www.doctoddlove.com

706-383-7401

-  www.facebook.com/doctoddlove
-  www.google.com/+Doctoddlove
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