



## DIGITAL SUGAR VS. DIGITAL VEGGIES

*How gaming and digital media help and hinder  
brain development in children*

**Andrew P. Doan, MPH, MD, PhD**

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Financial Interests:

Dr. Doan is the founder of the non-profit 501(c)(3) Real Battle ([www.realbattle.org](http://www.realbattle.org)), and the author of "Hooked on Games" and "Digital Vortex Survival Guide". He has no other financial interest in any products or services mentioned, aside from his wife's life coaching.



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**WOULDN'T YOU LOVE TO  
HOLD THIS DEGREE OF  
ATTENTION WITH YOUR  
CHILDREN OR SPOUSE?**



## **We Bare Bears, Cartoon Network**

*(Fair use for educational purposes and commentary)*

# CONCEPT OF A DIGITAL DRUG TO RE-WIRE THE BRAIN

Hébert, S., Béland, R., Dionne-Fournelle, O., Crête, M., & Lupien, S. J. (2005).

Physiological stress response to video-game playing: the contribution of built-in music.

*Life sciences*, 76(20), 2371-2380.

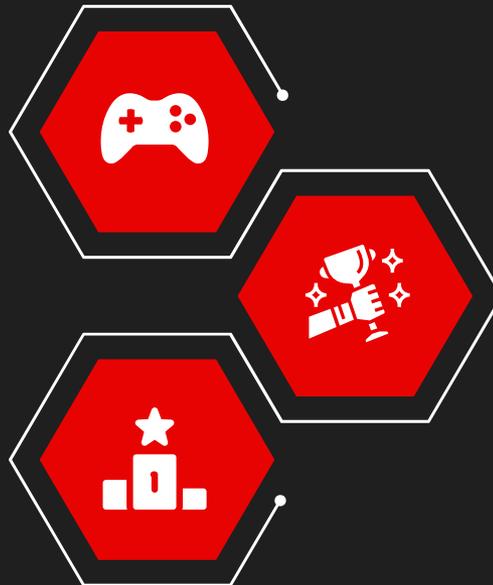
<https://doi.org/10.1016/j.lfs.2004.11.011>

Zilioli, S., & Watson, N. V. (2012).

The hidden dimensions of the competition effect: basal cortisol and basal testosterone jointly predict changes in salivary testosterone after social victory in men.

*Psychoneuroendocrinology*, 37(11), 1855-1865.

<https://doi.org/10.1016/j.psyneuen.2012.03.022>



Kätsyri, J., Hari, R., Ravaja, N., & Nummenmaa, L. (2013).

The opponent matters: elevated fMRI reward responses to winning against a human versus a computer opponent during interactive video game playing.

*Cerebral cortex* (New York, N.Y. : 1991), 23(12), 2829-2839.

<https://doi.org/10.1093/cercor/bhs259>

# CEDAR-SINAI ROLLS OUT VR PAIN RELIEF



appliedVR™



**Patients wear a GearVR  
headset fitted with a  
hygienic liner.**

*(Image courtesy AppliedVR.)*



Gavin being moved onto the operating bed in the OR.



Excerpt from a handwritten letter from Gavin retelling his surgery experience.

surgery, at first, I was scared because I thought it was going to hurt. When I got to the hospital I saw Dr. Raven. He was wearing a blue shirt and he was nice. The nurse showed me the Virtual Reality. It was awesome! I saw red tears, blue bear, and bear with mustaches and hats. The game I played made me feel happy!! I felt



## PAIN RELIEVR

Over 3 pre-clinical studies, the Pain RelieVR products showed over 136% improvements in pain endurance performance.

**Methodology:** Respondents exposed themselves to pain twice, by dipping alternating hands into a tank of 0-4 Celsius water. They were instructed to leave their hands in as long as possible

**AUG 15**

**1st Exposure:** VR first, then video

**2nd Exposure:** Video first, then VR

N=30

Users engaged with Pain RelieVR were able to tolerate **19%** more cold pressor exposure than the 2D video.

**19% PAIN TOLERANCE**

**NOV 15**

**1st Exposure:** No stimulus

**2nd Exposure:** Pain RelieVR Gaze, Smash Hit game, Pixar "Birds" Video, or No Stimulus

N=294 / Ages: 10-55

Pain RelieVR increases pain tolerance by an average of **41%**, nearly 20% more than Smash Hit, a polished VR app currently on the market with similar gameplay. Those who used Pain RelieVR were able to tolerate pain **45%** longer than the Pixar video and **116%** longer than those using no distraction

**41% PAIN TOLERANCE**

**JAN 16**

**1st Exposure:** No stimulus

**2nd Exposure:** AVR Experience: Pain RelieVR or Shape Your Path  
N=37

Results: Pain RelieVR increases pain tolerance by an average of **45%**, Shape Your Path version helps by **62%**. suggesting that VR is an effective tolerance method

**45-62% PAIN TOLERANCE**



Hoffman, H. G., Chambers, G. T., Meyer, W. J., 3rd, Arceneaux, L. L., Russell, W. J., Seibel, E. J., Richards, T. L., Sharar, S. R., & Patterson, D. R. (2011). Virtual reality as an adjunctive non-pharmacologic analgesic for acute burn pain during medical procedures. *Annals of behavioral medicine : a publication of the Society of Behavioral Medicine*, 41(2), 183-191. <https://doi.org/10.1007/s12160-010-9248-7>



Schmitt, Y. S., Hoffman, H. G., Blough, D. K., Patterson, D. R., Jensen, M. P., Soltani, M., Carrougher, G. J., Nakamura, D., & Sharar, S. R. (2011). A randomized, controlled trial of immersive virtual reality analgesia, during physical therapy for pediatric burns. *Burns : journal of the International Society for Burn Injuries*, 37(1), 61-68. <https://doi.org/10.1016/j.burns.2010.07.007>

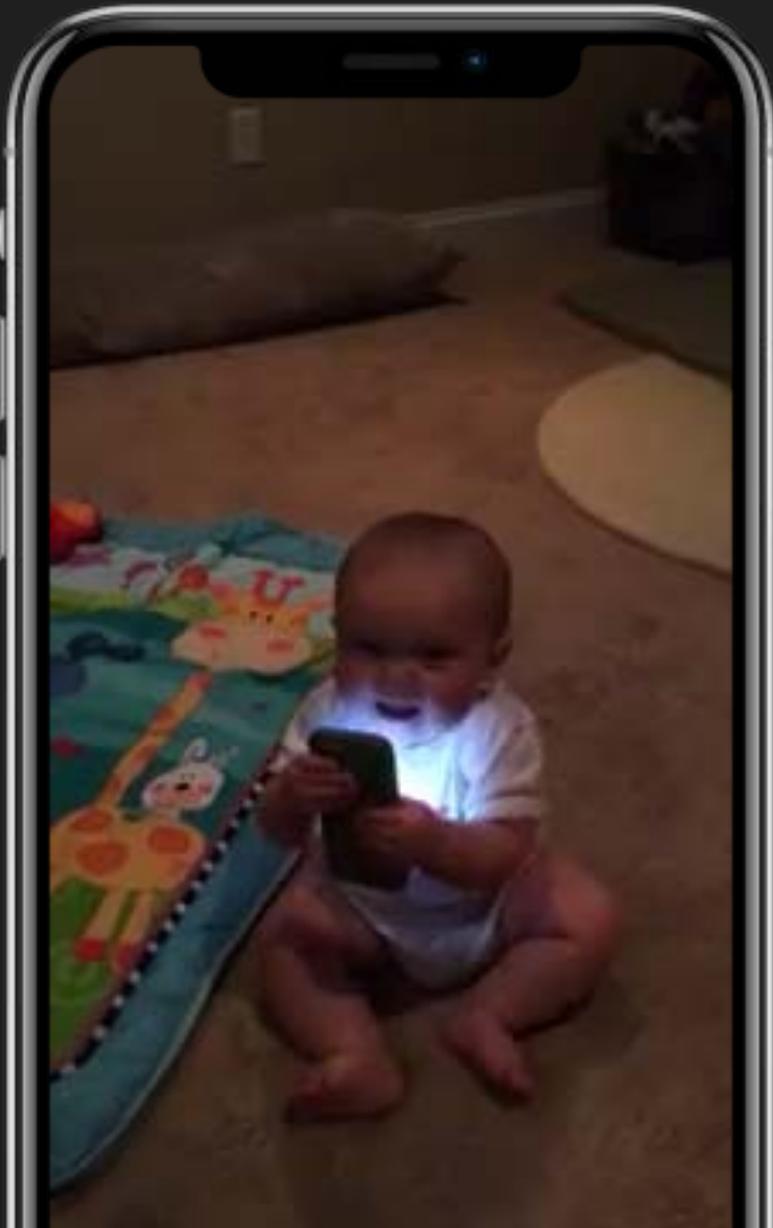


Soltani, M., Drever, S. A., Hoffman, H. G., Sharar, S. R., Wiechman, S. A., Jensen, M. P., & Patterson, D. R. (2018). Virtual reality analgesia for burn joint flexibility: A randomized controlled trial. *Rehabilitation psychology*, 63(4), 487-494. <https://doi.org/10.1037/rep0000239>





**BABIES LOVE THE  
SCREENS AND  
STIMULATION!**



# BABIES LOVE THE SCREENS AND STIMULATION!

Video from

[https://www.youtube.com/  
watch?v=N\\_Rh56ypjhU](https://www.youtube.com/watch?v=N_Rh56ypjhU)



*(Fair use for educational  
purposes and commentary)*

# MEDIA IS A DIGITAL DRUG

*Positives associated with moderate use*



## Hand Eye Coordination

Rosser et al. (2007). The impact of video games on training surgeons in the 21st century. *Archives of surgery (Chicago, Ill. : 1960)*, 142(2), 181-186.



## Reduces Anxiety & Depression

Granic et al. (2014). The benefits of playing video games. *Am Psychol.* Jan;69(1):66-78.



## Enhances Memory Skills

Boot et al. (2008). The effects of video game playing on attention, memory, and executive control. *Acta psychologica*, 129(3), 387-398.



## Training Tool

Domínguez et al. (2018). Video games as a method of training basic laparoscopic skills. Videojuegos como método de entrenamiento para las habilidades quirúrgicas laparoscópicas básicas. *Medwave*, 18(7), e7345.



## Solving Science Problems

Khatib et al. (2011). Algorithm discovery by protein folding game players. *Proceedings of the National Academy of Sciences of the United States of America*, 108(47), 18949-18953.



## Coping with PTSD

Maples-Keller et al. (2017). Virtual Reality-Enhanced Extinction of Phobias and Post-Traumatic Stress. *Neurotherapeutics : the journal of the American Society for Experimental NeuroTherapeutics*, 14(3), 554-563.



## Pain Management

Hoffman et al. (2008). Virtual reality pain control during burn wound debridement in the hydrotank. *The Clinical journal of pain*, 24(4), 299-304.



***All things are poison and  
nothing is without poison;  
only the dose makes a  
thing not a poison.***



**Dr. Paracelsus,**  
a physician in the 1500s and  
the father of toxicology



# TOO MUCH OF ANYTHING IS HARMFUL



Healthy



Average American Child in 2010  
7h 38m daily of digital media  
(Kaiser Foundation)



Dysfunctional

# MEDIA IS A DIGITAL DRUG

## Negatives Associated with Overuse

### Family Abuse and Extreme Violent Behaviors & Self-harm



### Sleep Deprivation

Lemola et al. (2015). Adolescents' electronic media use at night, sleep disturbance, and depressive symptoms in the smartphone age. *Journal of youth and adolescence*, 44(2), 405-418.



### Failure to Achieve Potential

Petry et al. (2015). Internet Gaming Disorder in the DSM-5. *Current psychiatry reports*, 17(9), 72.



**Addiction –  
Over 1100 peer-  
reviewed  
research  
papers!**



### Gamer Rage

Yao et al. (2019). Violent video games exposure and aggression: The role of moral disengagement, anger, hostility, and disinhibition. *Aggressive behavior*, 45(6), 662-670.



### Depression, Anxiety, and Anti- social Behaviors

Stockdale, L., & Coyne, S. M. (2018). Video game addiction in emerging adulthood: Cross-sectional evidence of pathology in video game addicts as compared to matched healthy controls. *Journal of affective disorders*, 225, 265-272.

**ALL ARE MENTAL HEALTH ISSUES**



Research Report

**aps**  
ASSOCIATION FOR  
PSYCHOLOGICAL SCIENCE

# Effects of Video-Game Ownership on Young Boys' Academic and Behavioral Functioning: A Randomized, Controlled Study

Psychological Science  
21(4) 463–470  
© The Author(s) 2010  
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[sagepub.com/journalsPermissions.nav](http://sagepub.com/journalsPermissions.nav)  
DOI: 10.1177/0956797610362670  
<http://pss.sagepub.com>  


**Robert Weis and Brittany C. Cerankosky**  
Denison University

## Abstract

Young boys who did not own video games were promised a video-game system and child-appropriate games in exchange for participating in an “ongoing study of child development.” After baseline assessment of boys’ academic achievement and parent- and teacher-reported behavior, boys were randomly assigned to receive the video-game system immediately or to receive the video-game system after follow-up assessment, 4 months later. Boys who received the system immediately spent more time playing video games and less time engaged in after-school academic activities than comparison children. Boys who received the system immediately also had lower reading and writing scores and greater teacher-reported academic problems at follow-up than comparison children. Amount of video-game play mediated the relationship between video-game ownership and academic outcomes. Results provide experimental evidence that video games may displace after-school activities that have educational value and may interfere with the development of reading and writing skills in some children.

# DIGITAL SUGAR VS DIGITAL VEGGIES



Emily



- ✓ Gaming & Social Media
- ✓ Videos for fun
- ✓ eBooks for entertainment
- ✓ Texts with friends
- ✓ e-mail for fun



- ✓ eTextbooks
- ✓ eBooks for classes
- ✓ e-mail for work/school
- ✓ Texts for work/school
- ✓ English
- ✓ Math
- ✓ Science
- ✓ Foreign Language
- ✓ Educational Webinars
- ✓ Online Lectures
- ✓ Biostatistics

# Los Angeles Times

LOCAL U.S. WORLD BUSINESS SPORTS ENTERTAINMENT HEALTH STYLE TRAVEL OPINION SHOP

BREAKING PHOTOS VIDEO CRIME OBITUARIES WEATHER TRAFFIC CROSSWORDS SUDOKU HOROSCOPES APPS

Search

## L.A. Unified takes back iPads as \$1-billion plan hits hurdles

*School staff and students report that iPads were collected Friday at some schools. One official says only two-thirds of the \$700 devices were turned in.*

September 30, 2013 | By Howard Blume



Share



42



Tweet



0



Recommend



0

Los Angeles school officials have taken back iPads from students at Westchester and Roosevelt high schools and possibly other campuses as well until further notice, the latest fallout from student hacking of the devices.

The move is another complication in efforts to provide an iPad to every student as part of a \$1-billion technology plan in the nation's second-largest school system.



Students at Theodore Roosevelt High School work with their iPads last month. (Irfan Khan, Los Angeles...)

# SUPER-AROUSING STIMULI HIJACK THOUGHTS AND THE BRAIN

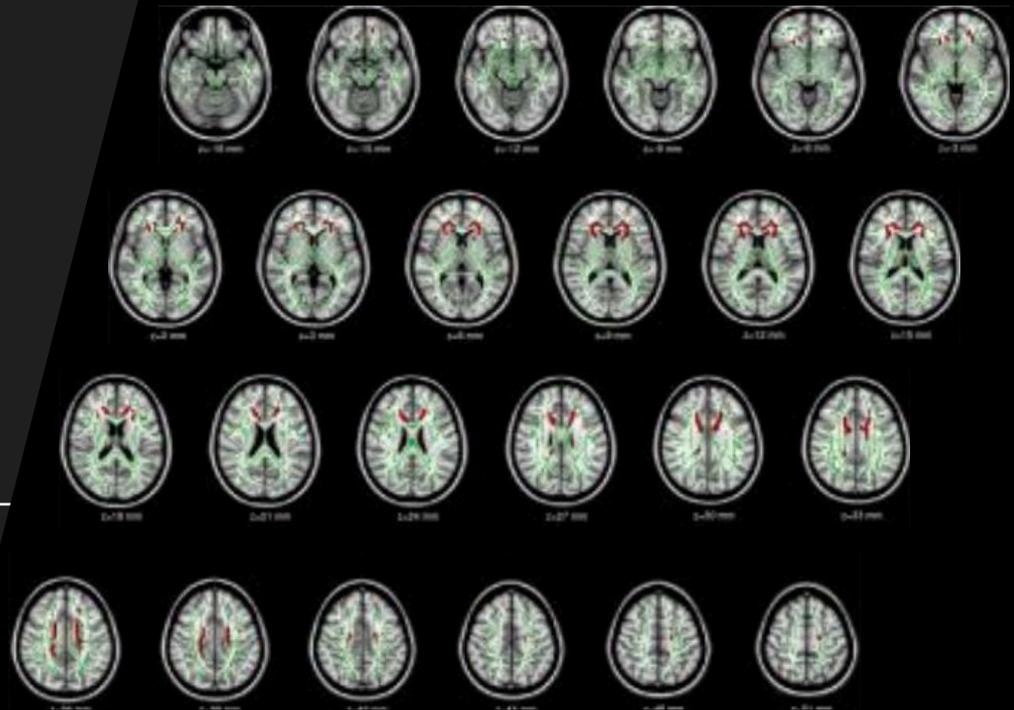


***Taken together, [studies show] internet addiction is associated with structural and functional changes in brain regions involving emotional processing, executive attention, decision making, and cognitive control.***

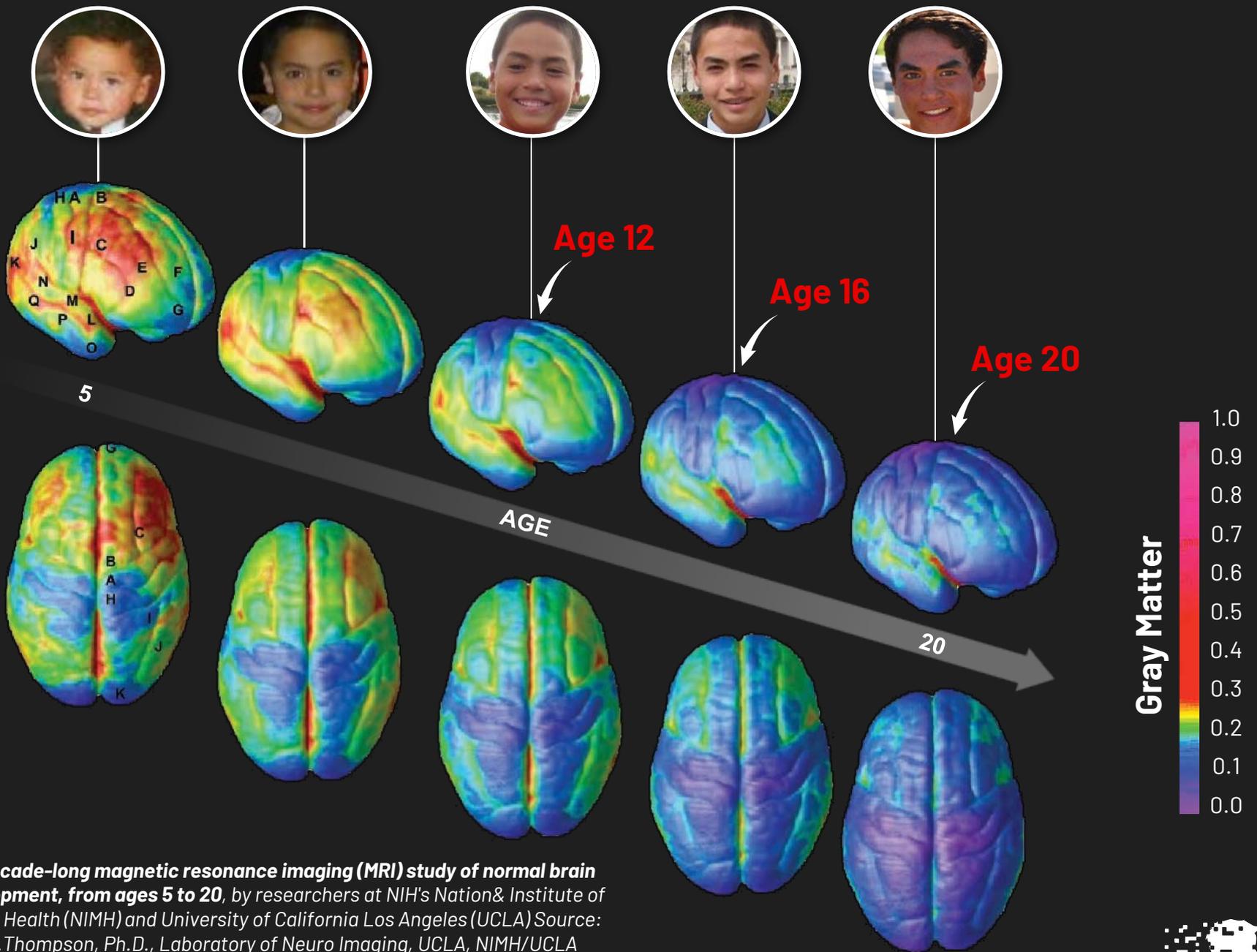


*- Research authors summarizing neuro-imaging findings in internet and gaming addiction.*

*- Lin et al. (2012). Abnormal white matter integrity in adolescents with internet addiction disorder: a tract-based spatial statistics study. PloS one, 7(1), e30253.*



Source: Lin, Zhou, Lei, et al., used with permission. Red areas designate abnormal white matter in Internet addicted teens



The **decade-long magnetic resonance imaging (MRI) study of normal brain development, from ages 5 to 20**, by researchers at NIH's Nation& Institute of Mental Health (NIMH) and University of California Los Angeles (UCLA) Source: Paul M. Thompson, Ph.D., Laboratory of Neuro Imaging, UCLA, NIMH/UCLA Project Reprinted with permission from Dr. Paul Thompson.

# HAND ANALOGY FOR BRAIN DEVELOPMENT

**Benefits of Gaming**

**Communication Skills**

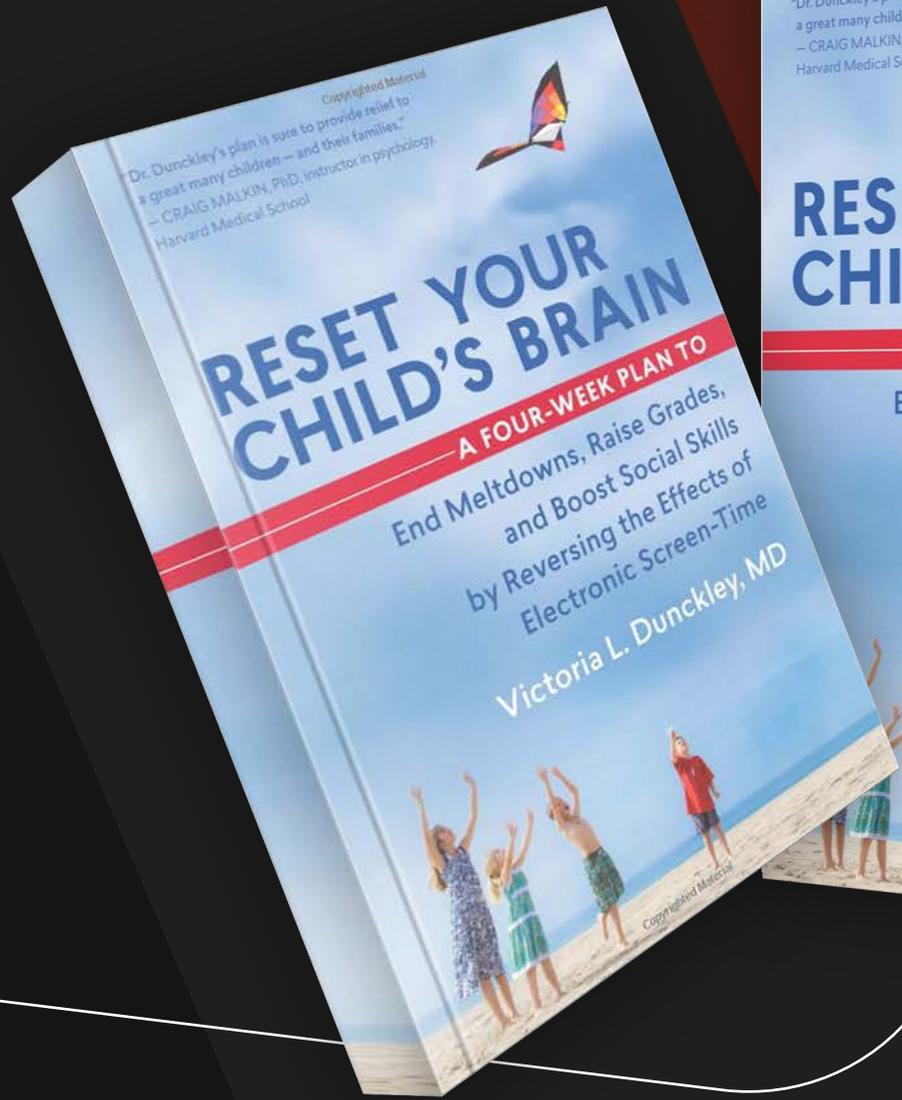
**Relationships**

**Empathy & Self Control**

**Athletic Ability**



**APPLY WISDOM  
FOR SUCCESS**



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"Dr. Dunckley's plan is sure to provide relief to a great many children — and their families."  
— CRAIG MALKIN, PhD, instructor in psychology, Harvard Medical School

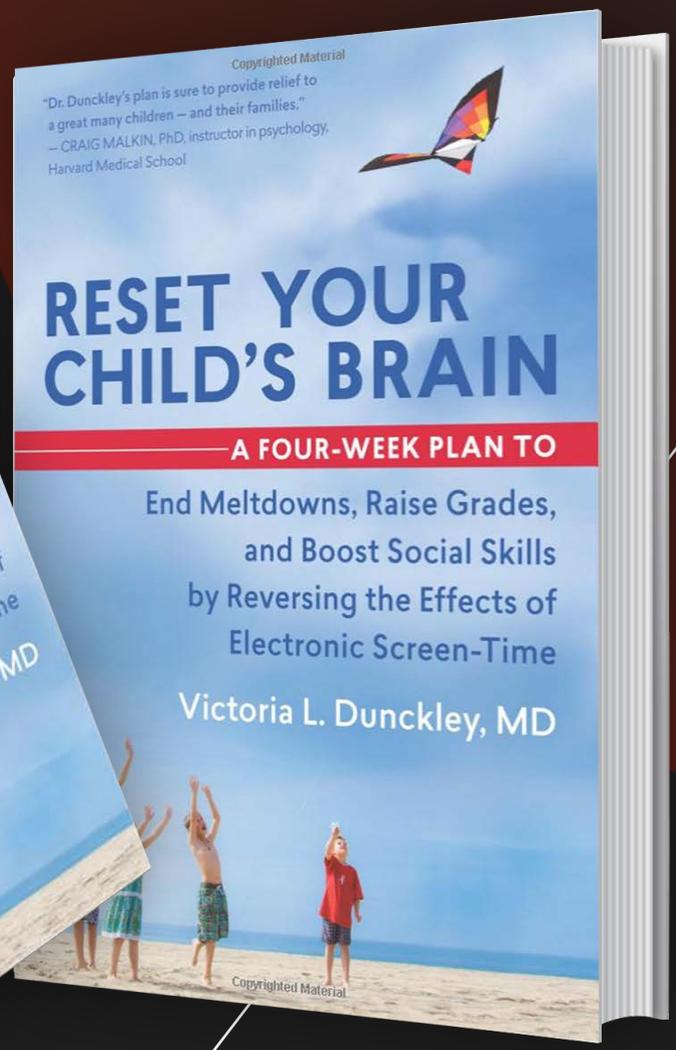
# RESET YOUR CHILD'S BRAIN

**A FOUR-WEEK PLAN TO**

End Meltdowns, Raise Grades,  
and Boost Social Skills  
by Reversing the Effects of  
Electronic Screen-Time

Victoria L. Dunckley, MD

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"Dr. Dunckley's plan is sure to provide relief to a great many children — and their families."  
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# NICHOLAS DOAN

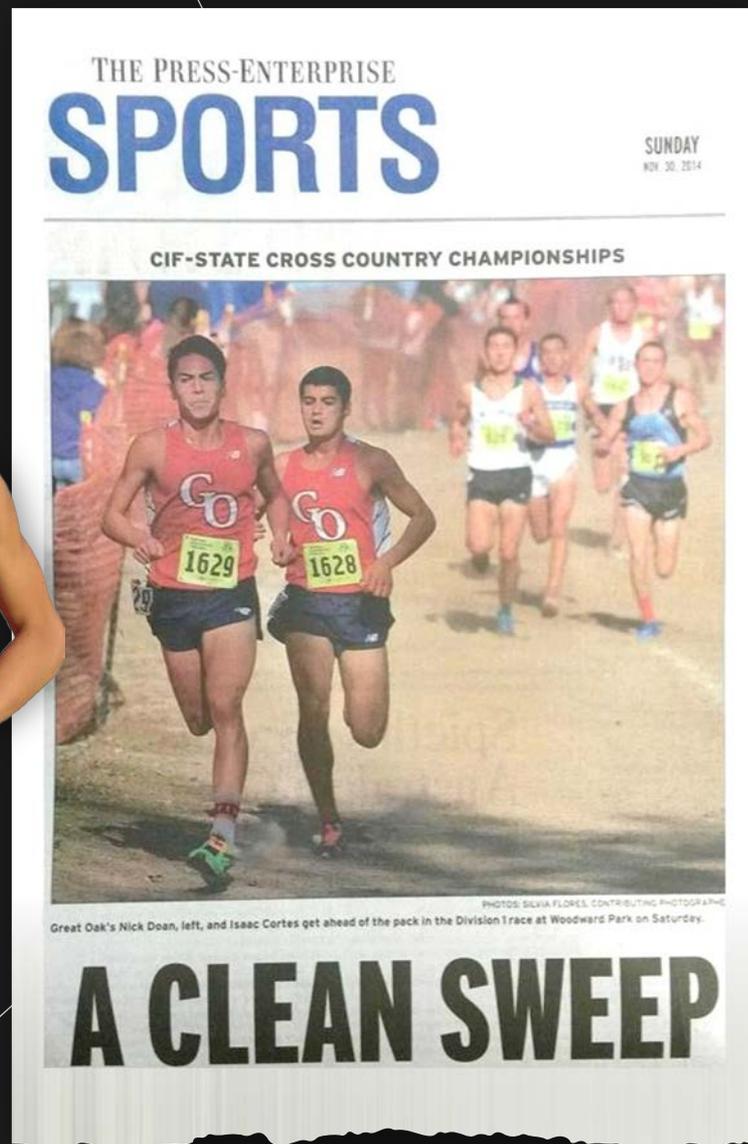


800M **1:55**

1600M **4:11**

3200M **9:05**

3 miles **14:48**





LIBERTY  
UNIVERSITY





Nick Doan



**CONSEQUENCES OF ALL  
ADDICTIONS ARE THE SAME!**

# PROTECT YOUR FAMILY FROM EXCESSIVE DIGITAL MEDIA USE

Establish guidelines on tech storage and use a lock box if necessary.

Limit digital media and gaming to less than one hour daily.

Balance technology use with physical activities. 1 hour of tech with 1 hour of physical activity.

Text less and call people instead.

Do not give smartphones to children under the age of 14. No digital media under age two during critical brain development.

Budget time for daily exercise.

Encourage tech-free zones such as the Bedroom.

Spend face-to-face time with family and friends.

Know the signs and symptoms of digital media addiction.

Only allow mature video games for ages 17+.



# TECHNOLOGY USE GUIDELINES FOR CHILDREN AND YOUTH- HEALTHY TIPS

Developmental Age	How Much?	Non-violent TV	Hand held devices	Non-violent video games	Violent video games	Online violent video games and/or Pornography
0-2 years	None	never	never	never	never	never
3-5 years	1 hour/day	✓	never	never	never	never
6-12 years	2 hours/day	✓	never	never	never	never
13-18 years	2 hours/day	✓	✓	limit to 30 minutes/day		never

Created by Cris Rowan, CEO Zone'in Programs Inc. and author of Virtual Child in conjunction with Dr. Andrew Doan, neuroscientist and author of Hooked on Games and Dr. Hilarie Cash, Director of reSTART Internet and Technology Addiction Recovery Program and author of Video Games and Your Kids, with contributions from the American Academy of Pediatrics and the Canadian Pediatric Society.

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[www.zonein.ca](http://www.zonein.ca)



# THE CONTENT MATTERS, FOLLOW THE RATINGS!



## EVERYONE 10+

Content is generally suitable for ages 10 and up. May contain more cartoon, fantasy or mild violence, mild language and/or minimal suggestive themes.



## TEEN

Content is generally suitable for ages 13 and up. May contain violence, suggestive themes, crude humor, minimal blood, simulated gambling and/or infrequent use of strong language.



## MATURE

Content is generally suitable for ages 17 and up. May contain intense violence, blood and gore, sexual content and/or strong language.

Anderson, C. A., & Bushman, B. J. (2001). Effects of violent video games on aggressive behavior, aggressive cognition, aggressive affect, physiological arousal, and prosocial behavior: a meta-analytic review of the scientific literature. *Psychological science*, 12(5), 353–359. <https://doi.org/10.1111/1467-9280.00366>

Anderson, C. A., Shibuya, A., Ihori, N., Swing, E. L., Bushman, B. J., Sakamoto, A., Rothstein, H. R., & Saleem, M. (2010). Violent video game effects on aggression, empathy, and prosocial behavior in eastern and western countries: a meta-analytic review. *Psychological bulletin*, 136(2), 151–173. <https://doi.org/10.1037/a0018251>

Chang, J. H., & Bushman, B. J. (2019). Effect of Exposure to Gun Violence in Video Games on Children's Dangerous Behavior With Real Guns: A Randomized Clinical Trial. *JAMA network open*, 2(5), e194319. <https://doi.org/10.1001/jamanetworkopen.2019.4319>



# YOUR NEXT STEPS

- 01** Be informed on this topic.  
[www.realbattle.org/resources/](http://www.realbattle.org/resources/)
- 02** Try a digital fast and observe.  
[www.realbattle.org/digital-detox-game-plan/](http://www.realbattle.org/digital-detox-game-plan/)
- 03** Set boundaries and maintain the course. Consider a Life Coach with expertise in gaming and media problems.
- 04** If the digital fast fails, then consider a digital detox camp for kids, detox retreat for adults, or professional mental health intervention for addicts.  
[www.realbattle.org/digital-detox-game-plan/](http://www.realbattle.org/digital-detox-game-plan/)  
[www.realbattle.org/video-game-addiction-survey/](http://www.realbattle.org/video-game-addiction-survey/)
- 05** If you're looking to connect with like-minded families for support, then join our "Problematic Gaming and Digital Media Support Group" on Facebook.  
[tinyurl.com/realbattlegroup](http://tinyurl.com/realbattlegroup)

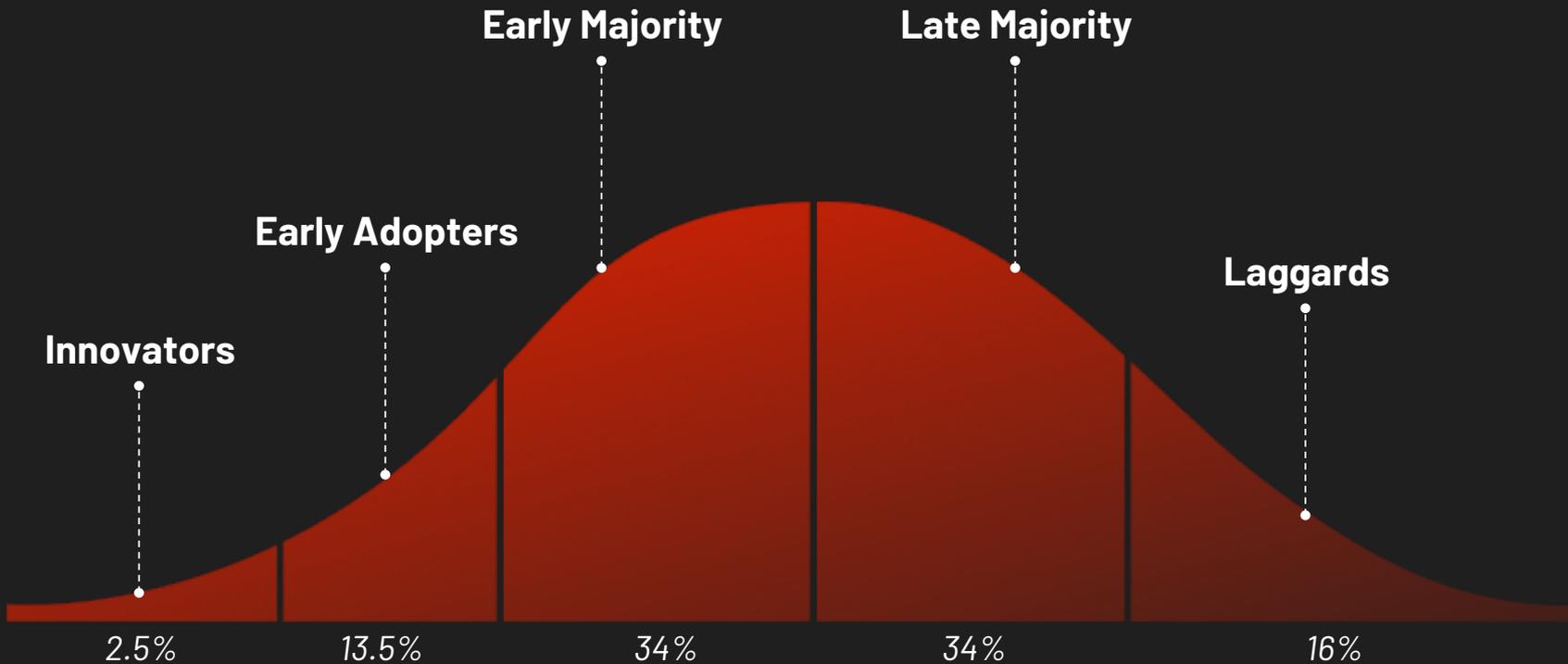


# CONTACT ME

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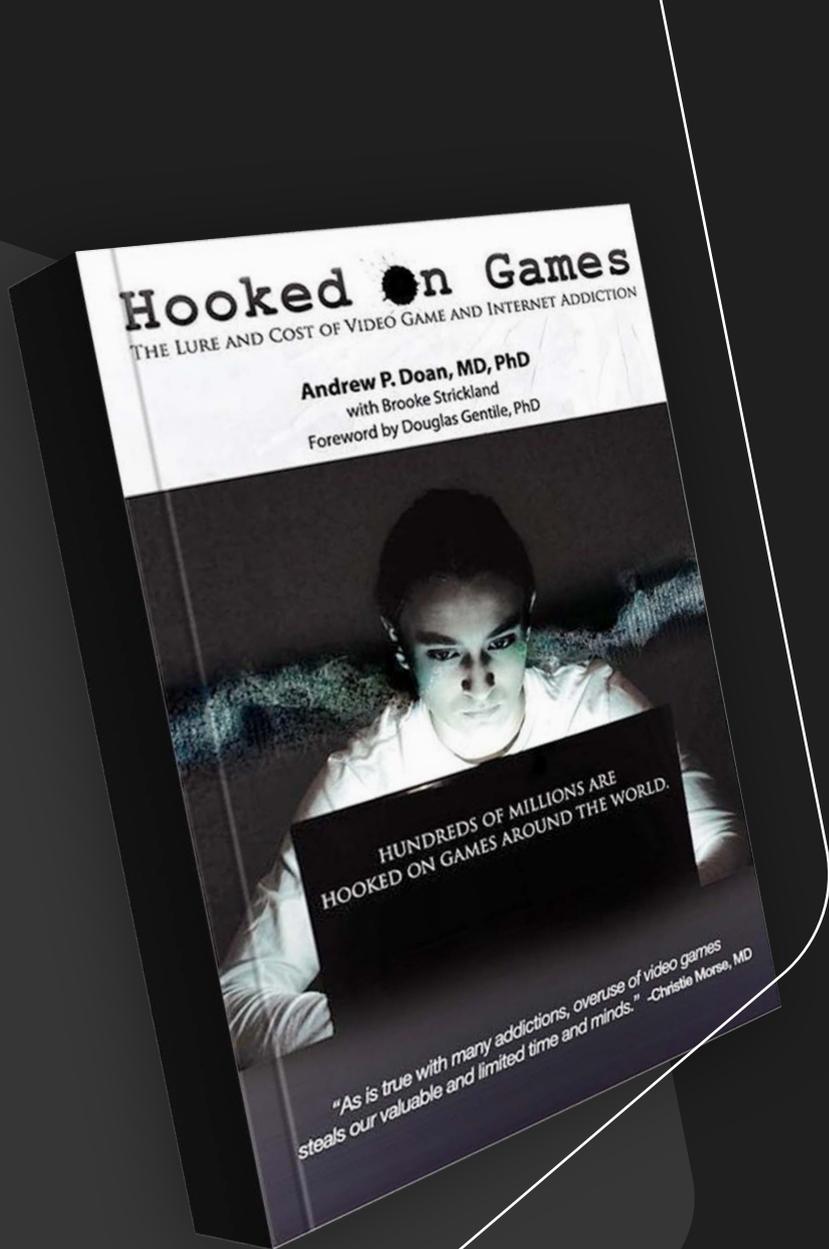
I am available to give this webinar to your circle of influence.



## INNOVATION ADOPTION LIFECYCLE

*Rogers' bell curve*





# THANK YOU AND QUESTIONS?

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review of this talk by going to:



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