The Impact of Electronics on the Developing Brain

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Learning Objectives

- Participants will understand the importance of the developing brain at different stages of life
- Participants will become aware of the research on electronic use and the developing brain
- Participants will be able to provide evidenced based strategies to better support parents and school staff when considering electronic use and children

Disclaimer and Limitations

- Not all electronics are bad. There are many wonderful things that come from devices, telemedicine, smartphones, social media, etc.
- Most of the research with brain scans includes adolescents and adults (ethical issues arise)
- Causation vs. Correlation
- We need more sound research (peer reviewed journals)

[redacted]

Why do I present on this?

"We need to think carefully and critically about how we use screens *with* and *around* young children. Kids can form some unhealthy habits and even a digital dependence on technology, if technology is introduced prematurely, or if it's used excessively, or in isolation."

Kristy Goodwin, Ph.D.

“While healthy and intentional tech use is perfectly fine, we cannot expect children to safely manage screens without first receiving adult guidance. Like learning to drive a car, children require instruction around how to use devices well, instead of getting used by them.”

Greater Good, Berkeley

My Clinical Experience (not all from electronics)

- Past 8 years
  - Increase in behavior problems and aggression in young children
  - Increased delays in language, fine and gross motor skills, and early learning skills
  - Increased IEPs in preschool/Kindergarten
  - Increase in anxiety in children and teens
  - Less creativity and problem solving skills
  - More attention problems and distractedness
  - Increased sleep disturbance
  - Increase in sudden/bizarre behaviors
  - Increase in sensory issues

Screen-Time is Associated with Inattention Problems in Preschoolers: Results from the CHILD Birth Cohort Study

- Tamana, Sukhpreet K.; et al. *PLOS ONE*, April 2019
  - Kids who were exposed to more screen time "showed significantly increased behavior problems at five-years"
  - "Briefly, children who watched more than 2 hours of screen time/day had increased externalizing, internalizing, and total behavior problems scores compared to children who watched less than 20 minutes." Attention problems in particular were apparent in children who had over two hours of screen time each day.

Mobile Media Device Use is Associated with Expressive Language Delay in 18-Month-Old Children

- van den Heuvel, Meta; et al. *Journal of Developmental & Behavioral Pediatrics*, 2019.
  - Toddlers who use mobile devices daily are more likely to experience speech delays, according to an analysis of parent-reported data on 893 children in the greater Toronto area of Canada. While 78% of parents said their kids spent no time on mobile device

Association Between Screen Time and Children's Performance on a Developmental Screening Test

- Madigan, Sheri; et al. *JAMA Pediatrics*, March 2019.
  - The researchers found that kids who spent more time watching screens at ages 2 and 3 did worse on developmental tests at the subsequent time points of 3 and 5 years. "To our knowledge, the present study is the first to provide evidence of a directional association between screen time and poor performance on development screening tests among very young children
  - The researchers suggest that excessive screen time leads to developmental delays, rather than the other way around – negating the notion that children with developmental delays might receive more screen time to manage their behavior

Screen Time

- The Centers for Disease Control and Prevention (CDC) reports that children ages eight to 10 spend an average of six hours per day in front of a screen, kids ages 11 to 14 spend an average of nine hours per day in front of a screen, and youth ages 15 to 18 spend an average of seven-and-a-half hours per day in front of a screen.
- According to the World Health Organization, over 23% of adults and 80% of adolescents are not sufficiently physically active. Our kids are living sedentary lives and the adults in their lives are as well.
- Children as young as 2 years old have their own tablets. The average age of a child getting a smartphone is now 10.3 years old. This is astounding and gravely against recommended ages of screen time according to the American Academy of Pediatric Guidelines.

http://www.theottoolbox.com/symptoms-of-too-much-screen-time/

Adults

- In one survey, nearly seventy percent of kids felt their parents are on their devices too much, suggesting that we are sometimes part of the problem.
  - Recognizing if we habitually turn on a device when bored or fatigued may help break that habit as we develop other ways of coping with these unpleasant emotional states.
- Children unconsciously mirror their parents' behavior in countless ways, so if we want them off their screens more often, that change starts with us.

https://greatergood.berkeley.edu/article/item/how_parents_can_hit_the_pause_button_on_screentime

What is happening when screens take over the balance of play, physical activity, creative play, and imagination?

- Less family interaction
- More frustration
- More stress
- Poor ability to transition between tasks (stopping screen play and moving to a different task)
- Less creative play
- Less imagination play
- Less opportunities for communication and interaction
- Wanting more and more screen time
- Lack of energy
- Poor motivation
- More distracted
- Posture issues
- Difficulty with pinch and grip strength and dexterity
- Eye tracking and shift difficulties

https://www.theottoolbox.com/symptoms-of-too-much-screen-time/

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Why should we be paying attention to our children's electronic use?

- Birth to 3, brain is 90% developed
- Birth to 6 is the sensitive period
- 11-13 the brain is pruning
  - https://www.youtube.com/watch?v=0O1u5OEc5eY

- 25-30 brain is fully developed
  - Frontal Cortex
  - Emotional Regulation
  - Planning and Organizing

[redacted]

Pruning- Dr. Dan Siegel

Research

- There is **not one credible research study** that shows that a child exposed to more technology earlier in life has better educational outcomes than a tech-free kid.
- There is **some** evidence that screen-exposed kids may have some increased pattern-recognition.
- **Brain-imaging research** is showing that glowing screens-like those of iPads-are as stimulating to the brain's pleasure center and as able to increase levels of dopamine (primary feel-good neurotransmitter) as much as sex does.
- **Recent brain-imaging studies** conclusively show that excessive screen exposure can neurologically damage a young person's developing brain in the same way that cocaine addiction can.
- **Children of addicts** are eight times more likely to develop an addiction problem. Merikangas, K. R., Stolar, M., Stevens, D. E., Goulet, J., et al. (1998)

Research cont.

- When we examine how social media behaviors correlate to mental health symptoms, research shows that there's a connection between more time spent using social media and an increase in mental health symptoms.
  - It's not simply a matter of *if* young people use social media, but more a matter of *how much time* they're spending with it.
- In one study students in 8th grade who spent more than 10 hours/week on social media were 56% more likely to report being unhappy than those who spend less time.
- Research also shows that when users are emotionally invested in social media it is also strongly correlated with higher levels of anxiety.
- **At this stage, it remains unclear as to whether social media is *causing* negative outcomes, or whether children with mental health issues are turning to social media to alleviate or manage their symptoms.**

Sleep (Dr. Kristy Goodwin)

The current sleep crisis facing young people

25% OF TEENAGERS REPORTED SUFFICIENT SLEEP ON SCHOOL NIGHTS[1]

20% OF TEENAGERS FELL ASLEEP IN CLASS AND 18% WHILST STUDYING[2]

THE AUSTRALIAN CHILD HEALTH POLL REVEALED THAT ALMOST HALF OF ALL CHILDREN (43%) USE DIGITAL DEVICES BEFORE BEDTIME AND ONE IN FOUR OF THESE CHILDREN (26%) REPORT HAVING SLEEP PROBLEMS

STUDIES HAVE SHOWN THAT 70% OF 14-YEAR-OLD GIRLS GET INSUFFICIENT SLEEP, MOST OF THEM RECORDING FEWER THAN EIGHT HOURS/NIGHT[3]

ABOUT 15% OF TEENS SLEEP FOR ONLY FIVE HOURS EACH NIGHT (8-10 HOURS/NIGHT IS RECOMMENDED)

45% OF TEENS AGED 14 TO 16 REGULARLY SENT TEXTS AFTER 3AM[4]

54% OF TEENS ADMIT THEIR SLEEP IS BEING INTERRUPTED BECAUSE OF ALERTS/NOTIFICATIONS[5]

51% OF TEENS SAY THEY ARE WAKING UP TO CHECK SOCIAL MEDIA[6]

36% OF TEENS WAKE UP AND CHECKS THEIR MOBILE DEVICE FOR SOMETHING OTHER THAN THE TIME AT LEAST ONCE A NIGHT[7]

75% OF TEENS AGED 14-16 SEND TEXTS AFTER MIDNIGHT[8]

STUDIES HAVE SHOWN THAT EVEN 30 MINUTES OF MISSED SLEEP CAN RESULT IN AN IQ DIFFERENCE OF TEN POINTS.[9]

Dopamine

- **Dopamine**– neurotransmitter that is central in our drive for personal reward (wanting, craving, seeking)
- When teens take part in stimulating or potentially addictive habits (gaming, social media, pornography) there is a flood of dopamine in the brain.
- Teen brains are most sensitive to dopamine at around age 15 and react up to four times more strongly to images perceived as exciting

Dan Siegel, M.D., Brainstorm

The Developing Brain and Pornography

- A teen's brain is at its peak of dopamine production and neuroplasticity, making it highly vulnerable to addiction and rewiring as their brain is not yet finished developing
- Porn use, like other addictive behaviors, overstimulates the reward circuits in the brain
- Exposure to sexually pornographic material is correlated with:
  - Concentration problems
  - Low motivation
  - Depression
  - Social Anxiety
  - Negative Self-Perceptions
  - Erectile dysfunction

Pornography

- A recent report by the internet security company Bitdefender claims that **one in ten of visitors to porn sites is under the age of 10.**
  - The research shows that, unless they are carefully supervised by their parents, children start visiting porn websites from an early age
- An empty browser history is also one of the *signs a child is viewing porn*
- Switching screens *is one of the signs a child may be viewing porn*
- Children who have been repeatedly exposed to pornography **may even act out sexually.** *Reports of child on child sexual abuse have risen drastically over the last several years*
- *Roblox, TikTok, Instagram, Snapchat, Gaming and Headset, Youtube, Fortnite*

Pornography

- Pornography exposure, especially for young, pre-adolescent children, can have catastrophic and life-long impacts on a child's social and emotional wellbeing. The research is confirming that there are very really harms associated with pornography exposure(Sitharthan G & Sitharthan T 2011).
- The basic problem is that our kids can't un-see something.

https://drkristygoodwin.com/pornography-in-their-pockets-young-kids-access-to-pornography/

Warning Signs to look for in children and teens

- Sadness or hopelessness
- Low self-esteem
- Sluggishness (less active)
- Substance abuse
- Spending more time alone (this includes time alone from parents and time away from their regular friends)
- Decrease in desire to do things they used to like to do (sports, activities, hobbies)
- Physical ailments (headaches, appetite problems, sleeping problems)
- Problems in school (falling grades, getting into trouble, not paying attention in class)
- Talking about death or suicide (never to be taken lightly)
- Not caring about appearance
- Running away from home

Complete list of warning signs of screen media obsession:

- **Unsuccessful Control**
  - *It is hard for my child to stop using screen media.*
- **Loss of Interest**
  - *Screen media is the only thing that seems to motivate my child.*
- **Preoccupation**
  - *Screen media is all my child seems to think about.*
- **Psychosocial Consequences**
  - *My child's screen media use interferes with family activities.*
- **Serious Problems Due to Use**
  - *My child's screen media use causes problems for the family.*

Complete list of warning signs of screen media obsession:

- Withdrawal
  - *My child becomes frustrated when he/she cannot use screen media.*
- Tolerance
  - *The amount of time my child wants to use screen media keeps increasing.*
- Deception
  - *My child sneaks using screen media.*
- Escape/Relieve Mood
  - *When my child has had a bad day, screen media seems to be the only thing that helps him/her feel better.*

American Academy of Pediatrics

- The original official policy of the AAP (made in 1999 and reaffirmed in 2011) states that "**pediatricians should urge parents to avoid television [or other media] viewing for children under the age of two years.**" **Children between 2 and 5 should be limited to "no more than 1 hour per day."**
- In 2016 they issued a policy adjustment stating that **pediatricians should discourage any media use under the age of 18 months, except for video-chatting.** Between 18 and 24 months, if a parent wants to introduce screen media, then they should choose high-quality apps and use it **together** with their toddlers.

Strategies for Parents and Educators

Shaming Language

"I can't believe you did this!"

"I'm so disappointed in you! Only bad kids get into stuff like this."

"What made you think this was okay?"

Helpful Behavior-Changing Language

"I'm sorry you were faced with this. What are some of the consequences of your decision?"

"Help me understand – how did you feel when you decided to do this? How did you feel after?"

"It is hard to know what to do in situations like this. If you could do this over, what do you think you'd do next time?"

Set Limits

- **Some examples might include:**
  - No gaming, social media, etc. during the week and have limits on the weekend
  - For younger, set a timer and when it goes off they have to get off the electronic device
    - KNOW there will be tantrums with young children and possibly teenagers, so this will take patience and practice
  - **Limit your own electronic use**
    - We have to model healthy behaviors
      - Electronics, dieting, exercise, respect towards self and others, overall health, emotions, etc.

Strategies for Parents

- **Remove the TV from the bedroom.** Take the TV out of your room and your child's room. Screen time at bedtime has been shown to influence sleep patterns and lead to less sleep and increased behavior problems.
- **Ban electronics from the dinner table.** Make mealtime an electronics-free zone – no TV, no smartphone, no tablet on the table. Eating with screens on makes you more likely to consume more calories and less likely to have a conversation with your child.

Strategies for Parents

- **Put limitations on screen time.** Limit as much screen time as possible – ideally no more than one hour per day. The more our children use electronics, the less physical activity they do. Fight the boredom by making a list of things to do to keep the kids occupied.
- **Set aside play time.** Show your child he or she is more important than the screen, and do things the old-fashioned way. Play with your kids, and let their imaginations run wild. Take them to the park, a museum or help them build a fort in the living room.

Strategies for Parents

- **Get interactive with your children.** There *are* times when screens are OK, but if you're going to use electronics, use them together as a family in an interactive way.

Create a Contract Together

- Just the act of creating an agreement together is a major positive step. Making the agreement requires calm family talks which lead to a definition of values, setting of goals, and determination of usage limits.
- Make sure to get your kids' input.
- Consider sharing something you as a parent are trying to change such as your phone distraction at the dinner table. The more it is not about you vs. them, the better.

https://www.screenagersmovie.com/contracts

Family/Classroom Screen Time Agreement Template and Ideas

- **Defining Your Family's/Class's General Principles**
  - **Parents/Teachers**: Think about your "why"
- **Defining Family/Class Rules**
  - Morning/Afternoon Time
  - Meal times — Are devices allowed at the table? Breakfast? Dinner?
  - Night power-down — When to turn off screens/phones before bedtime
  - Bedroom — Screens in the bedroom? If so, all the time? Are phones allowed in the bedroom?
  - Cars — May non-drivers be on their phones?
- **Establishing Incentives and Consequences**
- **Allow wiggle room**

https://www.screenagersmovie.com/family-contract

Intentional (Joint Media Engagement)

- "Co-viewing" Movies, videos, video games
  - The Center on Media and Child Health explains that co-viewing reduces fear and aggression, while increasing learning and discussion.
    - On average, it took 41 minutes and 44 seconds for students to master Algebra skills during the Washington State Algebra Challenge using the DragonBox App
    - Montessori Crosswords on the iPad
- Strong parental monitoring of screen time all on its own correlates with better academic, social and even physical outcomes in children
  - Teens report feeling "relieved" with parental monitoring

- Executive function-based self-management skills—such as the ability to delay gratification, plan ahead, and control impulses—are crucial building blocks of resilience
- One-time, early-childhood measures of these self-management skills correlate with later measures of achievement and well-being, including better test scores in high school, improved odds of graduating college on time, less likelihood of obesity as an adult, and even a higher adult income.
- In contrast to free play, video games rely on the game creator's imagination (not the child's) and promote a type of rapidly shifting attention, making it harder for children to focus in the real world.

Resources to Share with Families

- Screenagers
- Social Dilemma on Netflix
- Trainings with Kristy Goodwin, Ph.D.
- Officer Gomez- Resource Officer who shares social media research
- Monitoring Apps
  - Stay Focused:
    - https://play.google.com/store/apps/details?id=com.stayfocused&hl=en_US&gl=US
  - Bark:
    - https://www.bark.us/?utm_source=aw&utm_medium=paid-search&utm_campaign=website-branded-google&utm_term=bark%20app&gclid=Cj0KCQiAyJOBBhDCARIsAJG2h5fPJvsjM-KuG3eA0cAMINN02j9K2fcR7k-7K0Iu-ZPSwv3MAQ4vi50aAvX-EALw_wcB
  - Circle
    - https://shop.meetcircle.com/products/limit-screen-time-parental-controls?utm_source=Google&utm_medium=SEM&utm_campaign=1747459817&utm_content=c-340286105474&utm_term=circle%20app-e&gclid=Cj0KCQiAyJOBBhDCARIsAJG2h5d4Ws3yv7iFEcUgSkJqJj6DPZAd6TU3nVNSOXHTw0I1Su158UG1nB0aAocSEALw_wcB

Research on Sensory, Play, and Movement

- 30 years of research say YES to recess
- Children need hours of free play on challenging equipment that stimulates their sensory systems, challenges physical strength and coordination and facilitates motor planning
  - Free play stimulates the vestibular system
- American Academy of Pediatrics
  - "Recess time is a crucial and necessary component of a child's development."
  - AAP does not recommend withholding recess as a punishment
- Children who engage in more physical activity and play do better academically than children who sit in the classroom all day/spend more time on electronics. Dr. Debbie Rhea, Director of Liink

Kristy Goodwin, Ph.D.

- "Kids need boundaries around tech time. Parents need to be the **pilot** of the digital plane, **not the passenger**. Parents need to set boundaries, basic needs and boredom (3 B's)."
  - No child/teen will be happy with limits and boundaries, and this is ok because we are not their friends, we are their parents. Tantrums and anger are normal.
  - If sleep, eating, exercise, etc. is being impacted from tech time then their basic needs aren't being met
  - The brain needs to be bored in order to build their imagination, sensory needs, and problem solving skills

Reset the Brain- Dr. Duncklеy

Reset the Brain

- **4-week Reset Program**
  - 1 week of planning
  - 3 weeks of electronic fast

- **Steps to prepare for the fast**
  - Define problem areas and target goals
  - Get everyone on board
  - Set a date and create a schedule
  - Inform relevant adults in your child's life
  - Obtain toys, games, activities to replace screen
  - Schedule breaks for yourself
  - Join with other parents, if possible
  - Inform your child and involve the entire family
  - Perform a thorough "screen swap"
  - Set your intention

Results??

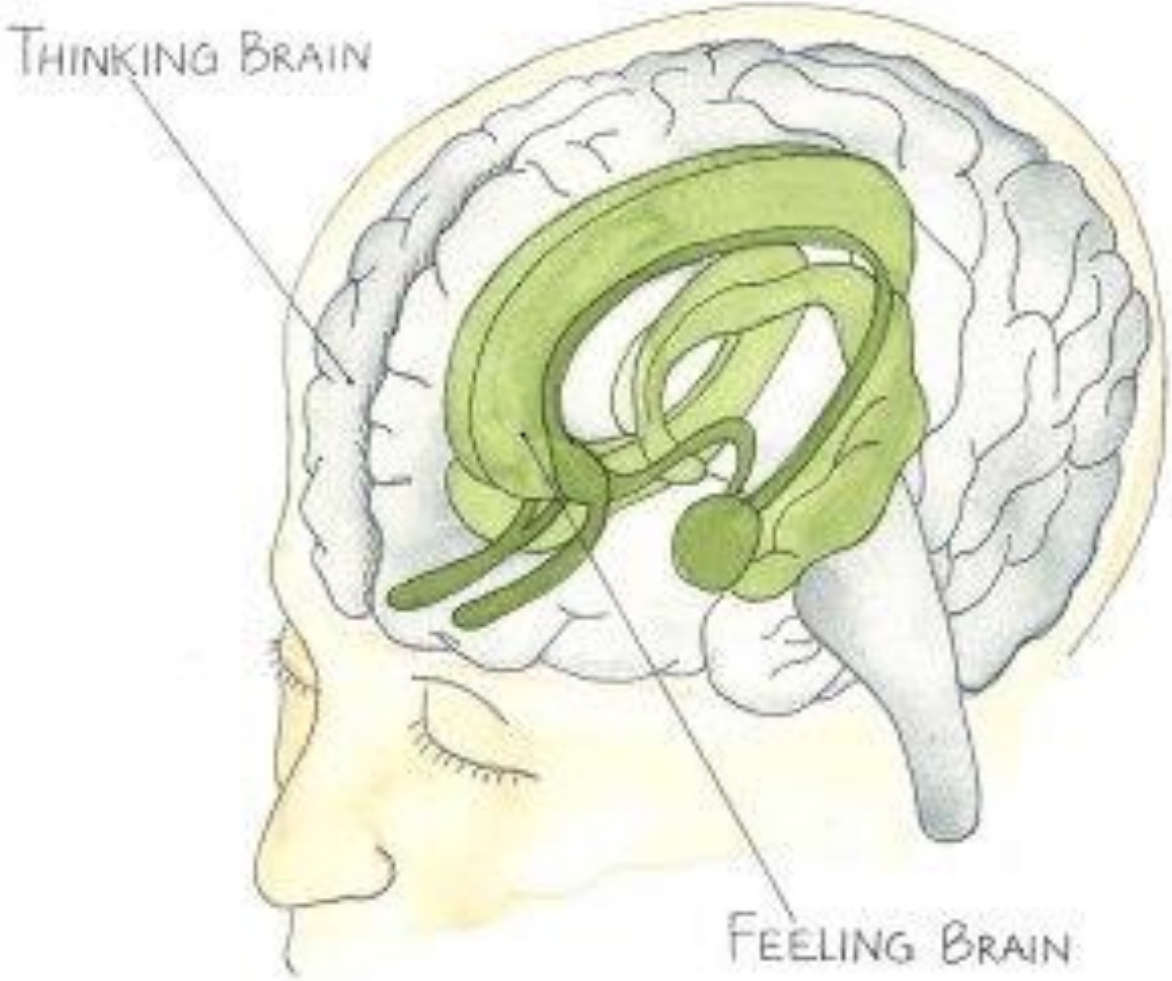
- Within Days
  - Child is initially angry, defiant, tearful
  - Child's mood/attitude begins to improve
  - Sleep improves
  - Play begins to be more creative
- Within Weeks
  - Meltdowns become less frequent/severe, or both
  - Mood/attention/grades improve
  - Sleep deepens
- Within Months
  - All areas continue to improve, social improvements are more apparent, child is more self-aware,

Conclusions

- Our children/teens want US. Our attention, love, respect, and clear-consistent boundaries
- Children/teens want us to validate their feelings and want us to handle their big feelings
- If all else fails, PLAY! Be silly with your child, get on the floor, look them in the eye and tell them how wonderful they are.
- Do NOT take their emotional outbursts/mean words personally. Children/teens react from the emotional brain.

- **REMEMBER!!** Birth to 3 the brain is 95% developed, changes occur rapidly, so there are small windows throughout where these factors are SO important.

Use your Thinking Brain!



If you don’t use it you LOSE it!

Websites

- https://protectyoungminds.org/2017/07/20/can-kids-hide-internet-history/
- https://handsonotrehab.com/screen-time-brain-sensory-processing/
- https://medium.com/@richardnfreed/the-tech-industrys-psychological-war-on-kids-c452870464ce?_ke=eyJrbF9lbWFpbCI6ICJpbmRpYW9yZW5AZ21haWwuY29tIiwgImtsX2NvbXBhbnlfaWQiOiAibXk3NXk2In0%3D
- https://www.screenagersmovie.com/
- https://drkristygoodwin.com/updated-screen-time-guidelines-what-parents-really-need-to-know-2/

Resources

- https://us2.campaign-archive.com/?u=6cac3885738ad9ca3a8b7da88&id=c528b72afa&e=43d2d9b0c6
- https://www.teensafe.com/blog/web-pornography-addiction-affects-teenage-brain/
- https://journalistsresource.org/studies/society/public-health/screen-time-children-health-research/
- https://m.youtube.com/watch?feature=youtu.be&v=j_wTkAxMm_Q
- Glow Kids: How Screen Addiction Is Hijacking Our Kids-and How to Break the Trance-by Nicholas Kardaras
- Reset Your Child's Brain: A Four-Week Plan to End Meltdowns, Raise Grades, and Boost Social Skills by Reversing the Effects of Electronics- by Victoria L. Dunckley MD

THANK YOU!

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