Screen Time, The Pandemic, and Development: *What SLPs Need to Know*

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My Goal is for You to Leave This Presentation…

1. Informed about the increases in speech-language disorders and Autism.

2. Passionate about the importance of conversational turns and play.

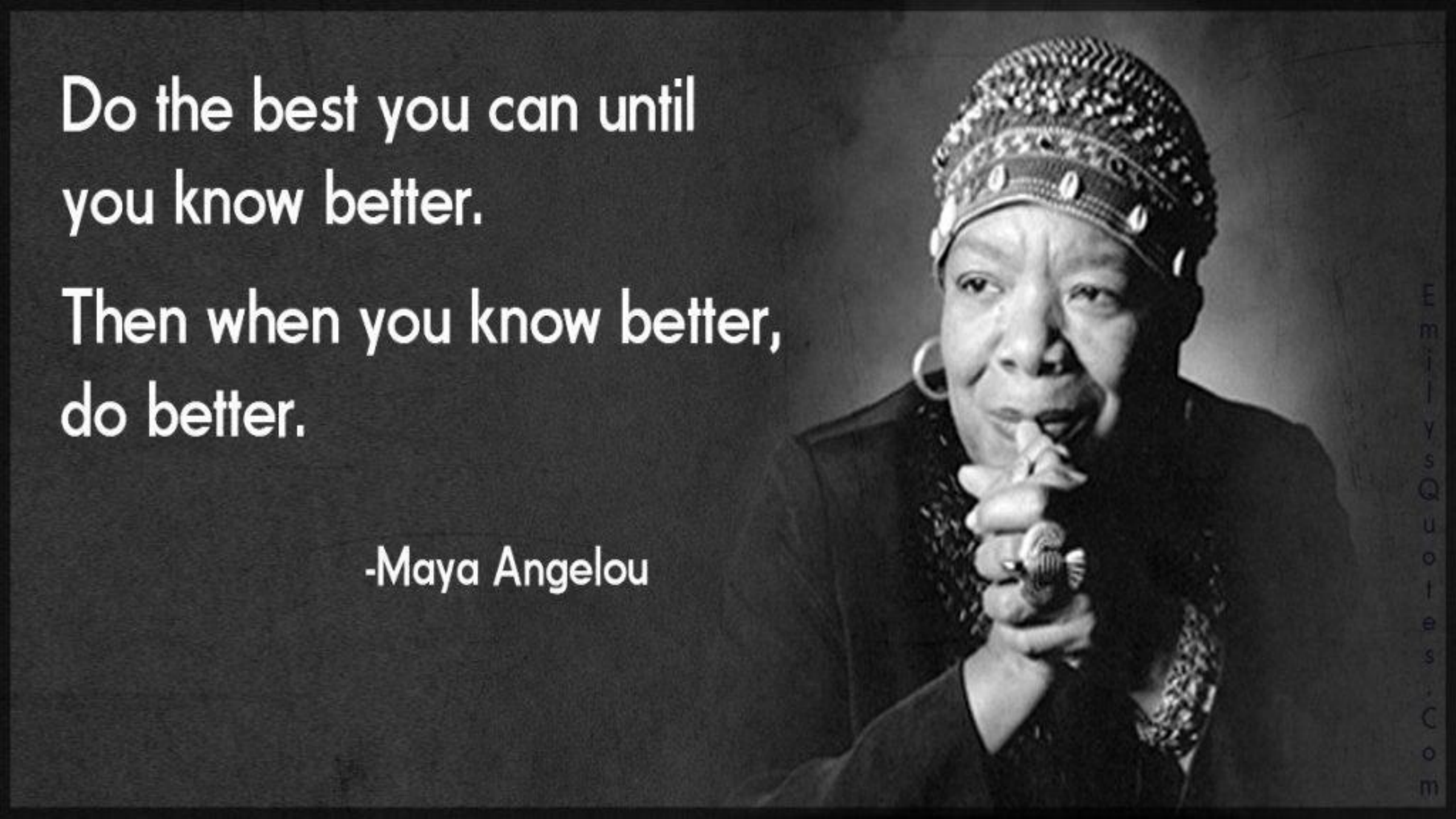
3. Familiar with the data on screen time and child development.

4. Eager to apply what you've learned to support families.

Do the best you can until
you know better.

Then when you know better,
do better.

-Maya Angelou



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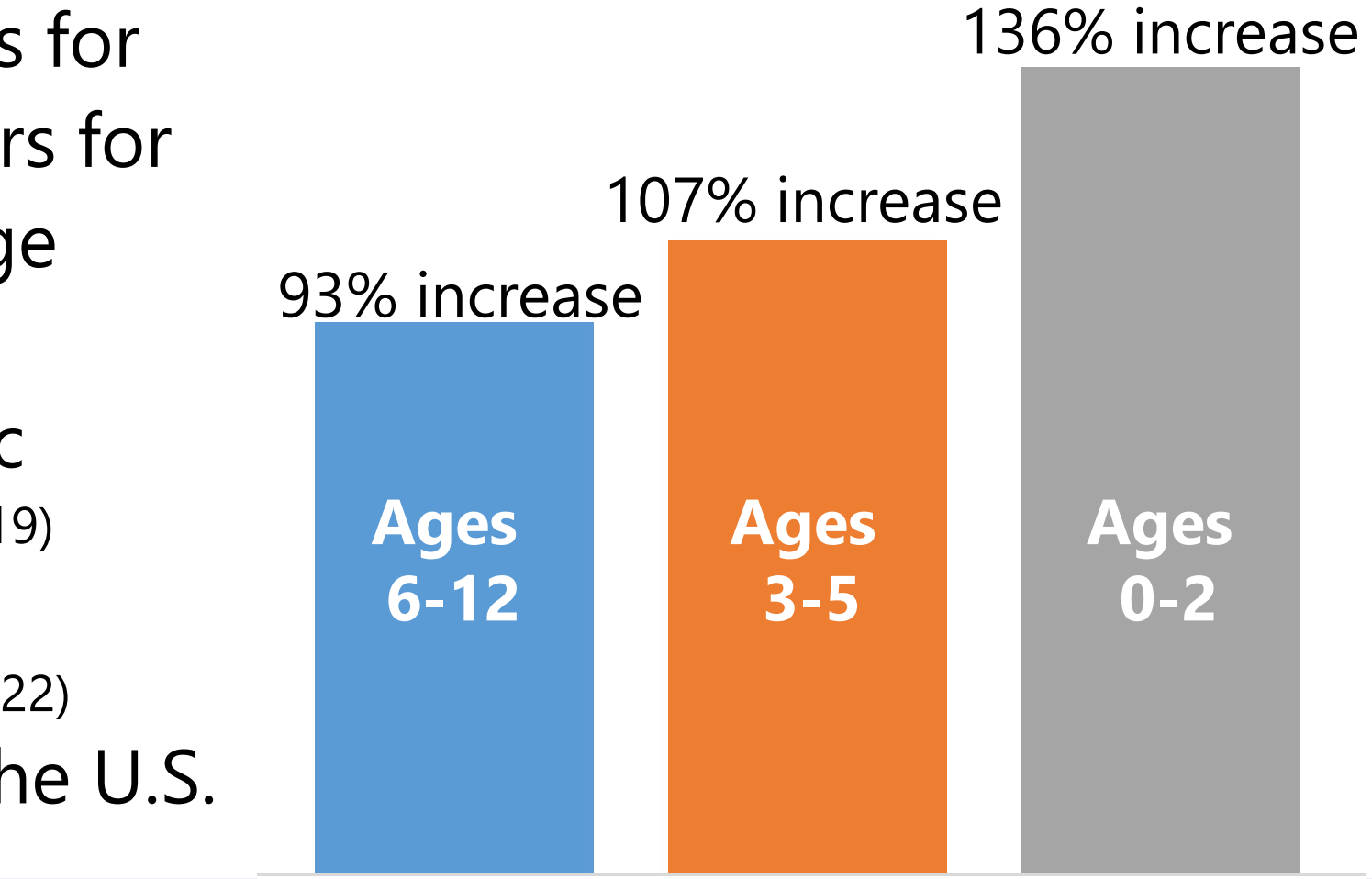
Has there been an increase in disorders of speech and language from pre to post pandemic?

Increases in Speech-Language Disorders

(Kahn, Freeman, & Druet, 2023)

New ICD-10 diagnoses for developmental disorders for speech and language increased 110% from pre-pandemic (January 2018-December 2019) to post-pandemic (January 2021 – December 2022) for children birth-12 in the U.S.



Rates of Autism in the United States (CDC)

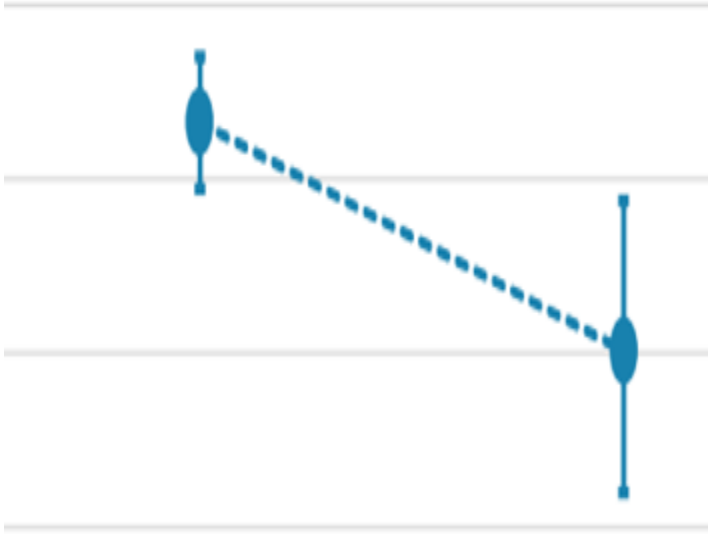
1 in 150	1 in 44	1 in 36
Year Reported 2007	**Year Reported 2021**	**Year Reported 2023***
Survey Year 2000	Survey year 2018	Survey year 2020*
		*320% increase from survey year 2000

*Pandemic began March 2020

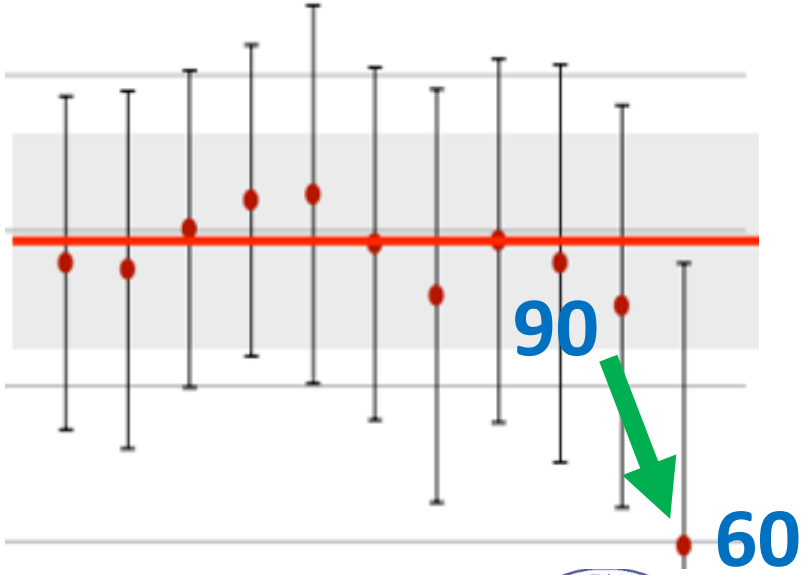
Longitudinal Data
(Deoni et al., 2022)

A year into the pandemic, the average performance of 1,700 children ages 3 months - 3 years of age was the **lowest it had been since researchers began tracking it in 2010** with an average decrease of 24.6 points across composite values (cognition, verbal development, and nonverbal development).

Two-year-olds decreased conversational turns from 35-50 exchanges to 15-25.

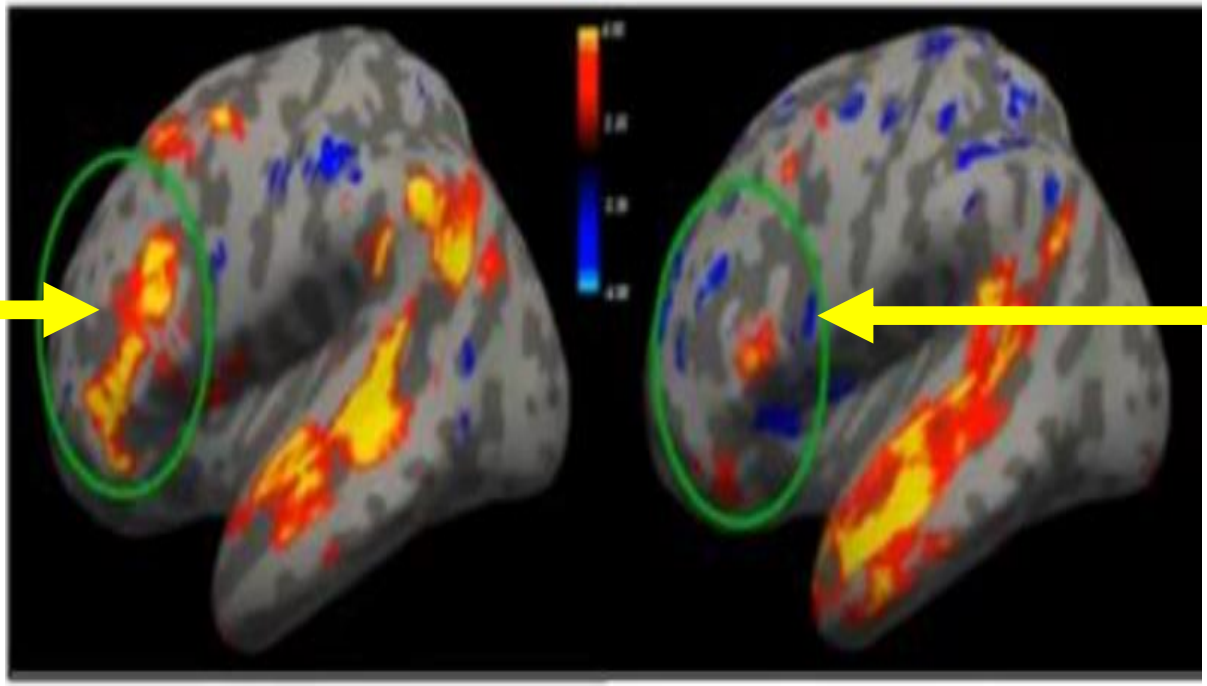


Children one year of age when the pandemic began had a significant decrease in verbal scores (standard score of 90 to 60)



The greater the **conversational turns**, the greater the verbal abilities regardless of socio-economic status or the volume of adult speech and conversational turns support cortical growth in language and social processing regions of the brain (Romeo, 2018, 2021).

1,220 turns per day
Verbal score = 121



580 turns per day
Verbal score = 90

The Language Environment

A child's language environment is a critical factor for brain maturation.

Beyond the quantity and linguistic quality of home language input (Rowe and Snow, 2020; Rowe and Weisleder, 2020), **social-interactional variables** are increasingly viewed as important **predictors of early and longer-term language achievement** (Tamis-LeMonda and Bornstein, 2002; Hirsh-Pasek et al., 2015; Gilkerson et al., 2017, 2018; Tamis-LeMonda et al., 2019), **as well as language-related brain structure** and function in childhood (Romeo et al., 2018, 2021).

The Language Environment in PreK (Duncan et al., 2022)

- Children engage in **73% more conversational turns at home** than in traditional early childhood childcare environments.

- 20% of children are in **language isolation**, experiencing **fewer than five turns per hour** for most of their school day.

- Per year, some children may experience an estimated **25,000 fewer conversational turns** than their classmates.

- The difference in pre-k classrooms with higher amounts of conversational turns over the preschool year is around **2 million words**.

Conversation creates a language rich environment.

Play is a language rich experience.

Through play children begin to…

- apply their newly acquired language skills,
- learn cognitive and higher-level language skills including
  - imagining,
  - problem solving,
  - making up stories,
  - vocabulary use,

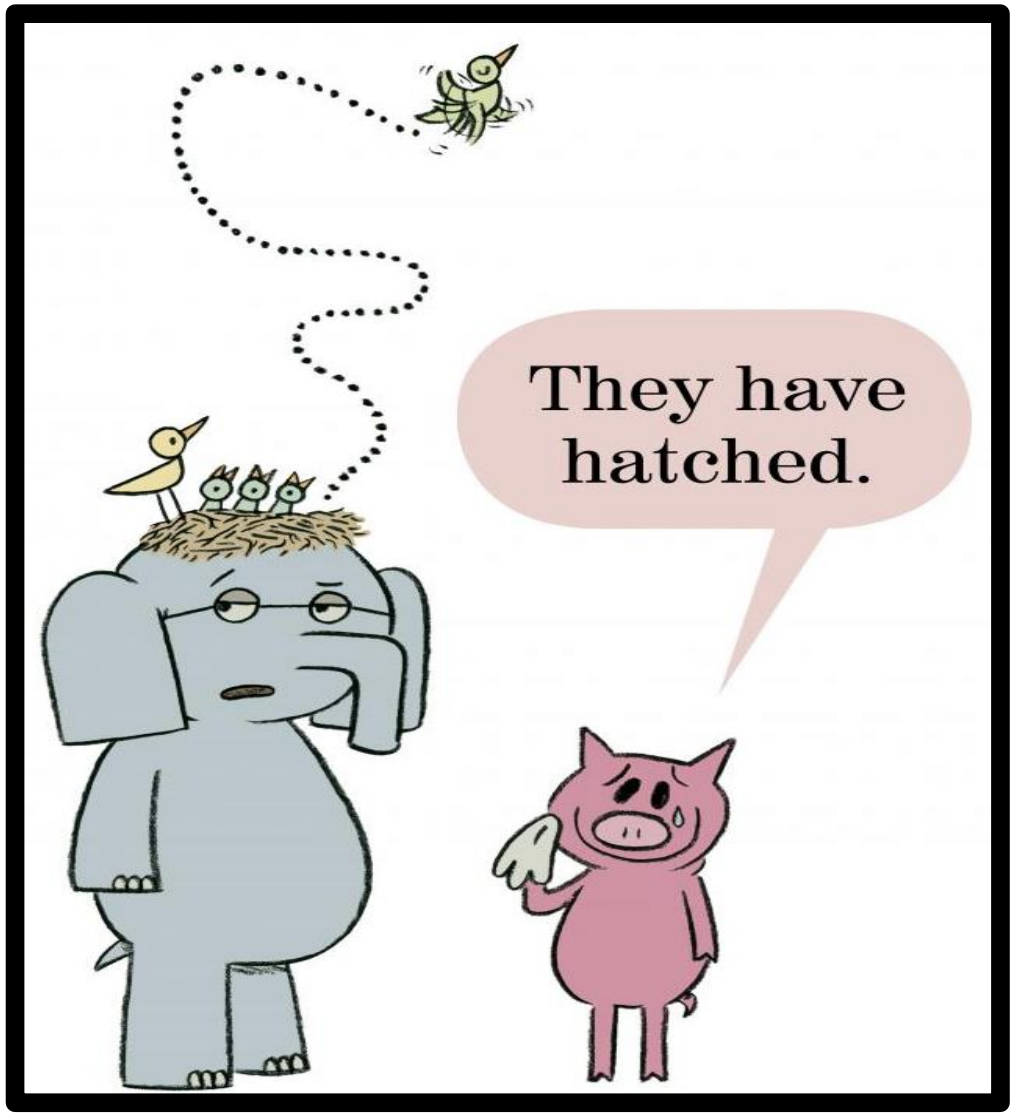
…….as well as…….

Perspective Taking

The foundation for perspective taking is built through pretending, playing, conversing, and engaging with other humans.

Pretend play requires the ability to think about yourself as a "different self" as well as being aware of the thoughts and emotions of others.

Reading comprehension
requires the ability to understand the perspective of characters, to recognize their emotions, and make inferences about characters' thoughts, emotions, intentions, and actions.



Imagining and Decontextualization

Decontextualization is

- talking,
- thinking,
- reading about, and
- imagining things outside of the here and now.

Preschool children's use of decontextualized language is **predictive of their kindergarten readiness** (Westby, 2021).

History, geography, and literature are all "make-believe" as these are conceptual constructions that are **never directly experienced** by the child (Smilansky, 1968).

Developmentally appropriate play is the singular opportunity to promote the

social-emotional,

cognitive,

language,

and self-regulation skills

that build executive function

and a prosocial brain

that is ready for academic learning (AAP, 2018).

Play is so powerful
it can be used
as an intervention
to close gaps for children
between the ages of 3 to 6
(Parker & Thomsen, 2019).

Do you assess or write goals for play?
If not, why not?

The Disappearance of Play

- From 1998 to 2010, the percentage of classrooms with a dramatic play area dropped from 90% to 58% (Bassok, Latham, & Rorem, 2016).

- Many classrooms are sacrificing the discovery and critical thinking skills that arise through play in favor of academics **despite early social skills being an important predictor of students' learning trajectories** (Bassok, 2016).

Play Provides the Opportunity to Develop Executive Function

- **Cognitive Flexibility** = **Problem Solving and Perspective Taking**
  - thinking about something in multiple ways and perspective taking (e.g., considering someone else's perspective on a situation or solving a problem in multiple ways).

- **Working Memory** = **Multi-Tasking**
  - keeping information in mind and manipulating it in some way.

- **Inhibitory Control** = **Social-Emotional and Impulse Control**
  - deliberately suppressing attention (and subsequent response) to something such as ignoring a distraction, stopping an impulsive utterance or action, or overcoming a highly learned response.

Inhibitory control has a very **steep developmental slope between 3 and 5 years of age** (Rosas et. al., 2019; Best et al., 2009; Best & Miller, 2010).

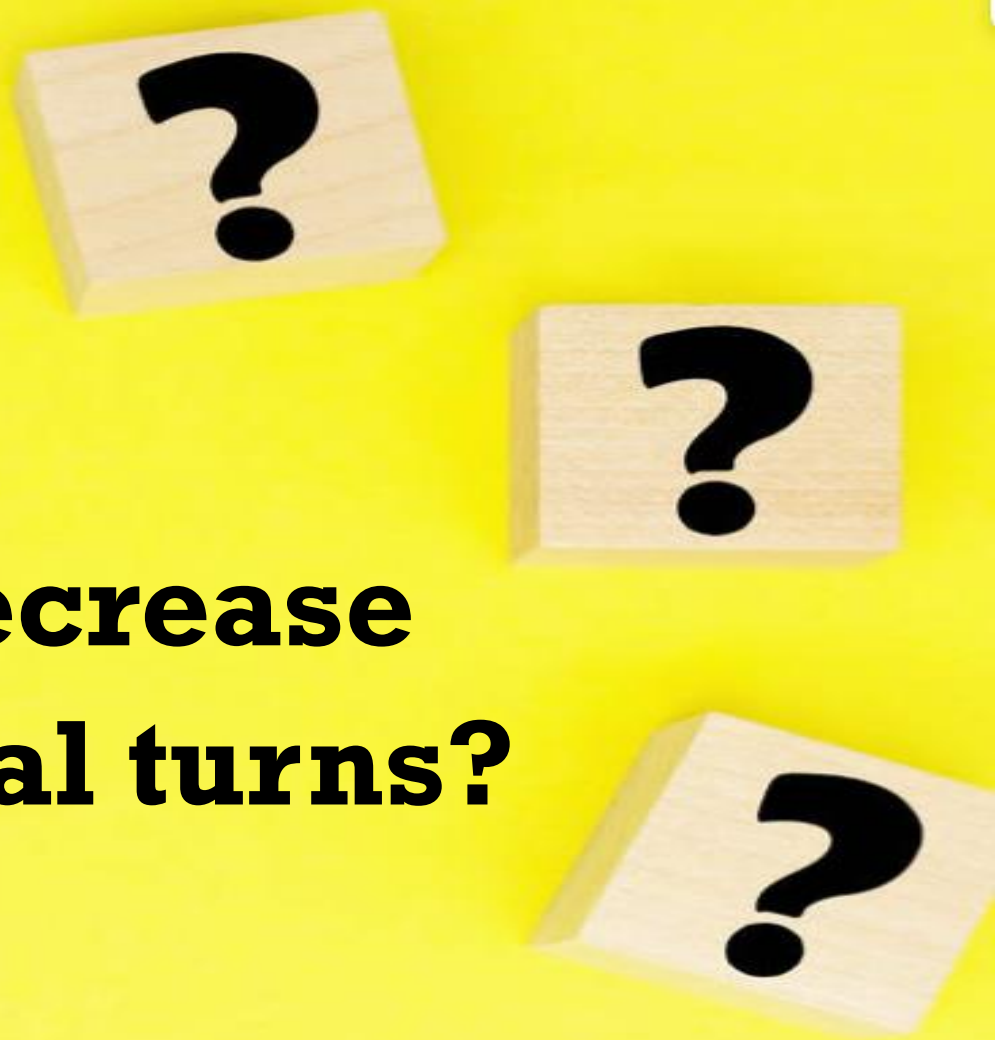
Which of These Is Not Necessary to be Ready and Available to Learn?

- Perspective taking
- Problem solving
- Thinking about a problem in multiple ways
- Identifying the problem
- Remembering information
- Storing information for quick retrieval
- Self-monitoring
- Completing multiple steps or applying multiple skills at one time (e.g., writing)
- Controlling impulses
- Paying attention
- Ignoring distractions
- Regulating emotions
- Planning
- Time management

Adults and Play

- **Children are not born with Executive Function skills - they are born with the potential to develop them.**
- iPads are the new pacifiers (Wolf, 2018).
- Teacher training

Adults play a critical role in the development of Executive Function skills through play,
first by helping them complete challenging tasks, and then by gradually stepping back to let them manage the process independently and learn from their mistakes (Center on the Developing Child at Harvard, University, 2014).

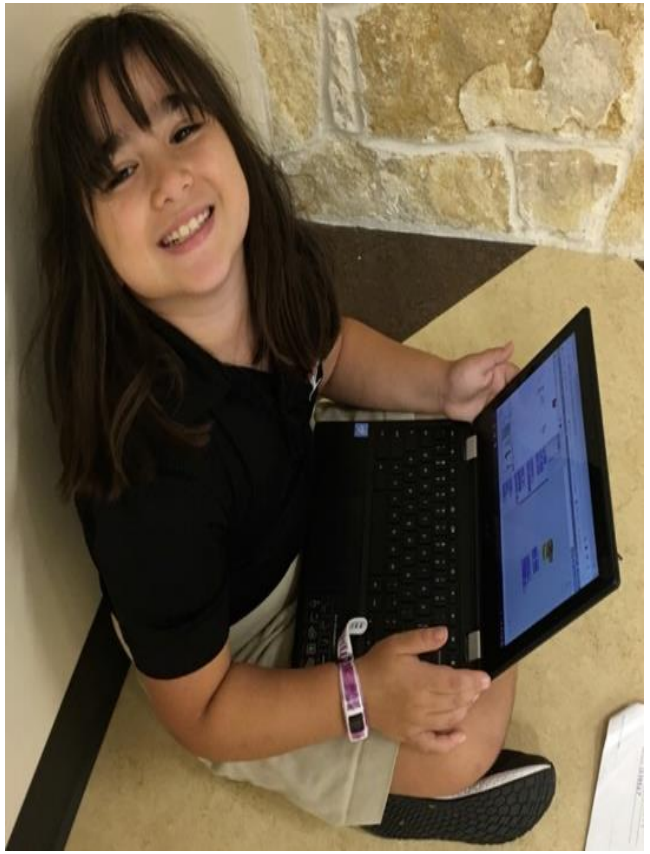


Why are we seeing a decrease in play and conversational turns?

A meta-analysis based on 29,017 children revealed that daily screen time **increased from 1.4 hours** pre-pandemic **to 2.7 hours** during the pandemic (Plamondon et al., 2023).

Define Screen Time

- Screen time isn't "one thing"; its many things!
- Screen time is different across age bands.
- Screen time is meant to imply passive and non-educational activities such as mindlessly watching videos or shows, scrolling, or playing games with no constructive or positive benefit to development nor connection to real world application.
- Screen time is a total amount per day which includes use of screens during the school day for *passive* activities.



Screen Time Recommendations of the American Academy of Pediatrics

*Unless video chatting with parent or relative.

*via co-viewing high quality content

Does Screen Time "Definitively, Always" Negatively Impact Development?

- It depends.
  - What is being watched?
  - Why is the screen being used/what is it replacing (e.g., "opportunity cost")? What is the balance of screen use and other activities?
  - Is the child benefitting from the content?
  - Is someone …
    - …monitoring what is watched?
    - … tracking the length of time in front of screens?
    - … co-viewing and connecting what is watched with the real world?

Opportunity Costs and the Data on Screen Time

- Not all screen time is the same which means not all screen time is bad.

- Screen activities "COST" children the OPPORTUNITY to engage in conversation and developmentally appropriate play with others.

  - **Screen time diminishes the quantity and quality of interactions** between children and their parents, **resulting in fewer opportunities** for the child to practice and develop language (Mustonen, Torppa, & Stolt, 2022).

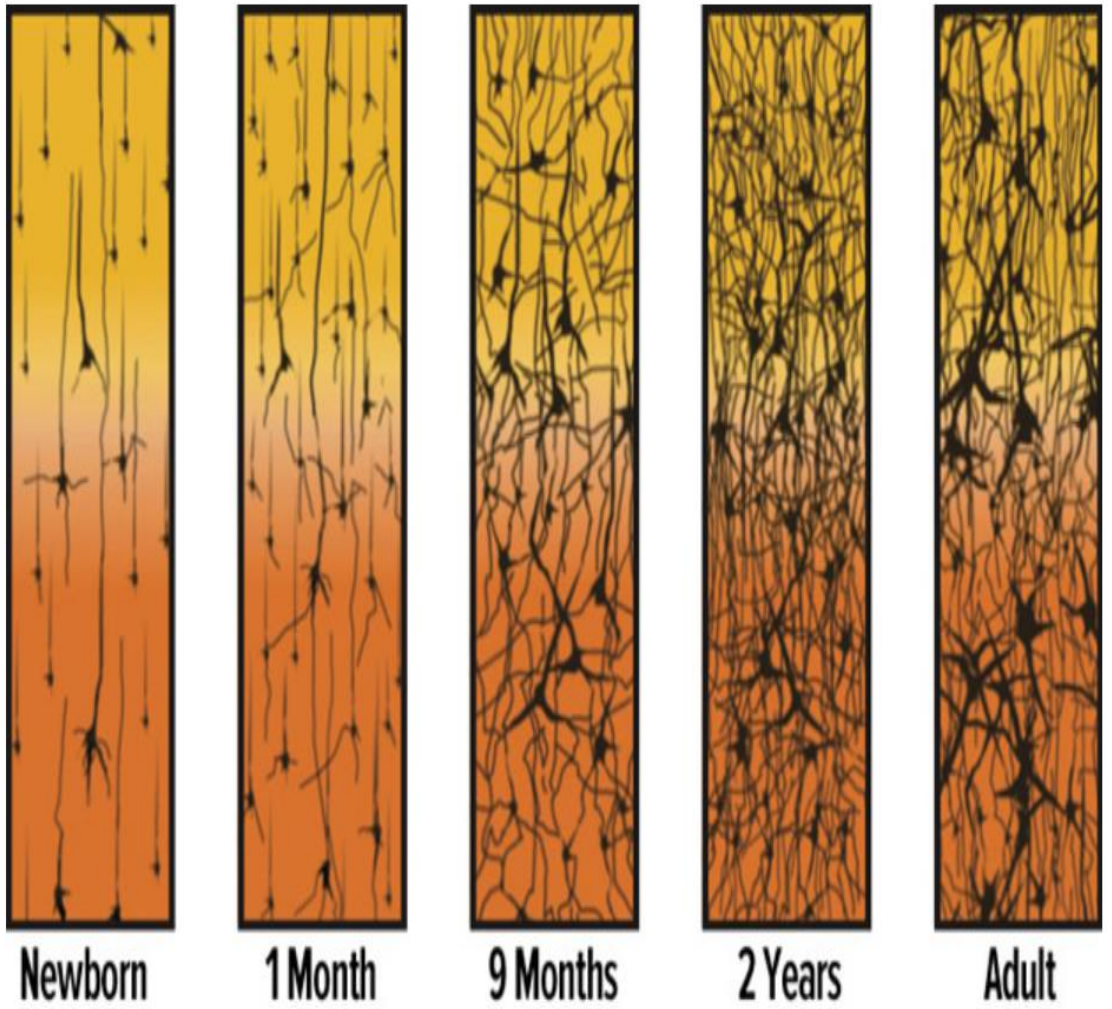
- Correlation vs. Causation.
  - The majority of the data regarding screen time is correlational (for good reason).

Critical Periods of Development

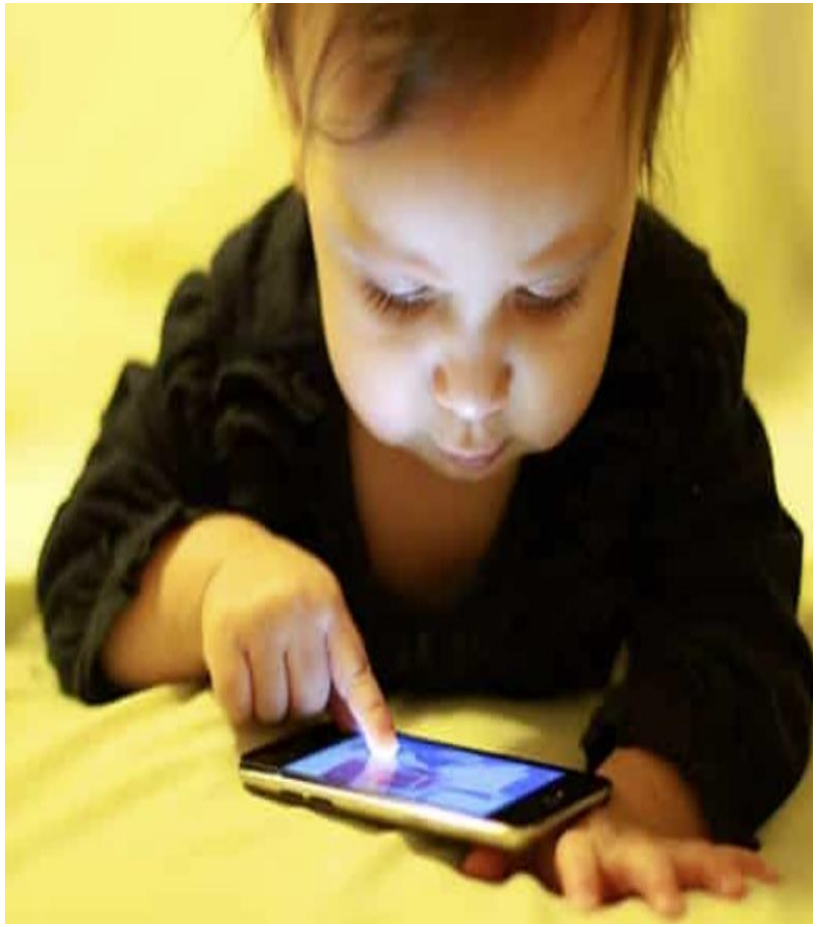
- At birth, a child's brain already has nearly all the neurons it will ever have, and it triples in size over the course of **the first three years** in response to what we learn from…

interactions with other people,
our environment,
and physical interaction with objects.

- The connections within the brain are formed at a **faster rate during these years than at any other time in the life of a human** and are extremely responsive to external stimuli (Huttenlocher, 2002).



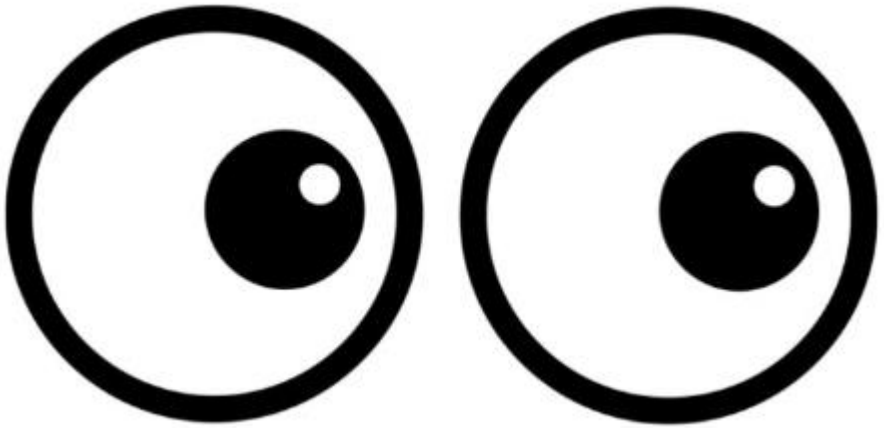
Between birth and age three all learning takes place
in a social context,
through our relationships with others;
it cannot be replicated any other way.



Screen use **before the age of 2** resulted in significantly lower emotional scores and higher risk of conduct problems,
learning problems,
and difficulties with impulsivity and hyperactivity –
independent of *excessive screen use*
(Xiang et al., 2022).

Visual Processing System

The reason why screens appear to calm children is because every bit of their brain is working to keep up with the pace of the visual stimuli.

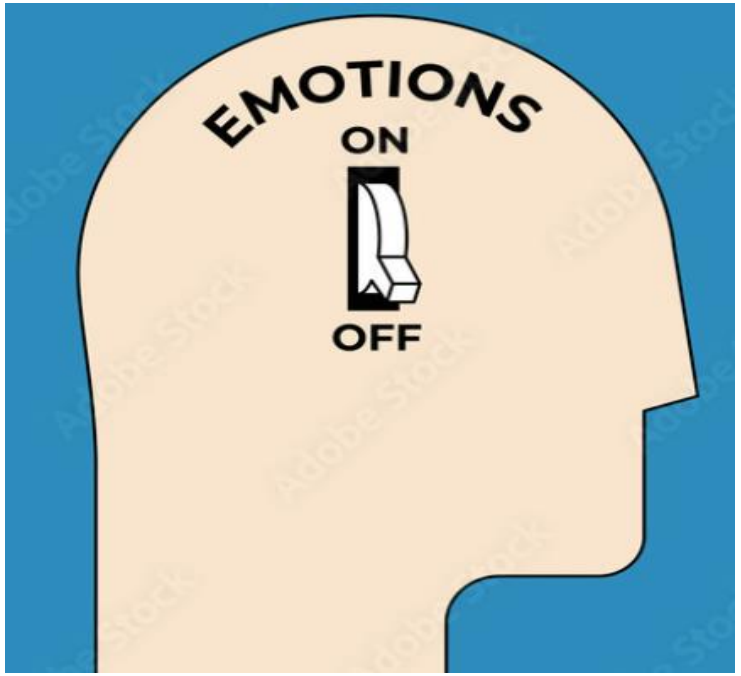


- The faster the visual content comes in, the harder the brain has to work to keep up.
- The visual processing system begins developing before the age of 2 but isn't fully developed until age 8 or 9.
- Repeated frequently, this changes the processing pace of the brain *making the normal pace of life uncomfortable* *(*see Overstimulation Hypothesis by Christakis)*

Vestibular System

The visual processing system is closely linked to the vestibular system which impacts mood (e.g., linear movement such as rocking and swinging is calming, and rotational movement such as spinning is arousing).

- When the visual processing system is **super-focused,** the vestibular system is **turned off** because all of the brain's energy is focused on processing at the same pace as the visual content.
- Once the hyperstimulating content is removed, the visual system is now super **UN**focused, and the vestibular system is **Un**locked (mood comes back on).
- To rebalance, it is helpful for children to do something physically active immediately after screen use.



But what about…

Educational Programs

*Screen changes every 3 seconds

- Children 12 months and younger are not able to follow the changing scenes on a screen or a program's dialog because they haven't learned the words, concepts, context and syntax.
- It is not until the age of around 18 months that a baby's brain has developed to the point where symbols on a screen begin to represent their equivalent in the real world.
- So, what's keeping them engaged?
  - The exciting colors, quick scene changes, the exciting music, stimulating sounds, and over exaggerated characters *which provide no educational or developmental benefit.*

Educational Apps

- Most apps have **no evidence of effectiveness,** target only rote academic skills, are not based on established curricula, and use little or no input from developmental specialists or educators (Chiong & Shuler, 2016; Christakis et al., 2013).
- Research shows that screens **do not make children learn faster or better than human interaction** (Teichert, 2020).
- Higher-order thinking skills and executive functions essential for school success, such as task persistence, impulse control, emotion regulation, and creative, flexible thinking, are **best taught and learned through unstructured and social (not digital) play** (Shaheen, S., 2015) **as well as responsive parent–child interactions** (Zelazo et al., 2011).

YouTube Videos

- For every 30-minute increase of screen time per day there is 2.3 times greater risk of language delay (van den Hewel, 2019).

- Children who watch videos before the age of 3 are more likely to have attention problems
  - **For every hour per day**, there is a 10% risk of attention problems than those children who never watched videos (Christakis, 2004, 2009).
  - 2 hours = 20% risk
  - 3 hours = 30% risk
  - 4 hours – 40% risk

But What About…

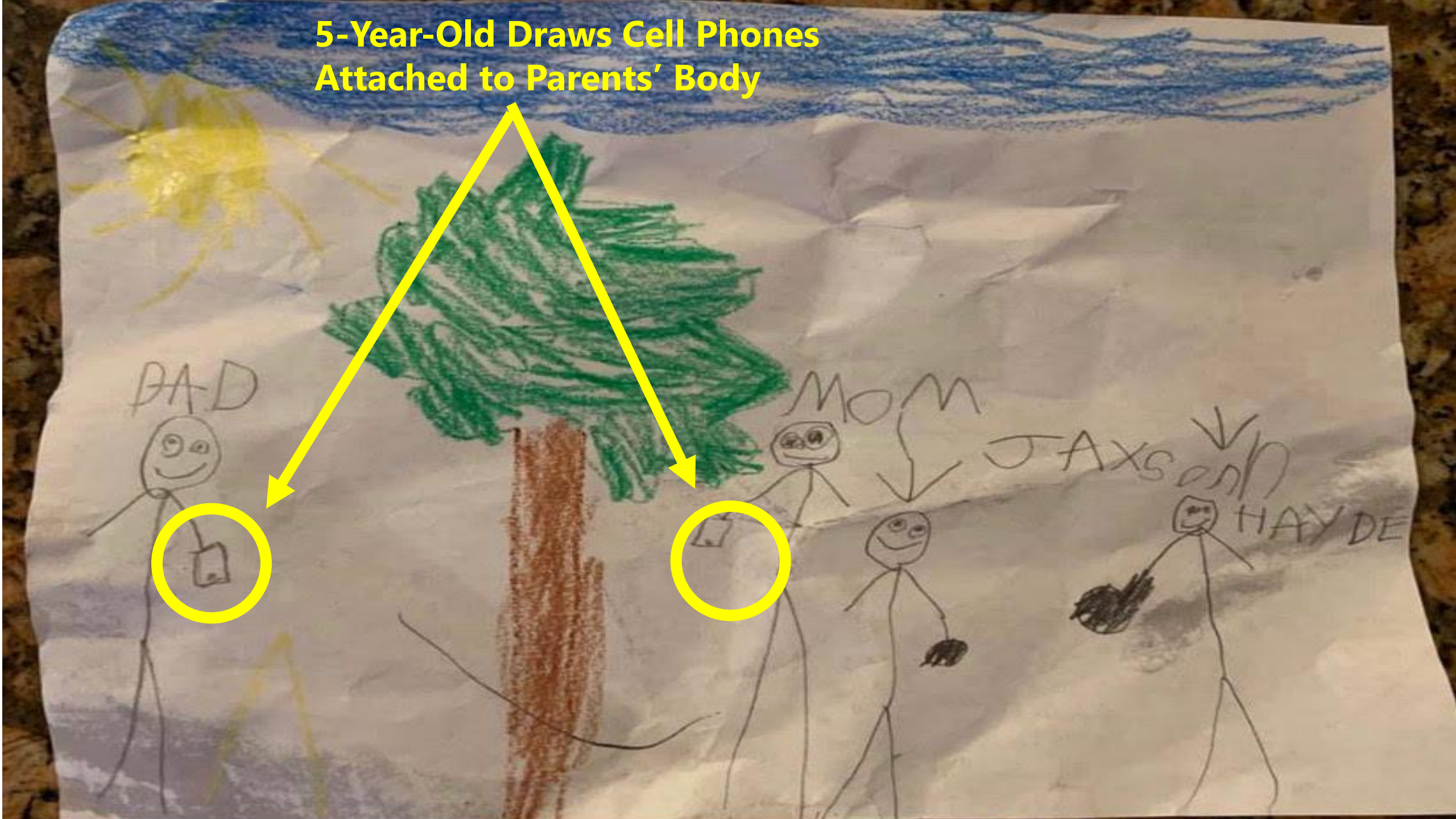
- Ms. Rachel and Speech Blubs are interactive and utilize many techniques used by pediatric Speech-Language Pathologists.

- Sesame Street was creating content for emotional regulation before it was “a thing”. Cookie Monster has an entire series dedicated just to emotional and self regulation.

Too much of a good thing

is no longer good.

What About Parental Screen Use?


5-Year-Old Draws Cell Phones
Attached to Parents' Body
DAD
MOM
JAXSON
HAYDE

Screen Time is "The New Secondhand Smoke"

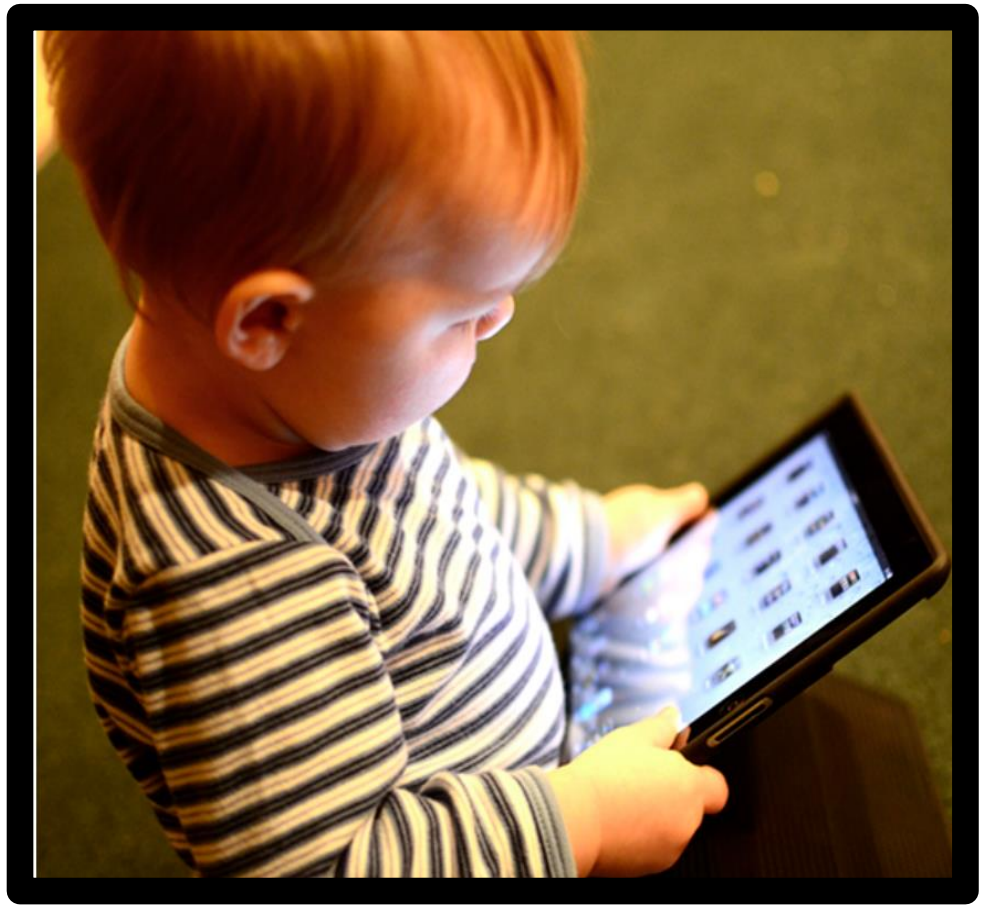
- In 2020, ASHA President Theresa H. Rodgers, published an op-ed in USA Today likening parental tech use to secondhand smoke in that it may "endanger children's health and development in ways we don't fully understand yet."
- 95% of parents say their tech use interferes with daily opportunities for talking, playing and interacting with their child (Common Sense Media, 2020).
- Excessive amounts of screen use **by the child and/or the parent** has a negative impact on play-based and other activities that enhance cognitive and social-emotional skills necessary for kindergarten readiness (Sigman, A., 2017; Pagani et al., 2010).
- Continuous partial attention: **being physically present, but emotionally disconnected**.

A Simple Guide for Adults for When to Use Digital Devices:

Would I read a book now?

What is the Opportunity Cost of Screen Time on Social Development?

Screen Time and Social Development



- Screen use by **children ages 3 to 5** can impact brain development in areas linked to language development, reading skills, **and social skills** such as complex memory encoding**, empathy, and understanding facial and emotional expressions** (Hutton et al., 2022).

- Neuronal pathways developed ***through audiovisual means*** compete with preferences for social processing (in children birth to two years of age) which **negatively affects development of social brain pathways** and cause global developmental delay (Heffler & Oestreicher, 2015).

Current research reports that increased hours spent screens as being associated with a higher chance of developmental disorders, *including Autism*

(Sarfraz, Shlaghya, & Narayana, 2023; Alrahili et al., 2021; Hu et al., 2020; Md Zaki Fadzil et al., 2020; Dehiol et al.,2022; Dieu-Osika et al., 2020; Chen et al. 2021; Bibi et al., 2022; Wu et al., 2017; Slobodan et al., 2019; Kushima et al., 2022).

However,…

Once excessive exposure was stopped there was a significant improvement in their symptoms

(Dehiol et al., 2022; Dieu-Osika et al., 2020).

Screen Time and Autism

- Screen time was positively correlated with the Childhood Autism Rating Scale **(CARS)** score in that the longer the screen time, the more obvious the autistic symptoms (Dong et al., 2021).

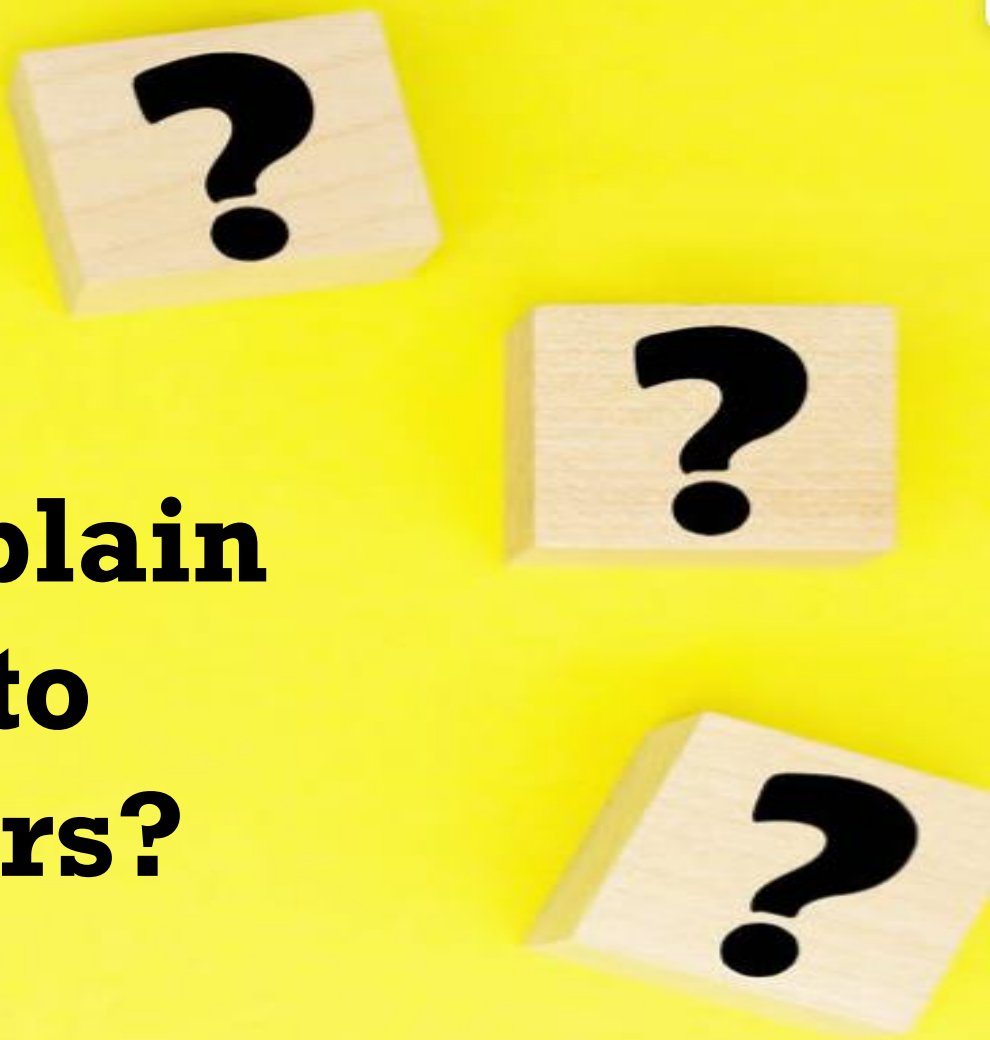
- High scores (≥15) on the Social Communication Questionnaire **(SCQ)** were significantly associated with screen time ($p < 0.05$) reflecting that prolonged exposure to screens is associated with poor social skill development and symptoms of ASD (Alrahili et al., 2021).

- Children who spent more than three hours or more hours watching screens impend a higher risk of developing ASD according to the Modified Checklist for Autism in Toddlers – Revised **(M-CHAT; R)** (Md Zaki Fadzil & Murad, 2020; Dikkala et al., 2022).

It is **not** that screens ***cause*** ASD,
but disproportionate digital interactions as opposed to human interactions during critical periods of development
can negatively impact
the development of …
social communication,
language, and
emotional regulation skills.

Sample of Supporting Research

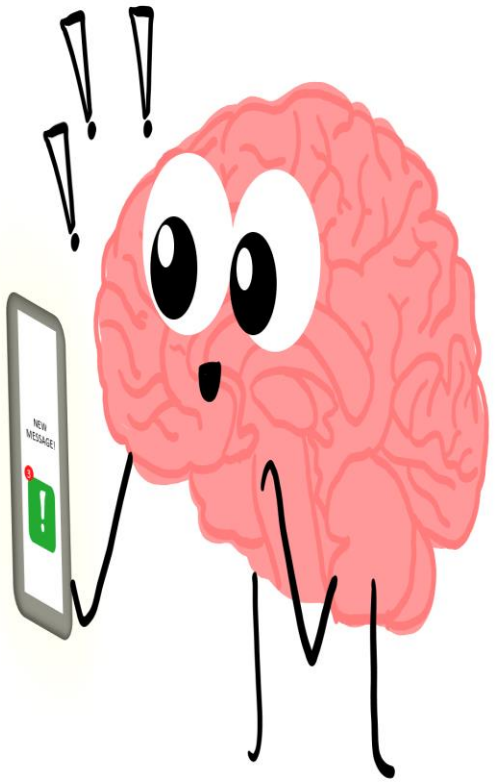
- The more screen time, the less social interaction (Stiglic & Viner, 2019; Taheri, M. 2013; Ray & Jat, 2010; Bickman & Rich, 2006).
- Screen exposure during 0-3 years of age was associated with the presence of autistic-like behaviors at preschool age *though frequency of caregiver-child interaction and sleep duration may function as potential mediators of this association* (Chen et al., 2020).
- Screen time during critical periods of development inhibits the development of neuronal social networks (Heffler et al., 2020; Heffler & Oestreicher, 2016; Slobodin, Heffler, & Davidovitch, 2019).
- Reduction in screen time and an increase in social interaction reduced autism severity in children with ASD-like symptoms (Sadeghi et al., 2019; Sadeghi et al., 2021).



How Can We Best Explain This Information to Parents and Teachers?

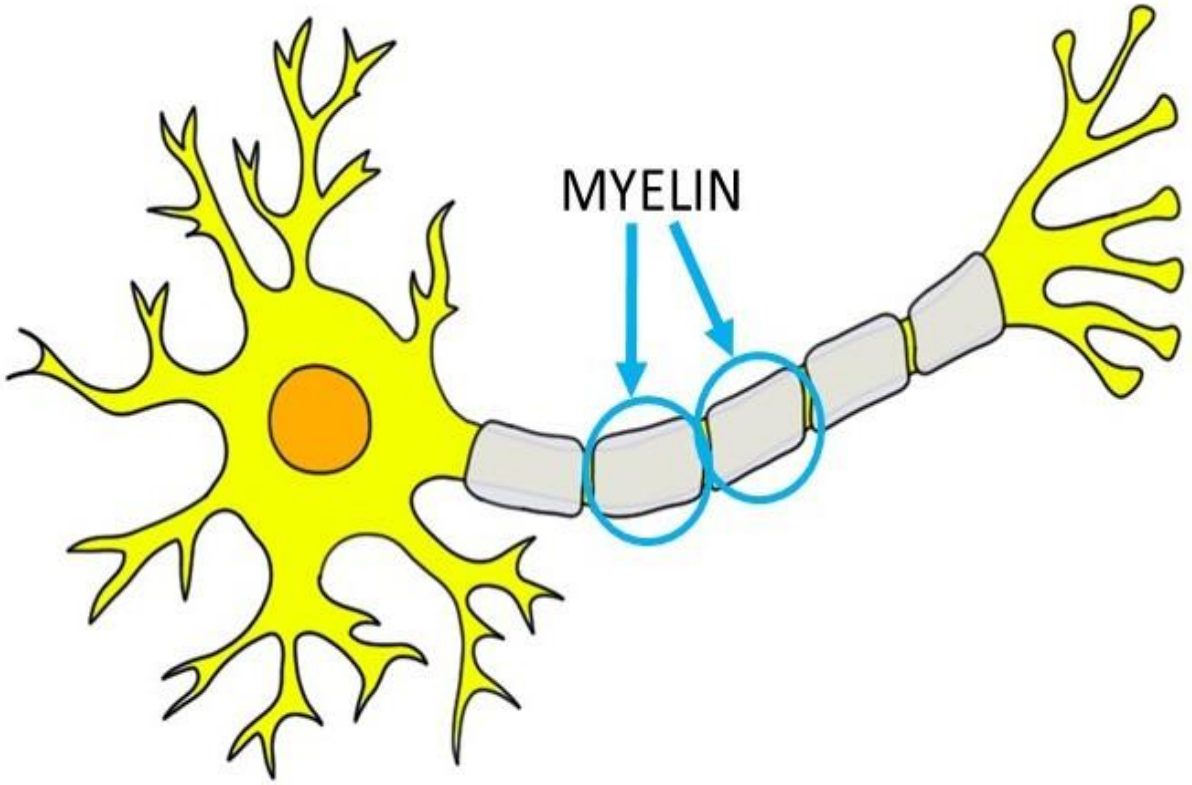
Dopamine and Serotonin

- *Dopamine* and *serotonin* function as neurotransmitters; a chemical released by neurons to send messages via myelin to other cells.
- Generally, *dopamine* is about **"wanting"** (what motivates us to pursue things we want)
- *Serotonin* is about **"having"** (being happy with what we have).
- Hyperstimulating digital technology floods the brain with an excessive amount of *dopamine* that humans haven't adapted to.
- As a result, there is an increased **craving** for more *dopamine* while producing less *dopamine* naturally which makes it harder to **experience joy from everyday experiences** (*serotonin*).



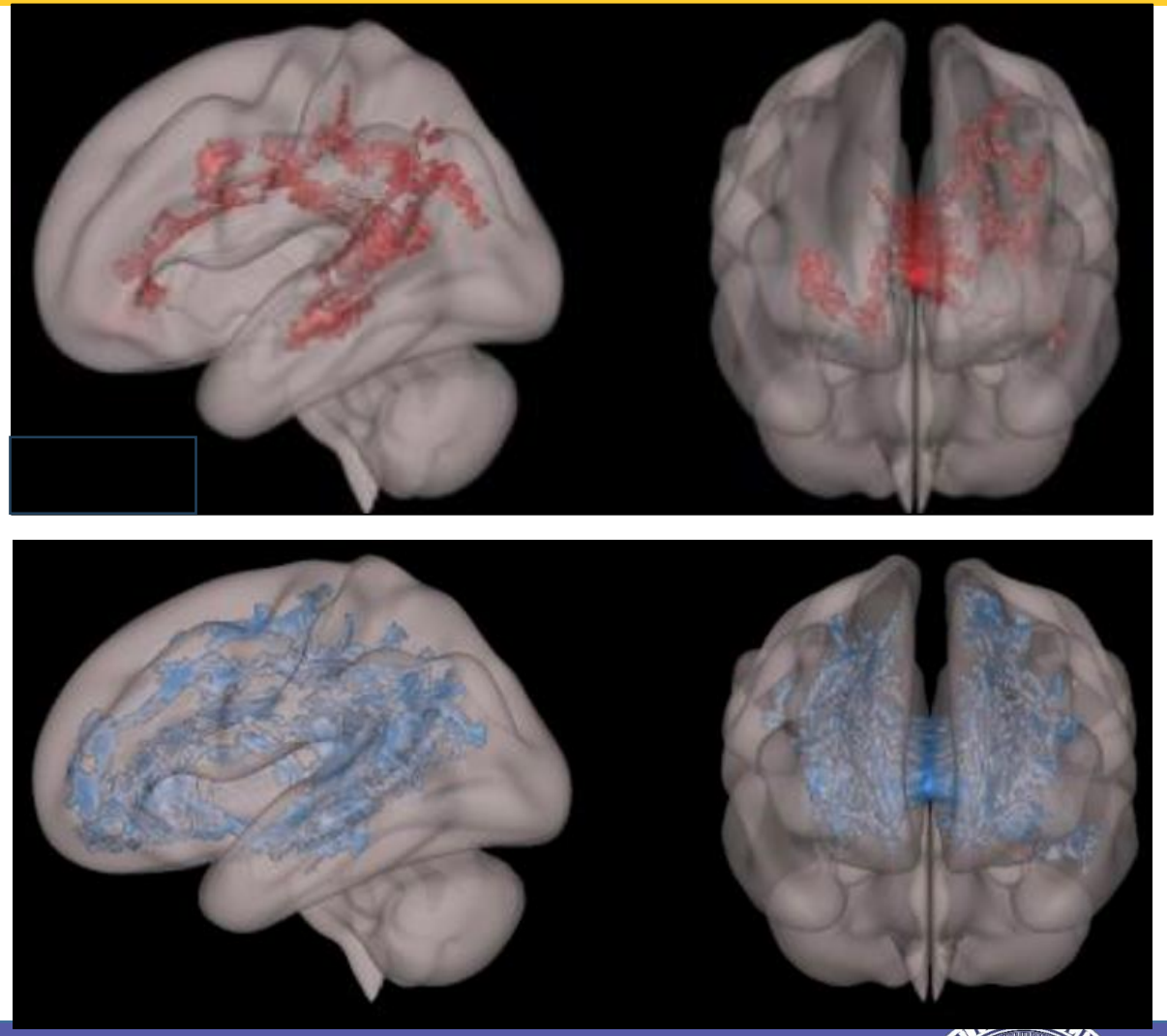
Myelin

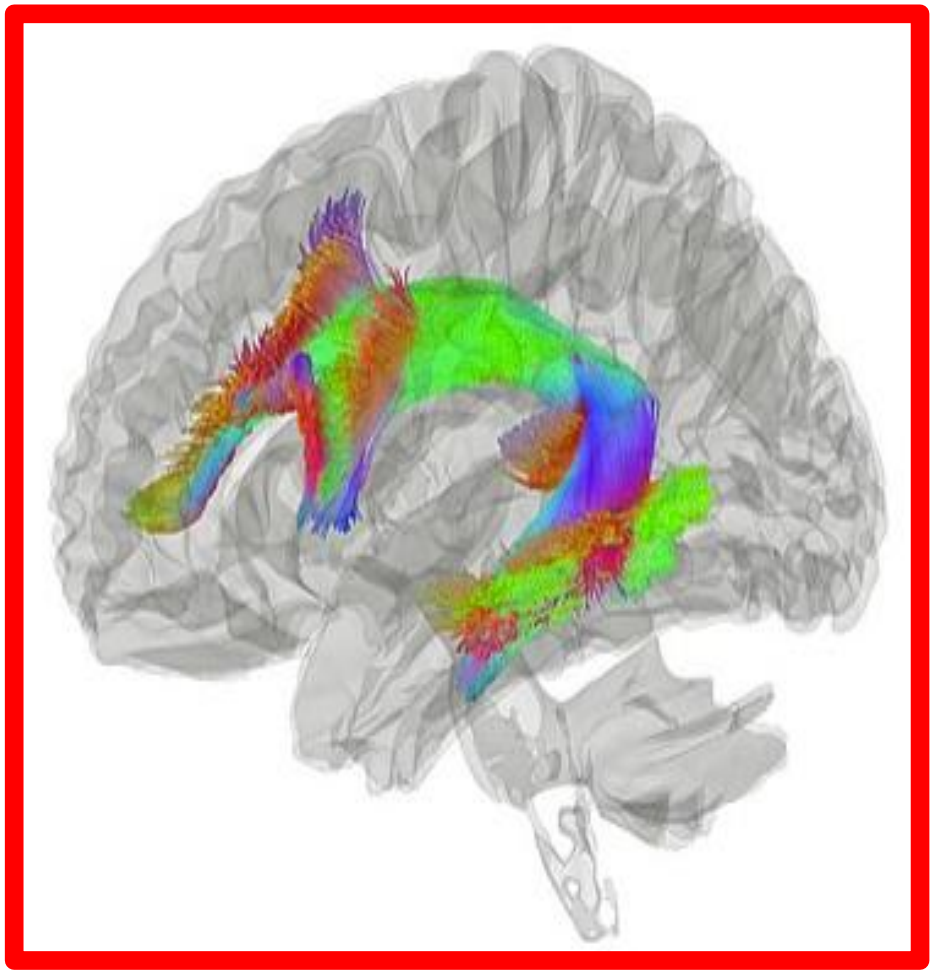
- Myelin forms a sheath around the synapses **(comparison to an electrical cord).**
- The brain cells that produce the cholesterol for myelination **are very easily damaged** by *"the wrong kind and wrong amount"* of stimulation including under stimulation and over stimulation.
- Synapses form based on early meaningful experiences.



To Learn is To Myelinate

- Myelin plays the essential role of making brain signals faster and stronger.
- A well-myelinated brain signal travels over 100 times faster than an unmyelinated brain signal.
- Bright brains are efficient brains, and efficiency comes from myelinating synapses.





Early stimulation sets the stage for how children will learn and interact with others throughout life. A child's experiences, good or bad, influence the wiring of their brain.

Loving interactions with caring adults stimulates brain development, causing synapses to grow **and** existing connections to get stronger. **Connections that are used become permanent.**

However, **if a child receives poor stimulation early on, the synapses will not develop, and the brain will make fewer connections** (Graham, J., 2011).

What can we do to support families and schools?

Strong evidence shows that **raising parents' awareness** and other straightforward actions may significantly lower children's screen time (Sigman, 2012).

Connect.

Co-view.

Converse.

Conversation is the "Secret Sauce"

Conversation is **the most efficient**
early-learning system we have
and far more valuable than most of the reading-skills
curricula we have been implementing.
During the preschool years, the focus should be on
talking and listening
not just vocabulary and reading (Christakis, 2016).

Clues That Screens May Be Becoming an Obstacle

1. Getting angry or upset when asked to turn off or put away screens
2. Insisting on more and more screen time
3. Spending time off screens thinking about how and when they will get back online
4. Preference for spending time on screens as opposed to with other humans
5. Use of technology as an escape from reality
6. Inability to calm or regulate emotion without technology
7. Deterioration of mental health or behavior (depression, anxiety, irritability, etc.)
8. Negative impacts on **sleep** or eating

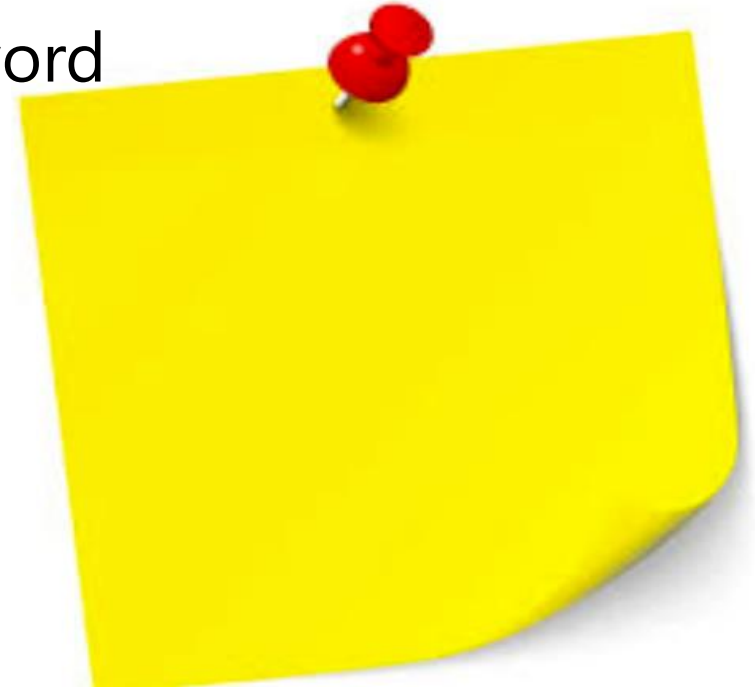
Screen Time Tips

1. Know the screen time recommendations
2. Understand “the why”
3. Watch for negative changes in behavior
4. Create tech free times and locations AND tech “possible” times and locations (as appropriate)
5. Be in control of the charger and/or password
6. Use and set up timers
7. Change device setting to grayscale
8. Plan ahead
9. Teach screen time etiquette
10. Balance screen time with other activities

Encouraging Conversation

- Even young children **who are not yet speaking** do engage in conversation in ways other than through words!

- Ask questions that cannot be answered with one word (e.g., **Tell me <u>three</u> things about your day**).



- Initiate conversations with…
  - I remember when…
  - Do you remember when…
  - I wonder if…
  - What do you think will happen if…

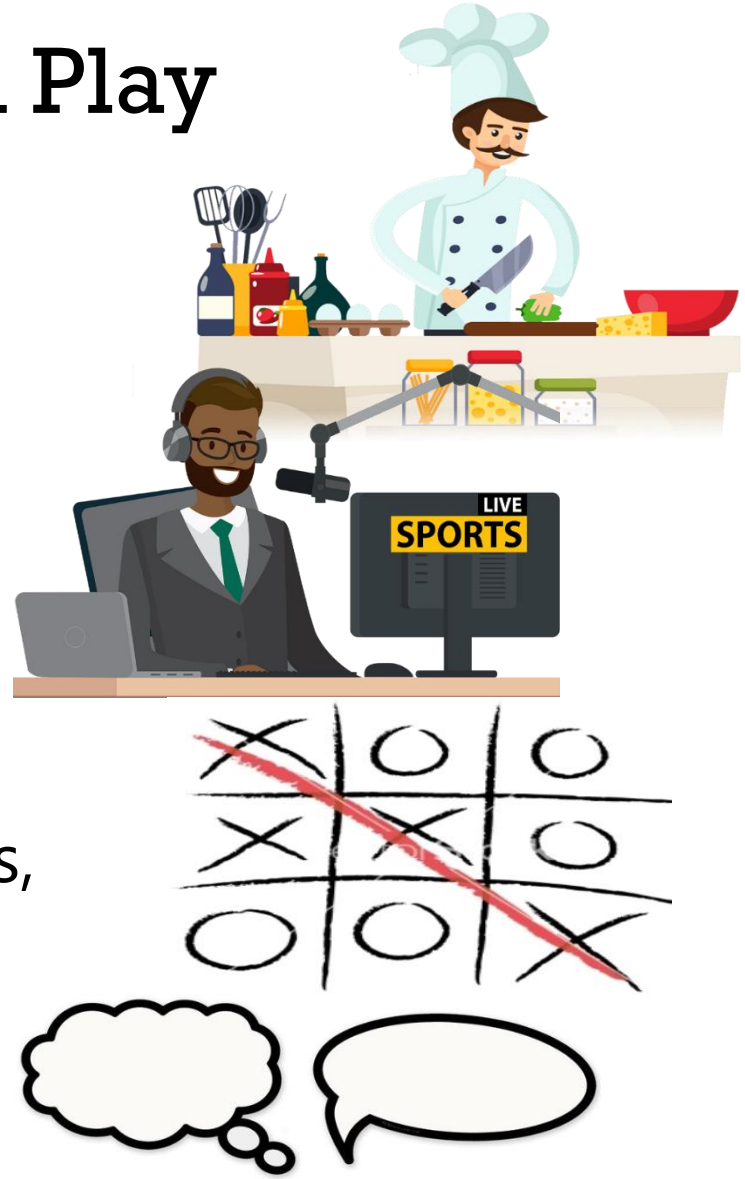
Supporting Language-Rich Play

- **Self-talk:** Describing what you are doing or how to do something (similar to how cooking show hosts talk to their audience).

- **Parallel talk:** Describing what the child is doing or should be doing (similar to how a sports broadcaster talks to their audience).

- **Play games:** Tic-Tac-Toe, Hide and Go Seek, board games, card games, sorting games, Rock Paper Scissors, Name That Tune, etc.

- **Think Out loud/Model:** problem solving and self-regulation.



Resources in the ASHA Leader

1. Tap 'Be Tech Wise' Resources to Help Families Manage Children's Screen Time
2. Screen Time: New Resource Helps Achieve a Healthy Balance
3. World Health Organization Recommends Against Screen Time for Infants
4. Help Families Find a Screen Time Balance
5. Guiding Families on Screen Time Recommendations

TOP 12 SCREEN TIME TIPS

1. KNOW THE LIMITS
2. KNOW "THE WHY"
3. TECH FREE TIMES
4. WHO IS IN CONTROL?
5. RED FLAGS
6. ADULTS TOO!
7. CONVERSATION
8. MAKE CONNECTIONS
9. PLAY
10. TALK
11. READ
12. PLAN

GROWING UP WITH TECH

TVs, tablets, smart phones, and computers, are part of our every day lives, but does that mean that they are safe for children? The American Academic of Pediatrics warns that excessive screen time can negatively impact a child's development, but why is that and what can we do in a world full of screens?

Play and conversation are the most important tools necessary for building a brain that will be ready for academic learning.

To be ready for academic learning, children need to...

- grow a large vocabulary,
- take turns in conversation,
- understand another person's perspective,
- attempt multiple ways to solve a problem,
- have task persistence,
- think about things outside of the "here and now",
- ignore distractions,
- manage their emotions,

...but none of these skills can be learned from a screen.

What About Educational Apps and YouTube Videos?

Most videos have a screen changes every 3 to 7 seconds. This trains the brain to seek out new and interesting content just as frequently. Most educational apps have no research to support that they lead to better academic outcomes and do not lead to applying skills in the real world. Videos and apps are also

recommends...

- No screen time for children birth to 18 months unless video chatting.
- Co-viewing of digital content for less than an hour a day for 18-24 month old children.
- No more than 1 hour per day for children ages 2 - 5 which includes time spent in front of screens at school for passive activites.

Conversation, play, and reading to your child are the best ways to grow a brain that is ready to learn!

For more information, contact Angie Neal, M.S.CCC-SLP - wordnerdspeech@gmail.com

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TALKING TIPS

ASK QUESTIONS THAT CANNOT BE ANSWERED WITH ONE WORD (E.G., TELL ME THREE THINGS ABOUT YOUR DAY).	START A CONVERSATION BY SAYING... I REMEMBER WHEN... DO YOU REMEMBER WHEN... I WONDER IF...	WAIT FOR THEM TO RESPOND. GIVE THEM UP TO 3 SECONDS.
(SIMILAR TO HOW COOKING SHOW HOSTS TALK TO THEIR AUDIENCE).	ASK QUESTIONS ABOUT WHAT THE CHILD IS INTERESTED IN OR IS DOING.	DESCRIBE WHAT THE CHILD IS DOING SUCH AS "I SEE THAT YOU ARE..." (SIMILAR TO HOW SPORTS BROADCASTER TALKS TO THEIR AUDIENCE).
	COMMENT ON WHAT OTHERS ARE DOING DURING PLAY... "HEY, DID YOU SEE WHAT ___ IS DOING WITH ___?"	WHEN YOUR CHILD IS UPSET SAY... "YOU LOOK LIKE YOU ARE FEELING ----------. HOW ABOUT SMELL THE FLOWERS (DEEP INHALE) AND BLOW OUT THE CANDLES (EXHALE)
TALK THROUGH WAYS TO SOLVE PROBLEMS... "I WONDER WHAT WOULD HAPPEN IF I TRIED TO..."	ASK THINKING QUESTIONS LIKE... IF YOU HAD $100 DOLLARS, WHAT WOULD YOU BUY? WHAT DO YOU THINK YOU WILL BE DOING IN 10 YEARS?	SOME OF THE BEST TIMES FOR CONVERSATION ARE: IN THE CAR/WHILE TRAVELING AROUND TOWN, DURING MEALS, BEFORE BED,

Question and Answer

Thank you for your time, attention, attendance, and for what you do for children every day!

If you'd like more information, please do not hesitate to reach out!

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Abbreviated list of references is available as a separate Word document.